



# AGENDA

## BOARD OF SUPERVISORS, COUNTY OF MONO STATE OF CALIFORNIA

Regular Meetings: The First, Second, and Third Tuesday of each month. Location of meeting is specified just below.

MEETING LOCATION Board Chambers, 2nd Fl., County Courthouse, 278 Main St., Bridgeport, CA 93517

### Regular Meeting March 7, 2017

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**TELECONFERENCE LOCATION:** Mammoth Lakes BOS Meeting Room, 3rd Floor Sierra Center Mall, 452 Old Mammoth Road, Mammoth Lakes, California, 93546; Board Members may participate from a teleconference location. Note: Members of the public may attend the open-session portion of the meeting from a teleconference location, and may address the board during any one of the opportunities provided on the agenda under Opportunity for the Public to Address the Board.

**NOTE:** In compliance with the Americans with Disabilities Act if you need special assistance to participate in this meeting, please contact the Clerk of the Board at (760) 932-5534. Notification 48 hours prior to the meeting will enable the County to make reasonable arrangements to ensure accessibility to this meeting (See 42 USCS 12132, 28CFR 35.130).

Full agenda packets are available for the public to review in the Office of the Clerk of the Board (Annex I - 74 North School Street, Bridgeport, CA 93517). Any writing distributed less than 72 hours prior to the meeting will be available for public inspection in the Office of the Clerk of the Board (Annex I - 74 North School Street, Bridgeport, CA 93517). **ON THE WEB:** You can view the upcoming agenda at <http://monocounty.ca.gov>. If you would like to receive an automatic copy of this agenda by email, please subscribe to the Board of Supervisors Agendas on our website at <http://monocounty.ca.gov/bos>.

***UNLESS OTHERWISE SPECIFIED BY TIME, ITEMS SCHEDULED FOR EITHER THE MORNING OR AFTERNOON SESSIONS WILL BE HEARD ACCORDING TO AVAILABLE TIME AND PRESENCE OF INTERESTED PERSONS. PUBLIC MAY COMMENT ON AGENDA ITEMS AT THE TIME THE ITEM IS HEARD.***

9:00 AM Call meeting to Order

Pledge of Allegiance

#### 1. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD

on items of public interest that are within the subject matter jurisdiction of the Board. (Speakers may be limited in speaking time dependent upon the press of business and number of persons wishing to address the Board.)

**2. APPROVAL OF MINUTES**

**A . Board Minutes**

Departments: Clerk of the Board

Approve minutes of the Regular Meeting held on February 7, 2017.

**B . Board Minutes**

Departments: Clerk of the Board

Approve minutes of the Regular Meeting held on February 14, 2017.

**C . Board Minutes**

Departments: Clerk of the Board

Approve minutes of the Special Meeting held on February 15, 2017.

**D . Board Minutes**

Departments: Clerk of the Board

Approve minutes of the Regular Meeting held on February 21, 2017.

**3. RECOGNITIONS - NONE**

**4. BOARD MEMBER REPORTS**

The Board may, if time permits, take Board Reports at any time during the meeting and not at a specific time.

**5. COUNTY ADMINISTRATIVE OFFICE**

CAO Report regarding Board Assignments

Receive brief oral report by County Administrative Officer (CAO) regarding work activities.

**6. DEPARTMENT/COMMISSION REPORTS**

**7. CONSENT AGENDA**

(All matters on the consent agenda are to be approved on one motion unless a board member requests separate action on a specific item.)

**A. Mono County Children's Medical Services (CMS) Plan Fiscal Year 2016-2017**

Departments: Health Department

Proposed contract with California Department of Health Care Services (DHCS) Children's Medical Services (CMS) branch pertaining to the CMS Plan Fiscal Year 2016-2017.



**Recommended Action:** Approve County entry into proposed contract with DHCS and authorize the BOS Chairperson to execute said contract on behalf of the County through signing the California Children Services (CCS) and Child Health and Disability Prevention Program (CHDP) Certification Statements.

**Fiscal Impact:** There is zero impact to the Mono County General Fund. These programs are funded with a mix of Federal Title XIX (Medicaid), Federal Title XXI funds, State General Fund, and Realignment dollars totaling \$252,558.

**B. 2017-2018 Boating Safety and Enforcement Financial Aid Program Agreement Board Resolution**

Departments: Mono County Sheriff's Office

2017-2018 Boating Safety and Enforcement Financial Aid Program Agreement Resolution.

**Recommended Action:** Adopt Resolution #17-\_\_ authorizing Mono County's participation in the FY 2017-2018 Boating Safety and Enforcement Financial Aid Program Agreement and designating the Sheriff-Coroner, Emergency Services Coordinator, and the Sheriff's Finance Officer as authorized agents to sign for and administer Boating Safety and Enforcement Financial Aid Program Agreement. Provide any desired direction to staff.

**Fiscal Impact:** This resolution will assist with meeting the program guidance for participation in the Boating Safety and Enforcement Financial Aid Program Agreement for Fiscal Year 2017-2018. When the agreement is awarded, the award will not exceed \$131,065.00. There is no match requirement for this grant.

**C. Treasury Transaction Report for 1/31/2017**

Departments: Finance

Treasury Transaction Report for the month ending 1/31/2017.

**Recommended Action:** Approve the Treasury Transaction Report for the month ending 1/31/2017.

**Fiscal Impact:** None.

**D. Safety Seat Checkup Proclamation**

Departments: Clerk of the Board

Stephanie M. Tombrello, LCSW, Executive Director, SafetyBeltSafe USA, has requested the Board adopt a proclamation recognizing the week of April 2 - April 8, 2017, as Safety Seat Checkup Week.

**Recommended Action:** Approve proposed

proclamation. **Fiscal Impact:** None.

**E. Wheeler Crest Design Review Committee Appointments**

Departments: Community Development-Planning

Consider Supervisor Stump's recommendations regarding reappointment of one new member and one existing member to the Wheeler Crest Design Review Committee.

**Recommended Action:** Appoint one new member, Bob Weiland, and re-appoint one existing member, Judy Beard, to the Wheeler Crest Design Review Committee, as recommended by Supervisor Stump.

**Fiscal Impact:** No fiscal impacts are expected.

**F. Appointments in Lieu of Election**

Departments: Clerk of the Board

Appointment of Directors of Special Districts in Lieu of Election. The following Special Districts have vacancies to be filled: Birchim Community Services District and Wheeler Crest Community Services District. These Special Districts have submitted names for appointment/reappointment, as outlined in the staff report. These terms will expire on 11/30/2020. The Board of Supervisors is the governing body under Elections Code Section 10515 to make these appointments.

**Recommended Action:** Appoint Robin Davis to Birchim Community Services District and William Dunlap to Wheeler Crest Community Services District, as recommended, to fill special district board vacancies.

**Fiscal Impact:** None.

**G. Change to Allocation List for Public Health Department**

Departments: Finance, Public Health

Proposed resolution amending the allocation list to reflect an increase to the full time equivalent (FTE) of the Director of Nursing from 0.8 FTE to 0.9 FTE in the Public Health Department.

**Recommended Action:** Adopt proposed resolution #R17-\_\_, amending the Allocation List to reflect an increase to the full time equivalent (FTE) of the Director of Nursing from 0.8 FTE to 0.9 FTE in the Public Health Department.

**Fiscal Impact:** The additional cost of this FTE increase is \$4,762 (\$2,797 for salary and \$1,965 for benefits) for the remainder of FY 16/17 and this amount was included in the department's mid-year budget request that was approved on February 21, 2017. The annual cost of this FTE increase is \$8,670 (\$4,983 for salary and \$3,687 for benefits).

8.

All items listed are located in the Office of the Clerk of the Board, and are available

review. Direction may be given to staff regarding, and/or the Board may discuss, any item of correspondence listed on the agenda.

**A. Letter from Terry Lee re Immigration**

Departments: Clerk of the Board

Letter from Terry Lee of Swall Meadows regarding concerns over immigration enforcement.

**B. Letter from Craig Schrager re Sierra Center**

**Mall** Departments: Clerk of the Board

Letter from Craig Schrager DDS to the Board of Supervisors regarding his experience as a tenant at Sierra Center Mall.

**9. REGULAR AGENDA - MORNING**

**A. Update on Racial & Ethnic Disparity Grant**

Departments: Probation and Behavioral Health 20 minutes (15 minute presentation; 5 minute discussion)

(Karin Humiston, Robin Roberts, Stacie Casabian, Jazmin Puga-Sosa, Sal Montenez, Sofia Flores) - Presentation by Karin Humiston and Robin Roberts regarding update of the Racial and Ethnic Disparity Grant and review of future changes.

**Recommended Action:** None (informational only). Provide any desired direction to staff.

**Fiscal Impact:** None

**B. Review of Need for Continuation of Local Emergency**

10 minutes (5 minute presentation; 5 minute discussion)

(Leslie Chapman, Ingrid Braun) - On January 31, 2017 the Mono County Sheriff declared a state of local emergency as a result of extreme winter weather. The Board of Supervisors ratified this declaration on February 7, 2017, and further declared a continuing state of emergency. Mono County Code Section 2.60.080 requires that the Board of Supervisors review the need for continuing the local emergency every 14 days, and Government Code section 8630 requires that the Board review the need at least every 30 days until it is terminated. This item is provided for that purpose.

**Recommended Action:** Review need for continuing the local emergency. If Board determines that need no longer exists, direct staff to prepare a declaration terminating local emergency.

**Fiscal Impact:** None

## C. General Plan Amendments

Departments: CDD

PUBIC HEARING: 10:00 A.M.

(Gerry Le Francois and Nick Criss) -

Conduct a public hearing on General Plan Amendment 17-01, Part A and Part B (originally identified as 16-00020). Following the public hearing and discussion, adopt Resolution 17-\_\_ approving addenda to the 2015 General Plan Final Environmental Impact Report and adopting General Plan Amendment 17-01 Part A, Annual Update and Part B, Land Use Element Chapter 25 Revisions Regarding Transient Rentals (originally identified as 16-00020).

The 2015 General Plan Final Environmental Impact Report is too large to attach and can be accessed at the following link:

<https://monocounty.ca.gov/planning/page/general-plan-eir>

### **Recommended Action: GENERAL PLAN AMENDMENT 16-00020(a):**

1. Change Land Use Designation (LUD) of former Mountain Gate property from Rural Residential (RR) 5 & 10 to Open Space (OS) (affected APNs 002-140-033, 002-490-002, -007, -008 & -011 are owned by Mono County); 2. Change LUD for Walker Behavioral Health property from Mixed Use 1-acre minimum to Public Facility (PF) (APN is 002-361-012 and is owned by Mono County); 3. Change LUD for Public Works property at West Walker River/North River Lane from Estate Residential (ER) to Public Facility (PF) (APN is 002-310-056); 4. Change LUD of Walker tennis courts from Estate Residential to Public Facility (APNs are 002-362-008 & -009); 5. Change LUD on various FEMA properties along North River Lane and Meadow Drive from Estate Residential (ER) to Open Space (OS) (APNs are 002-290-005, 006, 007, 002-300-002, 002-310-001, -009, -038, -037, -035, and 002-343-005); 6. Change LUD on APN 002-450-014 Antelope Valley Fire Station from Agricultural 10 (AG10) to Public Facilities (PF); 7. Add policy to Land Use Element, Antelope Valley Plan as follows: The RPAC endorses the use of FEMA/County properties on N. River Road and Meadow Lane as open space, without development for public improvements and facilities until 2041; 8. Change setback in Mixed Use district for residential uses from 0 feet to 10 feet; 9. Specify that a General Plan Amendment initiated by a private landowner must go before the Board of Supervisors for approval if the GPA is a major policy change with potential significant impacts countywide; and 10. Amend Chapter 16, Accessory Dwelling Units, to comply with AB2200 and SB1069. **GENERAL PLAN AMENDMENT 16-00020(b):** Revise General Plan Land Use Element Chapter 25 concerning transient rentals. Highlights of the recommended changes include: establish a process to permit transient rentals in residential areas if specific proposals are compatible with applicable area plans, extend noticing requirements for public hearings to 30 days, define Type I rentals as owner-occupied properties and set Use Permit Process for approval, define Type II rentals as vacant properties with off-site management and set a General Plan Amendment process for approval, require Vacation Home Rental Permits (Ch. 26) for both Type I and Type II rentals, eliminate solicitation of multi-parcel applications or setup of districts, focus on standard for approval as lack of reasonable opposition by neighbors directly affected rather than neighborhood support, and clarify "neighbor."

**D. Presentation on Sierra Nevada Bighorn Sheep**

1.5 hours (30 minute presentation; 1 hour discussion)

(CA DFW staff and USFWS staff) - Presentation by CA DFW and USFWS regarding Sierra Nevada Bighorn Sheep Recovery efforts.

**Recommended Action:** None (informational only). Provide any desired direction to staff.

**Fiscal Impact:** None.

10. **OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD** on items of public interest that are within the subject matter jurisdiction of the Board. (Speakers may be limited in speaking time dependent upon the press of business and number of persons wishing to address the Board.)

11. **CLOSED SESSION**

**A . Closed Session--Human Resources**

CONFERENCE WITH LABOR NEGOTIATORS. Government Code Section 54957.6. Agency designated representative(s): Stacey Simon, Leslie Chapman, Dave Butters, Janet Dutcher, and Anne Larsen. Employee Organization(s): Mono County Sheriff's Officers Association (aka Deputy Sheriff's Association), Local 39--majority representative of Mono County Public Employees (MCPE) and Deputy Probation Officers Unit (DPOU), Mono County Paramedic Rescue Association (PARA), Mono County Public Safety Officers Association (PSO), and Mono County Sheriff Department's Management Association (SO Mgmt). Unrepresented employees: All.

**B . Closed Session - Existing Litigation**

Departments: County Counsel

CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION. Paragraph (1) of subdivision (d) of Government Code section 54956.9. Name of case: Czeschin v. County of Mono; administrative citation appeal (Mono County Superior Court Case No. CV 170001).

**C . Closed Session - Real Property Negotiations**

CONFERENCE WITH REAL PROPERTY NEGOTIATORS. Government Code section 54956.8. Property: Sierra Center Mall, Mammoth Lakes. Agency negotiators: Leslie Chapman, Janet Dutcher, Tony Dublino, Stacey Simon. Negotiating parties: Mono County and Highmark Mammoth Investments, LLC. Under negotiation: Price and terms of payment.

12. **REGULAR AGENDA - AFTERNOON**

**A. Direction to Staff re Conway Ranch Request for Grazing Proposals** Departments: Public Works; CAO 2.5 hours (15 minute presentation; 2.25 hour discussion)

(Tony Dublino) - Presentation by Tony Dublino regarding potential issuance by County of a Request for Proposals for Grazing at Conway Ranch.

**Recommended Action:** Receive presentation and provide direction to staff regarding the issuance of an RFP for grazing on Conway Ranch, including, but not limited to, one of the following options: 1. Direct staff to prepare RFP for sheep grazing at Conway and Mattly Ranch. Any such proposal will require indemnification as well as applicant funding of any necessary CEQA. Once prepared, present to Board for approval, posting and publishing. 2. Direct staff to prepare RFP for cattle grazing at Conway and Mattly Ranch. Any such proposal will require indemnification as well as applicant funding of any necessary CEQA. Once prepared, present to Board for approval, posting and publishing. 3. Do not direct staff to prepare an RFP – allow current grazing lease to expire without subsequent lease in place.

**Fiscal Impact:** None at this time.

**B. State Transportation Funding Legislation Update**

Departments: Public Works - Roads 30 minutes (10 minute presentation; 20 minute discussion)

(Garrett Higerd) - Two competing bills have been introduced in the California state legislature to address the transportation funding crisis that has been worsening over recent years. Draft letters have been prepared in support of both bills and attached for consideration.

**Recommended Action:** Receive update on SB 1 (Beall) & AB 1 (Frazier) the “Transportation Funding and Reform Act” and AB 496 (Fong) the “Traffic Relief and Road Improvement Act”. Consider approval of a letter of support for one of the proposed bills – potentially with recommended amendments. Provide direction to staff.

**Fiscal Impact:** None at this time. However, if signed into law, both proposals would significantly increase funding to maintain and improve local streets and roads and state highways. SB 1 (Beall) & AB 1 (Frazier) would be primarily funded by increases to state gas tax, vehicle registration fees, and diesel taxes and a partial restoration of weight fee diversions and partial loan repayments. AB 496 (Fong) would primarily be funded by weight fee diversions, loan repayments, vehicle sales and use taxes, and vehicle insurance taxes that are currently diverted to the state General Fund to pay for services like public health and human services.

**C. Request for Letter of Support for**

**AB174** Departments: Public Works -  
Roads 5 minutes

(Garrett Higerd) - Assemblyman Bigelow, along with a bipartisan coalition, introduced AB 174, which requires one voting member of the California Transportation Commission to reside in a county with a population of less than 100,000. Currently, the California Transportation Commission consists of 11 voting members. There are no requirements to fill these positions. This bill will ensure the voices of small, rural California counties are heard and will give our communities a needed seat at the table. This item is sponsored by Supervisor Johnston.

**Recommended Action:** Approve proposed letter of support for AB174 and authorize Chair to sign on behalf of the County. Provide any desired direction to staff.

**Fiscal Impact:** None.

**ADJOURN**



**OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS**

**REGULAR AGENDA REQUEST**

Print

**MEETING DATE** March 7, 2017

**Departments: Clerk of the Board**

**TIME REQUIRED**

**SUBJECT** Board Minutes

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

**AGENDA DESCRIPTION:**

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Approve minutes of the Regular Meeting held on February 7, 2017.

**RECOMMENDED ACTION:**

**FISCAL IMPACT:**

**CONTACT NAME:** Helen Nunn

**PHONE/EMAIL:** x5534 / hnunn@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

**SEND COPIES TO:**

**MINUTE ORDER REQUESTED:**

YES  NO

**ATTACHMENTS:**

<p>Click to download</p> <p> <a href="#">Draft Minutes</a></p>
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**History**

Time	Who	Approval
3/1/2017 4:50 AM	County Administrative Office	Yes
2/28/2017 4:24 PM	County Counsel	Yes
3/1/2017 5:29 PM	Finance	Yes





**DRAFT MEETING MINUTES  
BOARD OF SUPERVISORS, COUNTY OF MONO  
STATE OF CALIFORNIA**

Regular Meetings: The First, Second, and Third Tuesday of each month. Location of meeting is specified just below.

MEETING LOCATION Board Chambers, 2nd Fl., County Courthouse, 278 Main St., Bridgeport, CA 93517

**Regular Meeting  
February 7, 2017**

<b>Flash Drive</b>	<b>Board Room Recorder</b>
<b>Minute Orders</b>	<b>M17-21 to M17-34</b>
<b>Resolutions</b>	<b>R17-09 to R17-11</b>
<b>Ordinance</b>	<b>ORD17-03 not used</b>

9:09 AM Meeting Called to Order by Chairman Corless.

*Supervisors present in Bridgeport: Gardner and Peters  
Supervisors present in Mammoth: Corless, Johnston, and Stump  
Supervisors absent: None*

*\*all votes done by roll call vote, facilitated by the Clerk of the Board*

*Break: 10:52 a.m.  
Reconvene: 11:06 a.m.  
Lunch: 11:53 a.m.  
Reconvene: 1:02 p.m.  
Adjourn: 2:48 p.m.*

**The Mono County Board of Supervisors stream all of their meetings live on the internet and archives them afterward. To listen to any meetings from June 2, 2015 forward, please go to the following link:**  
<http://www.monocounty.ca.gov/meetings>

Pledge of Allegiance led by Supervisor Peters

**1. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD**

**Gary Nelson, Mono City:**

- Had previously attempted to secure 2 lots at the Mono City Cemetery. It's been years and he

**Note:**

**These draft meeting minutes have not yet been approved by the Mono County Board of Supervisors**

still has not been able to secure those lots. Would like to see improvements to the parks and roads. Feels Mono City road is dangerous for the kids in the area to ride their bikes on.

## 2. APPROVAL OF MINUTES

### A. Board Minutes

Departments: Clerk of the Board

Approve minutes of the Regular Meeting held on December 13, 2016, as corrected.

**Johnston moved; Stump seconded**

**Vote: 3 yes; 0 no; 2 abstain: Gardner and Peters**

**M17-21**

**Supervisor Corless:**

- Page 10, first sentence should read "This does not affect recreational and medical use of marijuana".
- Page 10, spelling of Jeff "Gunzick".

### B. Board Minutes

Departments: Clerk of the Board

Approve minutes of the Special Meeting held on December 20, 2016.

**Stump moved; Johnston seconded**

**Vote: 3 yes; 0 no; 2 abstain: Gardner and Peters**

**M17-22**

### C. Board Minutes

Departments: Clerk of the Board

Approve minutes of the Regular Meeting held on January 3, 2017, as corrected.

**Johnston moved; Peters seconded**

**Vote: 5 yes; 0 no**

**M17-23**

**Supervisor Johnston:**

- Page 7, please note on item 9a that Supervisor Stump had to leave prior to the vote.

### D. Board Minutes

Departments: Clerk of the Board

Approve minutes of the Regular Meeting held on January 17, 2017.

**Peters moved; Gardner seconded**

**Vote: 5 yes; 0 no**

**M17-24**

## 3. RECOGNITIONS - NONE

## 4. BOARD MEMBER REPORTS

**Note:**

These draft meeting minutes have not yet been approved by the Mono County Board of Supervisors

**Supervisor Corless:**

- RCRC meeting highlights: Fire Memorandum of Understanding update from CALFire Chief Ken Pimlott and Craig Thomas of Sierra Forest Legacy, effort to use more fire in forest mgt. Invited them to come to Mono County to present MOU information.
- Sunne McPeak/CA Emerging Technologies Fund also came seeking support for legislation to continue CASF/broadband funding...
- Stepping Up Initiative: Team Mono (CAO, Sheriff, DABH Director) attended conference with representatives from 50 or so California counties, focused on national effort to reduce mental illness in jails. Inspiring conference, looking forward to follow
- Storm: Major impacts in Old Mammoth, including structural damage (red-tagging) to apartment buildings
- Collaborative Planning Team: Update from Caltrans on District 9 issues/storm response, down personnel and equipment. HWY 108 restriction is in place. Other staffing updates from BLM and US Fish and Wildlife. Presentation from Steve Nelson/BLM on Ormat CDIV monitoring plan that was approved in January (related to letter of support on today's agenda). Eastern Sierra Land Trust presented on the Regional Conservation Partnership Award program—great opportunity for local ranchers.
- Meeting w/City of Bishop re: ESCOG and broadband consortium issues, will be addressed at Feb. 17 ESCOG meeting in Bishop
- Meeting w/Lynda Salcido, Bob Rooks, Supervisor Stump re: Emergency Medical Svcs, workshop happening on Feb. 15.
- State PILT request from RCRC: In 2015, RCRC aggressively advocated for the \$8 million in past due State Payment in Lieu of Taxes (PILT) monies owed by the California Department of Fish and Wildlife through the State Budget process. Advocacy continues this year, RCRC is asking for a letter of support from counties, will bring this item to the board soon

**Supervisor Gardner:**

- I attended the CSAC seminar on short term rentals in Sacramento. It was very informative with information from other counties which are dealing with this issue. CSAC will be providing information useful to us as we consider this issue in the future.
- I also attended the Eastern Sierra Agency Advisory on Aging meeting in Bishop. This group provides advice for senior programs in Inyo and Mono County. It was useful to get information on the services we provide to our seniors and the impact they have on their quality of life.
- I received a briefing from our First Five Commission Executive Director. Again, it was very interesting to hear about these programs and their goals, and the clear effort that exists to measure their impact on Mono County children from birth to five years old. I look forward to serving on that commission.
- I worked with Caltrans to resolve twice a ice/road problem in June Lake. They were quite responsive to the concerns of the residents.
- My first "Coffee with the Supervisor" event is this Saturday, the 11<sup>th</sup> at 10:00 AM at Trout Town Joe's in June Lake. This is an effort to provide an informal opportunity for citizens to meet with me and ask questions or provide information. I will be doing these events monthly in the 3<sup>rd</sup> District at different locations.

**Supervisor Johnston:**

- Shoveled a lot of snow along with many, many people. Trying to keep ahead of the snow has been challenging for many snow removal operators.
- As noted by Supervisor Stump, I'd like to commend the Road Department for the continuing snow removal operations.
- Visited the avalanche site in Long Valley; a huge amount of effort is going on there with snow removal and assistance with SCE as they replace damaged poles.
- Talked to and met with an number of people regarding the Conway Ranch and sheep grazing issue.

**Note:**

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- Attended the Mammoth Lakes Housing meeting; reviewed financial reports among other things. Noted that there are almost 50 families on the waiting list for housing.
- Attended the IMACA meeting in Bishop; discussed financial reports and food distribution systems in the region.
- Attended the Fisheries Commission along with Supervisor Peters; good group working on a number of special projects.

**Supervisor Peters:**

- During the last few weeks I attended several local and state level meetings and community events including:
- RCRC 1/18
- Bridgeport RPAC on 1/19
- Tourism Commission 1/31
- Fisheries Commission 2/1
- AV RPAC 2/2
- I met separately with representatives of both Bridgeport and NMCC
- Attended an Antelope Valley Lions Club Business meeting 2/4 and also
- Then Annual Lions Club Speech contest on 1/30
- I had the pleasure being one of the Judges for the County Poetry Out Loud Contest in Bridgeport on Sunday 2/5
- I also met separately with Social Services Director Kathy Peterson and Behavioral Health Director Robin Roberts. I also had the opportunity to meet with Stacey Simon and Leslie Chapman and Jay Sloane and Tony Dublino
- Also in last couple of weeks, I have met with representatives of CDFW Dr Tom Stephenson and Dawn Emory to better understand some of the challenges and opportunities that are facing our County. A special thank you to Jeff Simpson for all his time and help on these matters.
- I will be holding Town Hall meetings next week on Monday the 13<sup>th</sup> in Antelope Valley at 6pm and in Bridgeport at Memorial on Wednesday the 15<sup>th</sup>. With Behavioral Health during their quarterly Community Social
- Later this week I will be traveling to Sacramento to continue the 2<sup>nd</sup> round of the CSAC new supervisors workshop series

**Supervisor Stump:**

- 1-18 : Attended the Tri Valley Water Commission. The Commission decided to hold off becoming a Groundwater Sustainability Agency until their March meeting so they could better understand the concerns coming from Inyo County.
- 1-31 : Attended a meeting with CAO Chapman, Inyo Water Department Director Bob Harrington, and Inyo CAO Carunchio to discuss the Groundwater Sustainability Act. My thanks to everyone for driving to Crowley to hold the meeting.
- 1-31 : Attended the CSA 1 meeting. Skate park project moving forward. We will see an agenda item on that soon. In addition, CSA 1 and the Sierra Club have joined to fund new blinds in the Crowley Community Center so presentations can be held during daylight hours. Thanks to Christy Milovich for her work on securing renewed Forest Service leases for CSA 1 and CSA 2 TV and radio translator sites.
- I want to thank all the Road Department crews for their excellent work dealing with the challenges posed by our seemly never ending storming weather. This includes their assistance to SCE in clearing a route to the power poles that were damaged in the Long Valley avalanche so that SCE could replace the poles and secure a redundant power supply from Mammoth to Swall Meadows. Without this repair if the back up circuit had failed those communities would have been in the dark.

## 5. COUNTY ADMINISTRATIVE OFFICE

**Leslie Chapman:**

**Note:**

**These draft meeting minutes have not yet been approved by the Mono County Board of Supervisors**

- Update regarding the storm and emergency preparedness. She has had numerous briefings and meetings with the Town. Raining and flooding right now. Shout out to Social Services group in Mammoth; they are preparing to open shelters and taking care of displaced families.
- On the 26<sup>th</sup>, she attended harassment training, required for all managers and new leaders within 6 months.
- Emergency Medical Services Board workshop will be coming up soon.
- Met with Superintendent of Schools, Stacey Adler, to talk about a program called Footsteps to Brilliance; will be giving a presentation next week.
- On the 30<sup>th</sup>, met with the IT Steering committee advisory group. There will be ongoing training on hackers and how to protect ourselves, plus our website upgrades.
- Attended CSAC Class in Sacramento on organizational leadership.

## 6. DEPARTMENT/COMMISSION REPORTS

### Peter Chapman:

- Re: LED lighting project almost done. \$167k worth of labor and product into our facilities, looking to save money and power each year.

## 7. CONSENT AGENDA

### Supervisor Peters:

Mono County RCD has dedicated, hardworking individuals who aren't recognized. Regarding CSA #5, he wants to acknowledge Chair Steve Noble and the other members for their service and volunteer efforts, and the hard work by Joe Blanchard, who attends CSA meetings in the evening.

(All matters on the consent agenda are to be approved on one motion unless a board member requests separate action on a specific item.)

### A. Release Form for Round Fire Insurance Payment

Departments: Finance, County Counsel

On behalf of Wheeler Crest Community Services District, the Association of California Water Agencies Joint Powers Insurance Authority (ACWA JPIA) submitted \$33,000 to Mono County as reimbursement for the debris removal cleanup by CalRecycle that occurred as a result of the 2015 Round Fire at property address 330 Rimrock Drive. ACWA JPIA has requested a signed release form in order to close Wheeler Crest Community Services District's insurance claim.

**Action:** Approve and request Board Chair signature on release form provided by the Association of California Water Agencies Joint Powers Insurance Authority related to the County's receipt of \$33,000 for Wheeler Crest Community Service District Round Fire debris removal reimbursement.

**Stump moved; Peters seconded**

**Vote: 5 yes; 0 no**

**M17-25**

### B. Monthly Treasury Transaction Report

Departments: Finance

### Note:

These draft meeting minutes have not yet been approved by the Mono County Board of Supervisors

Treasury Transaction Report for the month ending 12/31/2016

**Action:** Approve the Treasury Transaction Report for the month ending 12/31/2016

**Stump moved; Peters seconded**

**Vote: 5 yes; 0 no**

**M17-26**

**C. Appointments in Lieu of Election**

Departments: Clerk of the Board

Appointment of Directors of Special Districts in Lieu of Election. The following Special District has vacancies to be filled: Mono County Resource Conservation District (two positions) This Special District has submitted recommendations for appointment/reappointment, as outlined in the staff report. The terms will expire on 11/30/2020. The Board of Supervisors is the governing body under Elections Code Section 10515 to make these appointments.

**Action:** Appoint Jim Reid and Hal Curti to the Mono County Resource Conservation District, as recommended, to fill special district board vacancies.

**Stump moved; Peters seconded**

**Vote: 5 yes; 0 no**

**M17-27**

**D. County Service Area #5 Appointments**

Departments: Clerk of the Board

Reappointment of two County Service Area #5 members. This item is sponsored by Supervisor Peters.

**Action:** Reappoint Helen Nunn and Joanne Werthwein to the County Service Area #5 board for terms expiring November 30, 2020.

**Stump moved; Peters seconded**

**Vote: 5 yes; 0 no**

**M17-28**

**E. June Lake Citizens Advisory Committee Appointments**

Departments: Community Development and Board of Supervisors

Reappointment of two June Lake Citizen Advisory Committee members.

**Action:** Reappoint Ann Tozier and Rob Morgan to the June Lake Citizens Advisory Committee, as recommended by Supervisor Gardner, for terms ending on December 31, 2020.

**Stump moved; Peters seconded**

**Vote: 5 yes; 0 no**

**M17-29**

**F. Mono Basin RPAC Appointment and Terms Update**

Departments: Community Development

Mono Basin RPAC appointment and four-year term update for existing membership.

**Note:**

These draft meeting minutes have not yet been approved by the Mono County Board of Supervisors

**Action:** 1. Appoint Kristie Nelson to the Mono Basin Regional Advisory Planning Committee, as recommended by Supervisor Gardner for a term ending December 31, 2020; and 2. Convert prior two-year terms to four-year terms for existing committee members, consistent with new RPAC requirements established by the Board of Supervisors.

**Stump moved; Peters seconded**

**Vote: 5 yes; 0 no**

**M17-30**

8. **CORRESPONDENCE RECEIVED**

All items listed are located in the Office of the Clerk of the Board, and are available for review. Direction may be given to staff regarding, and/or the Board may discuss, any item of correspondence listed on the agenda.

A. **Thank You Note from the Bridgeport Elementary School**

Departments: Clerk of the Board

Thank you note received from the Bridgeport Elementary School's 7th and 8th grade classes regarding their Service Learning Project at the Bridgeport Visitor's Center.

B. **Application for ABC License by Big Meadow Brewing Co.**

Departments: Clerk of the Board

Copy of an application for Alcoholic Beverage License received from the State of California on behalf of James and Rosemarie Lierly, dba Big Meadow Brewing Co.

**Supervisor Peters:**

- Kudos to the Lierlys and the County for working hard toward making this happen.

C. **Letter from Rodger Guffey re: June Lake restaurant**

Departments: Clerk of the Board

Letter dated January 17, 2017 received from Rodger Guffey regarding an application for a new restaurant on Lakeview Blvd. in June Lake in the existing Chevron building.

D. **Letter from American Lung Association re State of Tobacco Control Report**

Departments: Clerk of the Board

Letter received on January 13, 2017 from the American Lung Association regarding the State of Tobacco Control Report to be released on January 25, 2017.

\*\*\*\*\*

9. **REGULAR AGENDA - MORNING**

**Note:**

**These draft meeting minutes have not yet been approved by the Mono County Board of Supervisors**

## A. Bridgeport Medical Clinic Update

Departments: CAO

(Leslie Chapman) - Bridgeport Medical Clinic Update

**Action:** Hear update regarding the status of the Bridgeport Medical Clinic and provide direction.

### Leslie Chapman:

- Went through her staff report, explained the drop in patient numbers, the financial losses sustained by Mammoth Hospital. Touched on several different options being pursued.

### Supervisor Peters:

- To the public: If you have been going to Bridgeport Medical Clinic, your files are with Mammoth Hospital. Southern Mono Healthcare District does not include Bridgeport. In 2009, LAFCO looked at Bridgeport and decided it was inside their existing sphere of influence. Feels there are options out there for solving this problem. Medical services are important throughout Mono County, not just Bridgeport. Clinic in AV has made strides to serve that community. Feels it's an Economic Development issue. The question is how do we go about accomplishing a profitable, sustainable clinic in Bridgeport? We need to continue to pursue an MOU with a provider.

### PUBLIC COMMENTS:

Pam Haas-Duhart  
Gary Nelson  
Steve Noble  
Jimmy Little  
Misti Sullivan

### BOARD DISCUSSION:

#### Supervisor Johnston:

- On the Profit and loss statement, why the large increase in total operating expenses? In the LAFCO study, Bridgeport is not included in the Southern Mono Hospital District. Perhaps an expanded tax base should be looked at.
- He's never heard of support for reducing the subsidy to the Clinic. Need to look at how to finance this, maybe take LAFCO up on expanding the district.

#### Supervisor Peters:

- There is great contribution from people outside of the area; tourism, etc. Agrees with the LAFCO study to expand the district, or even to create a new district to serve the underserved areas in Mono County.
- Thank you to all who took their time, all the signatures, all the letters written. All aspects of Bridgeport came together to stand up for this issue. Great effort.
- Would like to hear an update at March 14<sup>th</sup> meeting in Bridgeport.

#### Supervisor Stump:

- Thanks the public for all the letters and petitions. Agrees that there is a need. Agrees with the subsidy and the offer of the building. Supports CAO Chapman's efforts to move this forward. Obtaining qualified applicants is out of the County's control.
- Notes of caution: under Prop 13, if you create a special district you are not guaranteed any property tax revenue.

#### Supervisor Gardner:

- Agrees with all comments already made. Difficult to find another issue that is as important to quality of life more than healthcare. Supports CAO's efforts to find providers, use EMS, etc. Will take some time to do this well, but merits taking the time to come up with the best solution possible.

#### Supervisor Corless:

- Concurs with many of Board comments. Hears consensus on all the main issues. Thank

#### Note:

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you to the community that spent their time writing letters and signing the petition.

## **B. Continuation of Local Emergency**

Departments: Board of Supervisors

(Ingrid Braun) - Review state of local emergency, which was proclaimed by the Sheriff as Director of Emergency Services on January 31, 2017. Consider ratification (by resolution) of a proclamation of local emergency made by the Sheriff on January 31, 2017 and declaration of continued state of local emergency.

**Action:** Adopt Resolution #R17-09, Ratifying Proclamation of Local Emergency and Declaring a Continued State of Local Emergency Due to Severe Winter Snowstorms which Commenced on January 21, 2017. Provide any desired direction to staff.

**Johnston moved; Peters seconded**

**Vote: 5 yes; 0 no**

**R17-09**

**Sheriff Braun:**

- Went through her staff report.

**Supervisor Corless:**

- Statewide proclamation did not include Mono County because State roads were not affected. The Federal highway funding they had access to did not cover snow or ice; snow removal is considered a normal expense.

**Stacey Simon:**

- Declaration is county wide, so any damages sustained county wide would qualify. The state declaration would not have provided any funds for schools, only for CalTrans highways. Contact the Sheriff to report damages.

## **C. Conway Ranch Grazing RFP -- Direction to Staff Regarding Scheduling and Process**

Departments: Public Works

(Tony Dublino) - Board direction to staff regarding timing and process for Board's receipt of input from wildlife agencies regarding Sierra Nevada Bighorn Sheep and Board's consideration of issuance of request for proposals for grazing on Conway Ranch.

**Action:** Schedule presentation by the USFWS and/or CADFW on Sierra Nevada Bighorn Sheep at the same meeting, but as a separate agenda item, as the Board considers issuance of a request for proposals for grazing at Conway Ranch.

**Stump moved; Gardner seconded**

**Vote: 5 yes; 0 no**

**M17-31a**

**Supervisor Corless:**

- This is only to provide direction to staff from among the options presented regarding an RFP, not to discuss the grazing issue itself.

**Tony Dublino:**

**Note:**

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- This is a process discussion only. Gave a brief status update, met with DFW on February 3, talked about letters of interest received already. The agencies do want to present a workshop to the Board.

**Supervisor Gardner:**

- He has spoken with County Council regarding a potential Conflict of interest and it is legal for him to participate.

**Stacey Simon:**

- Supervisor Gardner is not disqualified from the discussion on the Ranch. The Political Reform Act does not disqualify based on nonprofit service. Gov section code 1091, when there's a contract, the supervisor with the interest can vote, but item must pass without his vote. Today is not a contract.

**Tony Dublino:**

- Current lease terminates at end of this year.

**PUBLIC COMMENT:**

Big Horn Sheep Project:

Advocates for option #2, would like to hear the latest updates from science.

April Fall:

Support for option #2

Gary Nelson:

Support for option #2, feels having Fish and Game there during the decision making process will allow their input.

**Supervisor Corless:**

- Thank you for emails on this topic, many in support of option #2.

**Supervisor Johnston:**

- This is a complex issue, doesn't feel the Board Chambers are a great venue for a discussion. Would rather see a real workshop. Previously requested the Board to process Conway Ranch through the Planning Commission. Conway is more than just grazing.
- Wants a workshop where people can have their say, show their evidence. Can't support any option unless modified to include a roundtable discussion, not just formal presentations.

**Supervisor Stump:**

- Supports option #2 on the 21<sup>st</sup> as we've heard from public and in letters. However, would like to see a 3<sup>rd</sup> item added, for the County to sell Conway Ranch. \$70k in liability insurance, \$100k to get conservation easement in place, unknown staff time. Asked to add this option to the action.

**Supervisor Peters:**

- Would add to the support of #2, included as management review of Conway, what is the status of current grazing and aquaculture permitting? Need to look at other uses of Conway while addressing the grazing.

**Supervisor Gardner:**

- Supports #2. Wants to make sure the item on the 21<sup>st</sup> includes the ability to discuss the Ranch further, more than just a grazing RFP.

**D. Employment Contract for Shannon Kendall, County Clerk/ Recorder/ Registrar**

Departments: Human Resources

(Dave Butters) - Proposed resolution approving a contract with Shannon Kendall as County Clerk/ Recorder/ Registrar, and prescribing the compensation, appointment and conditions of said employment.

**Action:** Approve Resolution #R17-10, approving a contract with Shannon Kendall as County Clerk/ Recorder/ Registrar, and prescribing the compensation, appointment and conditions of said employment. Authorize the Board Chair to

**Note:**

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execute said contract on behalf of the County.

**Fiscal Impact:** The cost for this position for the remainder of FY 2016-2017 (February 7 to June 30th) is approximately \$67,256 of which \$41,310 is salary; \$9,856 is the employer portion of PERS, and \$16,090 is the cost of the benefits and is included in the approved budget. Total cost for a full fiscal year (2016-2017) would be \$161,417 of which \$99,144 is annual salary; \$23,656 is the employer portion of PERS, and \$38,617 is the cost of the benefits.

**Peters moved; Stump seconded**

**Vote: 5 yes; 0 no**

**R17-10**

**Leslie Chapman:**

- A full recruitment was conducted, including advertising in several publications. Shannon Kendall was the successful candidate.

#### **E. Employment Contract for Stacey Westerlund, Payroll & Benefits Manager**

Departments: Human Resources, Finance

(Dave Butters, Janet Dutcher) - Proposed resolution approving a contract with Stacey Westerlund as Payroll & Benefits Manager, and prescribing the compensation, appointment and conditions of said employment.

**Action:** Approve Resolution #R17-11, approving a contract with Stacey Westerlund as Payroll & Benefits Manager for a term of three years from February 7, 2017 to February 6, 2020, and prescribing the compensation, appointment and conditions of said employment. Authorize the Board Chair to execute said contract on behalf of the County.

**Fiscal Impact:** The cost of this position for the remainder of FY 2016-2017 (February 1 through June 30) is approximately \$66,107 of which \$40,420 is salary, \$9,644 is the employer portion of PERS, and \$16,043 is the cost of the benefits and is included in the approved budget. Total cost for a full fiscal year would be \$159,558 of which \$97,008 is annual salary, \$23,146 is the employer portion of PERS, and \$39,404 is the cost of the benefits. The 2% COLA approved by the Board of Supervisors on December 13, 2016, is the only salary increase included. There is sufficient budget remaining in the fiscal year to cover the cost of this contract.

**Peters moved; Gardner seconded**

**Vote: 5 yes; 0 no**

**R17-11**

**Janet Dutcher:**

- Stacey Westerlund has been payroll and benefits manager for 6 years, employed with Mono for 22 years. This is not a salary increase, just the COLA.

#### **10. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD**

**Note:**

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**Stacey Simon:**

- Ask to recall the emergency ratification to allow Bob Gardner to sign on behalf of the chair.

**Supervisor Corless:**

- Recall Item #9b to have board consensus to have pro tem Supervisor Gardner sign the resolution. Board consensus.

**Lunch break at 11:53**

**11. CLOSED SESSION**

**The closed session item was cancelled.**

**A. Closed Session--Human Resources**

CONFERENCE WITH LABOR NEGOTIATORS. Government Code Section 54957.6. Agency designated representative(s): Stacey Simon, Leslie Chapman, and Dave Butters. Employee Organization(s): Mono County Sheriff's Officers Association (aka Deputy Sheriff's Association), Local 39--majority representative of Mono County Public Employees (MCPE) and Deputy Probation Officers Unit (DPOU), Mono County Paramedic Rescue Association (PARA), Mono County Public Safety Officers Association (PSO), and Mono County Sheriff Department's Management Association (SO Mgmt). Unrepresented employees: All.

**THE REGULAR AGENDA WILL RECONVENE NO EARLIER THAN 1:00 P.M.**

**12. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD**

*No one spoke.*

**13. REGULAR AGENDA - AFTERNOON**

**A. Letter of Support for MCWD's CEC Grant Application**

Departments: Board of Supervisors

(Stacy Corless - Chairwoman) - Mammoth Community Water District is submitting a CEC Grant Application to fund the construction and sampling of a Geothermal Monitoring Well BLM2. This letter, to be approved by the Mono County Board of Supervisors and signed by the Chairwoman, is in support of this grant application.

**Action:** Approve the Chairwoman's signature on a letter of support for Mammoth Community Water District to submit a CEC Grant Application to apply for funding for the construction and sampling of a Geothermal Monitoring Well BLM2.

**Johnston moved; Stump seconded**

**Vote: 5 yes; 0 no**

**M17-31**

**Note:**

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## B. Quarterly Investment Report

Departments: Finance

(Gerald Frank) - Investment Report for the Quarter ending 12/31/2016

**Action:** Approve the Investment Report for the Quarter ending 12/31/2016

**Johnston moved; Stump seconded**

**Vote: 5 yes; 0 no**

**M17-32**

**Gerald Frank:**

- Went through his staff report and spreadsheets.

**Bob Gardner:**

- Asked what happens if a special district doesn't participate?

**Janet Dutcher:**

- Some districts don't invest with the county; they have their own treasurer and can invest in their own pool.

## C. Investment Policy and Delegation of Investment Authority

Departments: Finance

(Janet Dutcher, Gerald Frank) - Mono County Statement of Investment Policy and proposed Ordinance to Delegate Investment Authority to the Treasurer.

**Action:** Approve the Mono County Statement of Investment Policy as presented or amended.

**Gardner moved; Peters seconded**

**Vote: 5 yes; 0 no**

**M17-33**

Introduce, read title, and waive further reading of proposed ordinance delegating investment authority to the County Treasurer.

**Johnston moved; Gardner seconded**

**Vote: 5 yes; 0 no**

**M17-34**

**Gerald Frank:**

- Date will be amended from January 10 to February 7.
- Explained the changes made to the policy

## D. Mono County Legislative Platform Update - 2017

Departments: CAO

(Leslie Chapman) - Mono County Legislative Platform update for 2017

**Action:** 1) Review draft 2017 Mono County Legislative platform; 2) Adopt 2017 Mono County Legislative Platform with amendments; 3) Direct staff to distribute to Mono County state and federal legislators.

**Leslie Chapman:**

- Went through her staff report. Shannon Kendall is tracking changes suggested by the

**Note:**

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Board. The final document, should it be approved today, will go to the printers by Friday.

**ADJOURN at 2:48 p.m.**

**ATTEST**

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**STACY CORLESS  
CHAIRMAN OF THE BOARD**

---

**HELEN NUNN  
SR. DEPUTY CLERK**



**OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS**

**REGULAR AGENDA REQUEST**

Print

**MEETING DATE** March 7, 2017

**Departments: Clerk of the Board**

**TIME REQUIRED**

**SUBJECT** Board Minutes

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

**AGENDA DESCRIPTION:**

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Approve minutes of the Regular Meeting held on February 14, 2017.

**RECOMMENDED ACTION:**

**FISCAL IMPACT:**

**CONTACT NAME:** Helen Nunn

**PHONE/EMAIL:** x5534 / hnunn@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

**SEND COPIES TO:**

**MINUTE ORDER REQUESTED:**

YES  NO

**ATTACHMENTS:**

<p>Click to download</p> <p> <a href="#">Draft Minutes</a></p>
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**History**

Time	Who	Approval
3/1/2017 4:48 AM	County Administrative Office	Yes
2/28/2017 4:32 PM	County Counsel	Yes
3/1/2017 5:30 PM	Finance	Yes



**DRAFT MEETING MINUTES  
BOARD OF SUPERVISORS, COUNTY OF MONO  
STATE OF CALIFORNIA**

Regular Meetings: The First, Second, and Third Tuesday of each month. Location of meeting is specified just below.

MEETING LOCATION Board Chambers, 2nd Fl., County Courthouse, 278 Main St., Bridgeport, CA 93517

**Regular Meeting  
February 14, 2017**

<b>Flash Drive</b>	<b>Board Room Recorder</b>
<b>Minute Orders</b>	<b>M17-35 to M17-39</b>
<b>Resolutions</b>	<b>R17-12 to R17-16</b>
<b>Ordinance</b>	<b>ORD17-03</b>

9:05 AM Meeting Called to Order by Chairman Corless.

*Supervisors present: Corless, Gardner, Johnston, Peters, and Stump.  
Supervisors absent: None*

*Break: 10:12 a.m.  
Reconvene: 10:19 a.m.  
Break: 1:15 p.m.  
Reconvene: 1:35 p.m.  
Break: 2:40 p.m.  
Reconvene: 2:47 p.m.  
Closed Session: 3:56 p.m.  
Adjourn: 4:40 p.m.*

**The Mono County Board of Supervisors stream all of their meetings live on the internet and archives them afterward. To listen to any meetings from June 2, 2015 forward, please go to the following link:**  
<http://www.monocounty.ca.gov/meetings>

Pledge of Allegiance led by Supervisor Gardner

- 1. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD**  
*No one spoke.*

**Note:**

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2. APPROVAL OF MINUTES - NONE

3. RECOGNITIONS - NONE

4. BOARD MEMBER REPORTS

**Supervisor Corless:**

- Thank you to social services, especially Cathy Young, for work on behalf of those displaced by roof collapses and building damage due to snow in Mammoth. Animal control also offered assistance for displaced pets.
- 2/13: Behavioral Health Advisory Board—update on Davison House—approval to move forward with permit-ready plans; once the plans are developed, public outreach on the project can begin in earnest; will post a q and a on county website re: Davison.
- Introduction to the current Mental Health Services Act Plan from Amanda Greenberg, BH's recently hired MHSA coordinator. MHSA funds much of the excellent work done by the department, and our board will be hearing more about plan development this year.
- Upcoming: ESCOG Friday—will discuss the new broadband consortium, update on regional air service
- Next week—big meeting Tuesday, will suspend board reports—as alternative ask board members to submit a written report that perhaps could be posted on the website separate from meeting minutes.
- NACo: submitted an interim policy resolution around support for outdoor Rec Act; will also participate in a Secure Rural Schools action. Will present resolution at legislative conference.

**Supervisor Gardner:**

- I attended the CSAC New Supervisors Institute in Sacramento Thursday Feb. 9 and Friday Feb. 10. The sessions were interesting and useful. The Institute will conclude with a session on April 20.
- I held my first “Coffee with the Supervisor” on Saturday, Feb. 11 in June Lake. There was no participation, but I will make a greater effort in the future to get more notice out to the media, and to get flyers posted in selected areas.
- I continue to work with various constituents on several issues.
- I also want to thank our many county employees for continuing to work long hours and for showing great patience in resolving the many problems resulting from the recent storms. They make us proud!

**Supervisor Johnston:**

- Recognized and seconded previous comments commending road crews and other county departments with regard to recent weather and weather emergency events.
- Attended a CSAC Executive Committee meeting. Items presented included Cannabis actions by some entities, including the State Board of Equalization. The San Bernardino attack was revisited by San Bernardino officials; it was an eye opening presentation. One take away was to have our staff update their individual emergency contact information.
- Attended the Local Transportation Commission meeting. A number of items were reviewed including the Reds Meadow Road proposed reconstruction project, the recent storm impacts and the fact that State Hwy 108 is now officially closed to large trucks. Also it was requested to have a review of weather response and communication during this winter, but after the winter is over.
- Noted there continue to be drainage and snow removal issues throughout the Town.
- Met with Town, County and CALTRANS staff regarding potential aesthetic guardrail specifications; there was general agreement and a policy proposal will be presented soon.
- Asked for consideration of funding for a portable generator that could be used in prolonged power outages for powering a designated local service station(s). This would allow snow removal operators and others to access fuel supplies in adverse conditions.

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**Supervisor Peters:**

- CSAC 2/8-10 met with legislators and CSAC lobbyists
- LTC 2/13
- Met With CERT team Representatives
- Met With Lynda Salcido Health department director
- Missed CSA #5 conflict with Town Hall
- Town Hall AV Last night and My Bridgeport Town Hall will be Wednesday night with the Behavioral Health Quarterly Social at Memorial hall
- Today Aspen Fales Shoulder Widening Public Hearing CalTrans 3<sup>rd</sup> attempt 4-7 Cal Trans Bridgeport
- Road Closure 395 near Meadowcliff with traffic diverted on Eastside Lane
- Power Outage Entire day on Thursday and Liberty solved the issues
- Cottonwood trees
- I had the pleasure of attending the NMCC community Valentines Dance on Saturday Night
- Later this week I will also be attending the Bridgeport RPAC on Thursday Night

**Supervisor Stump:**

- 2-13 : attended LTC – Congratulate Supervisor Peters for Elected Chair
- Last Tuesday through Friday: Spent a considerable time working with residents on road, power and weather issues. Corresponded with Inyo County Supervisor Tothoroh re Lower Rock Creek Road on the Inyo side. Thanks Public Works and CAO Chapman for the constant updates he received and was able to pass along to those affected. .

## 5. COUNTY ADMINISTRATIVE OFFICE

**Leslie Chapman:**

- Spent time last week in multiple weather briefings and command briefings.
- She has been working on several workshops: EMS tomorrow, South County today, next Tuesday mid-year budget. Ready to go.
- Requests from Town, have a shortage of big trucks to move snow.
- MLFD and conservation corps and prisoner group, been digging out fire hydrants, propane tanks, storm drains, getting ready for the next storm.

## 6. DEPARTMENT/COMMISSION REPORTS

**Shannon Kendall, Clerk of the Board:**

- Two main projects: e-Recording. Moving along, a few more things to come together, hoping to be completed within 2-3 months.
- e-Disclosure docs with FPPC project. There has been lots of work done on the database to import all the information so we can send out log in information to everyone. There is a Conflict of Interest code section that we may be able to work on with County Counsel.
- Talk of special election for cannabis, possibly in November. Keeping in touch with Town.
- Assistant County Clerk position is currently open. We will continue flying the position but we do have two county employees to interview. We need our office to be fully staffed again.

**Joe Blanchard, Public Works:**

- Biomass boiler; the manufacturer came out. We need 3 phase power, we had to install a new transformer.
- Starting Walker Senior Center generator today.
- Snow removal around the entire county, digging out cars, fixing leaks.

**Note:**

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**Stacie Casabian, Probation:**

- 1<sup>st</sup> drug court graduation on the 25<sup>th</sup>. He was in program 585 days, only 3 positive tests, 383 days since last positive test. Attended 425 AA meetings, has started his own AA meeting in his area. He wrote journal entries, letters to the judge. He has faced many challenges during this time but is a success. Proving to be a great program so far.

**Kathy Peterson, Social Services:**

- Opened Red Cross shelter this weekend. Saturday we learned another 8 people were displaced. New shelter opened Sunday, took over Monday. Still open and involved. CAO Chapman sent out a call for housing, Mammoth resident offered 3 rooms. Red Cross has agreed to stay here because of our upcoming weather events at least through Monday.

**Sheriff Braun:**

- Great cooperation and work put in by everyone to make emergency services happen. Thank the entire county for the hard work. Thank you to Mammoth High School for opening up their gym. Encouraged shoveling roofs early and often.

**Barry Beck, Assessor:**

- Regarding property damage from the recent storms, the Assessor's Office is reaching out with a calamity claim to those who may have sustained damage. Have received a list from MLFD and TOML of damaged properties they are aware of. Under the calamity program, if a structure sustains damage, they are required to appraise the current structure and deduct a percentage from the overall assessed value.

**Jeff Walters, Roads:**

- Long hours lately by the Roads crew. Road closures, rock slides, mud slides, floods. Cooperative efforts by all the agencies involved.
- Current status of roads in June Lake, Benton, Coleville. Several dirt roads suffered serious degradation but are now fixed and open again. Golden Gate Rd in Walker was closed last week and is still closed. Mill Canyon in Coleville had a slope failure a few years ago, but has not slid at all even with all the rain. Still closed at gate due to concern that it may slide, however.
- Fuel gelling issue, has had conversations with fuel supplier. Assured it will not gel again.
- Ongoing work continues, reevaluating roads, many still under snow. Some equipment failures, but should be running again soon.
- Detour off the 395 due to mudslide by Meadowcliff. Concern over rigs on Cunningham; that bridge is not suitable for the heavy loads. Larsen Ln and Topaz Ln are good.

## 7. **CONSENT AGENDA**

(All matters on the consent agenda are to be approved on one motion unless a board member requests separate action on a specific item.)

**Supervisor Gardner:**

- Two Consent items require matches, where is that money?

**Janet Dutcher:**

- Those are for the next budget cycle which has not been formulated yet. Emergency management is funded by general fund, OHV match normally budgeted through Sheriff. Match identified through application process.

### A. **Mono County Child Care Council Certification Statement Regarding**

**Note:**

**These draft meeting minutes have not yet been approved by the Mono County Board of Supervisors**

### **Composition of Local Planning Council Membership**

Departments: Clerk of the Board

The Board of Supervisors and Superintendent of Schools make the appointments of the Council Members to the Mono County Child Care Council. The submission of the Certification is required annually by the California Department of Education. The Certification Statement Regarding Composition of LPC Membership certifies that the membership criteria as established under the Education Code, Section 8499.3, are met. This item has been sponsored by Supervisor Corless.

**Action:** Approve the Membership Certification for the Mono County Child Care Council and authorize the Board Chair to sign the Certification.

**Gardner moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**M17-35**

### **B. 2017-2018 Off-Highway Vehicle Grant Board Resolution**

Departments: Mono County Sheriff's Office

Proposed resolution 2017-2018 Off-Highway Vehicle Grant Board Resolution.

**Action:** Adopt Resolution #17-12, approving the application for State Off-Highway Vehicle Grant FY 2017-2018.

**Gardner moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**R17-12**

### **C. California Emergency Management Agency Fiscal Year 2017-2018 Emergency Management Performance Grant Program Board Resolution**

Departments: Mono County Sheriff's Office

Proposed resolution California Emergency Management Agency Fiscal Year 2017-2018 Emergency Management Performance Grant Program Board Resolution.

**Action:** Adopt Resolution #17-13, authorizing Mono County's participation in the FY 2017-2018 Emergency Management Performance Grant (EMPG) Program and designating the Sheriff-Coroner, Emergency Services Coordinator, and the Sheriff's Finance Officer as authorized agents to sign for and administer the EMPG Grant.

**Gardner moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**R17-13**

### **D. Office of Homeland Security Fiscal Year 2017-2018 Homeland Security Grant Program Board Resolution**

Departments: Mono County Sheriff's Office

**Note:**

These draft meeting minutes have not yet been approved by the Mono County Board of Supervisors

Proposed resolution Office of Homeland Security Fiscal Year 2017-2018 Homeland Security Grant Program Board Resolution.

**Action:** Adopt Resolution #17-14, authorizing participation in the Office of Homeland Security FY 2017-2018 Homeland Security Grant Program and designating the Sheriff-Coroner, Emergency Services Coordinator, and the Sheriff's Finance Officer as authorized agents to sign for and administer the Homeland Security Grant.

**Gardner moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**R17-14**

**E. 2017-2018 Department Of Alcoholic Beverage Grant Assistance Program**

Departments: Mono County Sheriff's Department

Proposed resolution 2017-2018 Department Of Alcoholic Beverage Grant Assistance Program.

**Action:** Approve Resolution #17-15, authorizing Mono County's participation in the FY 2017-2018 Department of Alcoholic Beverage Control (ABC) Grant Assistance Program and designating the Sheriff-Coroner, Emergency Services Coordinator, and the Sheriff's Finance Officer as authorized agents to sign for and administer the ABC Grant.

**Gardner moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**R17-15**

**F. Ordinance Delegating Investment Authority to the County Treasurer**

Departments: Finance

Proposed ordinance delegating investment authority to the County Treasurer.

**Action:** Adopt proposed ordinance delegating investment authority to the County Treasurer.

**Gardner moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**ORD17-03**

**8. CORRESPONDENCE RECEIVED**

All items listed are located in the Office of the Clerk of the Board, and are available for review. Direction may be given to staff regarding, and/or the Board may discuss, any item of correspondence listed on the agenda.

**A. February 2017 Agriculture Report**

Departments: Clerk of the Board

**Note:**

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February 2017 report from the Inyo-Mono Agricultural Commissioner.

**B. Joint County Affordable Care Act Letter**

Departments: Social Services; Public Health; Behavioral Health

Joint letter from California county associations that outlines the effects of repeal of the Affordable Care Act without an adequate replacement.

**C. Application for ABC License by Twin Lakes Resort**

Departments: Clerk of the Board

Application for ABC License by Tim and Misti Sullivan, dba Twin Lakes Resort.

**9. REGULAR AGENDA – MORNING**

**A. FOOTSTEPS2BRILLIANCE Presentation**

Departments: CAO/Superintendent of Schools Adler

(Superintendent Stacey Adler) - Presentation by Superintendent Adler regarding Footsteps2Brilliance educational program.

**Action:** Hear presentation, provide comments and direct staff to include request for funding in the midyear budget review.

**Stacey Adler:**

- Went through her power point presentation.
- The Footsteps 2 Brilliance support team will be collecting and sending data continuously so we can see how often it's accessed, and from where in the county. Along with school test results we can judge the success.
- Right now, the county office is footing the bill, but is asking for contributions from other sources, too: the Board of Supervisors, Town of Mammoth Lakes, Mammoth Mountain, Mammoth Hospital board, and others. Private sources, too, but not many here.
- She does not have literacy rates for adults in front of her, but could look at statistics.
- She will be going to a tribal meeting with the Benton tribe in March, would welcome Supervisor Stump's assistance in reaching out to them.
- Mono County Public Health is already a partner, but no monies have been contributed at this time.
- This has not yet been integrated into the school curriculum, but they will get training and hopefully will. They are looking at the 1<sup>st</sup> week of March for training, coming back in April, and in fall for follow up trainings. Ongoing remote support throughout the year as well.
- Intends to ask for \$10k per year for 5 years.

**Supervisor Gardner:**

- Does the program require constant data from testing to reflect the impact of the program? What is the source of funding? Do you have literacy rates for Mono County?

**Supervisor Stump:**

- Has this program also been discussed with tribes?

**Supervisor Johnston:**

- Mono County is already a partner? What does that mean?

**Supervisor Peters:**

- Is this currently integrated into school curriculum?

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- SA: not yet, but they will get training and hopefully will. 1<sup>st</sup> week of march fro training, coming back in April and in fall for follow up trainings. Ongoing remote support throughout the year as well.

**Leslie Chapman:**

- She has put a policy item in the midyear budget so the board can decide if they'd like to make a commitment to this program.

**B. South County Facility Comparative Analysis**

Departments: Public Works, Finance

(Tony Dublino, Janet Dutcher) - Presentation by Tony Dublino and Janet Dutcher regarding options for a South County Facility in Mammoth Lakes.

**Action:** Revisit negotiations with SCM for Lease only and maintain progress on McFlex concept – continue coordination on MOU and site planning with Town, explore and develop procurement alternatives for Architect/Engineering, and revisit direction on March 14<sup>th</sup>.

**Stump moved; Peters seconded**

**Vote: 5 yes; 0 no**

**M17-36**

**Tony Dublino:**

- Went through his power point analyzing differences between options of lease or purchase of Sierra Center Mall versus a new building at another location.

**Supervisor Corless:**

- There will not be a decision made today, this is on to give staff direction. A direction could be to produce site plans at the next meeting.

General board discussion, questions and answers with Tony and Garrett.

**Paul Rudder, Sierra Center Mall:**

- Drew Hild was unable to attend today. Feels the estimated need of a 90 car parking lot would not be adequate. Health and safety items are not a tenant responsibility. Went over several things he and his partner are currently working on, recent improvements, improvements that were derailed because of the weather. Addressed his letter in packet, dated February 8. Many of the Board's questions haven't been hashed out yet because it all takes time. Knows there are things that need to be fixed. SCM has served the County for over 20 years. Would like to sit down with the County's team and go over exactly what the County's needs are.

**Pam Kobylarz, Town Manager TOML:**

- TOML Council has not had a formal discussion regarding the future of the Town offices. Will be brought up tomorrow night. Town is facing similar issues with their current location that the County faces. Town may be interested when their lease expires to look at other options.
- The McFlex parcel was purchased in 2007 by Town, County, and Hospital. MOU says, in part, the Town and County agree to work together to use the property, mutually beneficial use of the property.

**Break at 1:15, move to item 13a**

**C. Program Supplement Agreement for the Systemic Safety Analysis Report Project (SSARP)**

Departments: Public Works - Engineering Division

(Garrett Higerd) - The SSARP will identify areas of safety concern on the Mono

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County maintained road network and will be used to improve the safety of the whole system by identifying the most effective future safety projects.

**Action:** Consider and potentially adopt proposed resolution #R17-16, "A Resolution of the Mono County Board of Supervisors, State of California, Approving Program Supplement Agreement No. 0091 Rev. 000 to Administering Agency-State Master Agreement No. 00187S for the Systemic Safety Analysis Report Project."

**Peters moved; Gardner seconded**

**Vote: 5 yes; 0 no**

**R17-16**

**Garrett Higerd:**

- Outlined his staff report.

#### **D. The Crowley Lake Skatepark**

Departments: Public Works

(Peter Chapman) - Request Board approval to release the Crowley Lake Skatepark Project Manual soliciting requests for bids (RFB) from qualified firms.

**Action:** Approve release of the Crowley Lake Skatepark Project Manual RFB.

**Stump moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**M17-37**

**Peter Chapman:**

- Went through his staff report.

**Supervisor Stump:**

- Planning Commission has given their approval on concept, but he wants to see actual plans.

**Kim McCarthy, CSA:**

- Thank you for the opportunity and for the board hearing this today. Outlined their budget.

#### **E. Medi-Cal Inmate Program**

Departments: Social Services

(Kathryn Peterson) - Proposed contract with Department of Health Care Services pertaining to the Medi-Cal County Inmate Program for FY 2016-17 and FY 2017-18.

**Action:** Approve County entry into proposed contracts and authorize the Board Chair to execute said contracts on behalf of the County. Authorize Board Chair to sign the MCIP Participation form to certify county interest in participation. Provide any desired direction to staff.

**Johnston moved; Stump seconded**

**Vote: 5 yes; 0 no**

**M17-38**

**Kathy Peterson:**

- Went through her staff report. Possible to go back to October 2016 and see if there are reimbursable expenses.

**Note:**

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## **F. Executive Order Regarding "Sanctuary Jurisdictions"/Cooperation with Federal Immigration Enforcement**

Departments: CAO, Behavioral Health, Social Services, Sheriff

(Leslie Chapman, Ingrid Braun, Kathy Peterson, Robin Roberts, Lynda Salcido) - Discussion of President Trump's January 25, 2017, Executive Order restricting federal grant funding for "Sanctuary Jurisdictions" (defined in the Order as entities or officials which prohibit or restrict the sharing of immigration status information with federal authorities or which prohibit or restrict the maintenance of such information) as well as any other jurisdiction as determined by the Secretary of Homeland Security, and its potential impacts on and within Mono County.

**Action:** Hear presentation from staff and have discussion regarding President Trump's Executive Order. Provide direction to staff regarding possible County response, which may include, but need not be limited to: providing information to the public through staff letter, other community outreach, or formal Board Proclamation regarding the County's position and/or current law regarding cooperation with federal immigration enforcement efforts.

### **Stacey Simon:**

- Went through staff report. The executive order is very broadly worded, very poorly worded and is unclear. There is no real definition of what a "sanctuary" jurisdiction means. We know if we fail to comply with Section 1373, we will be considered a sanctuary jurisdiction. Under the US Constitution, the President does not have spending authority. Congress' power is even limited; cannot withhold funding in such a broad manner.
- We will be participating in biweekly conference calls with other county counsels. We don't know as a government agency, what we might do that might trigger a penalty. It is undefined and unclear.
- Withholding funding has to be tied to the infraction. All of these issues are being addressed through multiple lawsuits. Coercion can be held in violation of the 10<sup>th</sup> amendment. We may not see loss of federal funds but there will be fallout based on the confusion around this order.
- Would like this to be a regular update item, back on agenda in a few weeks.

### **Supervisor Gardner:**

- Believes it's very difficult to cut off grants using other laws. Cannot overstate that we understand it would be very hard to see this through to ending federal funding.

### **Robin Roberts:**

- She can provide context from a different angle. Believes treating this as a public matter is very important. Tremendous amount of fear right now; people are afraid to be in public right now.

### **Sheriff Braun:**

- Her office is following CA law and if they receive an ICE detainer request, it simply means ICE wants to talk to the person. It does not happen often. Concern for law enforcement in general is #8b – it is beyond the scope of adhering to CA law. We are not immigration enforcement. Wants everyone in the community to feel safe and trust law enforcement. A detainer is not the same as a warrant, it is merely a request.

### **Kathy Peterson:**

- There is a pervasive outward sense of fear. They are following state and federal law, not giving out immigration status information about clients. We are a safe place, a safety net for the community.

### **Tim Kendall:**

- DA deals with undocumented persons every day as victims of crime. Philosophy has always

### **Note:**

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been to assist everyone. They issue visas, they will always extend their help to everyone. There are many obligations under federal law, but there is no intention of actively becoming a mechanism for ICE. Balancing act we all have to deal with, but the DA will operate as they always have.

Board Discussion:

- Staff should reissue a version of the prior letter to the community and focus on immigration. Add statements from legislative platform, describe what we do already or that we are not changing our existing practices. Add that it is an ongoing process, that the original order is fallible and impossible to know what we're supposed to do.
- Many are confused and scared by this, partially because of unclear language.

10. **OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD**

*No one spoke.*

11. **CLOSED SESSION**

**Nothing to report out of Closed Session.**

**A. Closed Session--Human Resources**

CONFERENCE WITH LABOR NEGOTIATORS. Government Code Section 54957.6. Agency designated representative(s): Stacey Simon, Leslie Chapman, and Dave Butters. Employee Organization(s): Mono County Sheriff's Officers Association (aka Deputy Sheriff's Association), Local 39--majority representative of Mono County Public Employees (MCPE) and Deputy Probation Officers Unit (DPOU), Mono County Paramedic Rescue Association (PARA), Mono County Public Safety Officers Association (PSO), and Mono County Sheriff Department's Management Association (SO Mgmt). Unrepresented employees: All.

**B. Closed Session - Exposure to Litigation**

CONFERENCE WITH LEGAL COUNSEL – ANTICIPATED LITIGATION. Significant exposure to litigation pursuant to paragraph (2) of subdivision (d) of Government Code section 54956.9. Number of potential cases: One. Facts and circumstances: Conway Ranch Sheep Grazing.

**C. Closed Session - Existing Litigation**

CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION. Paragraph (1) of subdivision (d) of Government Code section 54956.9. Name of case: Desert Survivors, et al. v. United States Department of Interior, et al. (Case No. 3:16-cv-01165-JCS).

**D. Closed Session - Existing Litigation**

**Note:**

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CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION. Paragraph (1) of subdivision (d) of Government Code section 54956.9. Name of case: Czeschin - appeal of administrative citation (Mono Superior Court No. CV170001).

**THE AFTERNOON SESSION WILL RECONVENE NO EARLIER THAN 1:00 P.M.**

**12. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD**

*No one spoke.*

**13. REGULAR AGENDA - AFTERNOON**

**A. Response to Public Comment on Camp Antelope**

Departments: CDD, Environmental Health, Public Works, County Counsel, Assessor

(Wendy Sugimura) - Presentation by Mono County departments regarding public comments made on the Camp Antelope project in Walker.

**Action:** None - informational only.

**Wendy Sugimura:**

- This is in response to public comments made since December 2016. Went through her staff report. Detailed where the County does (or does not) have jurisdictional authority.

**Louis Molina:**

- Water system overview at Camp Antelope. Currently working on designating them as a community water system; need to have their treatment facility improved and certified. Will keep working with them toward that end.

**Jon Drozd** spoke to the water issue.

**Supervisor Stump:**

- In prior public comment, Eric Swab made reference to liability, but he doesn't see anything here. It appears the county is doing its due diligence.

**Stacey Simon:**

- We don't own Camp Antelope, and we are not responsible for it. There is no County liability; it is the same as private property. We issue permits; we are not the insurer or guarantor.
- If the Owens Valley Indian Housing Authority no longer exists, if it's been dissolved, its articles and bylaws would indicate what happens to its assets and liabilities.

**Jon Drozd:**

- Believes the Shoshone-Paiute tribe as a whole is taking this over, but no formal transfer yet. They are a Public water system based on last inspection in 2014, designated as a transient non-community water system. Coordinating with State and they have permitted them as a community water system based on permits, but not technically until all homes are built and occupied.

Stacey:

PUBLIC COMMENT

**Eric Swab**

**John Glazier, Tribal Chair, Bridgeport Indian Colony:**

- Non recognized, has been asked to assist them. Since things are in limbo with OVIHA and

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Lone Pine tribe, they are assisting. Misappropriation of funds is a concern. Believes the housing there are condemned but three families live there. The water system sits on Federal land. A complaint the water was contaminated, serves those three homes and runs down to the clinic, which is owned by Bridgeport tribe. Asking for the board to help give the Coleville tribe some direction.

**Stacey Simon:**

- She can contact the attorney for OVIHA. Eric will send her the attorney information.

**John Peters:**

- Questions about permitting and who can take out permits, if the owner no longer owns the land.

**Wendy Sugimura:**

- Permits don't have to be taken out by owner, they can be issued to contractor. Permits follow the land even if changes ownership.

## **B. Legislative Platform Final Review**

Departments: CAO

(Leslie Chapman) - Final review and adoption of Mono County Legislative Platform

**Action:** Review changes to the Legislative Platform that were proposed at the February 7th Board meeting and adopt the 2017 platform. Direct staff to prepare and distribute the final document per today's corrections.

**Stump moved; Gardner seconded**

**Vote: 5 yes; 0 no**

**M17-39**

**Leslie Chapman:**

- Went through the changes made at the last meeting.
- Final document will be posted to web under Additional Documents.

**ADJOURN at 4:40 p.m.**

**ATTEST**

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**STACY CORLESS  
CHAIRMAN OF THE BOARD**

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**HELEN NUNN  
SR. DEPUTY CLERK**

**Note:**

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**OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS**

**REGULAR AGENDA REQUEST**

Print

**MEETING DATE** March 7, 2017

**Departments: Clerk of the Board**

**TIME REQUIRED**

**SUBJECT** Board Minutes

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

**AGENDA DESCRIPTION:**

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Approve minutes of the Special Meeting held on February 15, 2017.

**RECOMMENDED ACTION:**

**FISCAL IMPACT:**

**CONTACT NAME:** Shannon Kendall

**PHONE/EMAIL:** x5533 / skendall@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

**SEND COPIES TO:**

**MINUTE ORDER REQUESTED:**

YES  NO

**ATTACHMENTS:**

<p>Click to download</p> <p> <a href="#">02-15-17 draft sp mins</a></p>
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**History**

Time	Who	Approval
3/1/2017 4:54 AM	County Administrative Office	Yes
2/28/2017 4:28 PM	County Counsel	Yes
3/1/2017 5:30 PM	Finance	Yes



**DRAFT MEETING MINUTES**  
**BOARD OF SUPERVISORS, COUNTY OF MONO**  
**STATE OF CALIFORNIA**

MEETING LOCATION Mammoth Lakes Suite Z, 237 Old Mammoth Rd, Suite Z, Mammoth Lakes,  
CA 93546

**Special Meeting**  
**February 15, 2017**

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<b>Flash Drive</b>	<b>NONE</b>
<b>Minute Orders</b>	<b>NONE</b>
<b>Resolutions</b>	<b>NONE</b>
<b>Ordinance</b>	<b>ORD17-04 NOT USED</b>

9:20 AM Meeting Called to Order by Chairman Corless.

*Supervisors present: Corless, Gardner, Johnston, Peters, and Stump.*  
*Supervisors absent: None*

*Break: 10:45 a.m.*  
*Reconvene: 10:55 a.m.*  
*Lunch: 1:10 p.m.*  
*Reconvene: 1:40 p.m.*  
*Adjourn: 3:07 p.m.*

The Mono County Board of Supervisors stream all of their meetings live on the internet and archives them afterward. To listen to any meetings from June 2, 2015 forward, please go to the following link:  
<http://www.monocounty.ca.gov/meetings>

Pledge of Allegiance led by Chairman Corless.

**1 OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD**

*No one spoke.*

**2. AGENDA ITEMS**

**A. EMS Workshop**

Departments: Mono County Emergency Medical Services

**Note:**

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(Lynda Salcido, Bob Rooks) - Presentation by Emergency Medical Services Management regarding future planning for services in Mono County. Please access the EMS Ad Hoc Committee webpage for links contained within the final EMS report. <http://www.monocounty.ca.gov/ems/page/ad-hoc-emergency-medical-services-committee>

**Action:** None.

**Supervisor Corless:**

- Gave overview of how this item would go; guidelines, recommended action.
- Perimeters set for this work are to provide high quality, fiscally sustainable, county-wide program.
- Doesn't feel we will get through all of the agenda today. Feels another special meeting is going to be required.
- Special Meeting March 8<sup>th</sup> at 10:00 a.m. – Bridgeport location (teleconference to Mammoth BOS Chambers).

**Lynda Salcido:**

- Gave introductions.

**Bob Rooks:**

Emergency Medical Services Workshop Power Point:

- How we got here
- Financial Crisis
- Board of Supervisors creates EMS Ad-Hoc Committee
- Goals of Committee
  - Committee presented findings on March 9, 2016 but nothing was adopted.
  - Interim EMS Chief approved but his time is running out
- Current System
  - 2017/17 Budget
  - Possibility of mid-year adjustment
- Statistics on where calls are run – 70% of call volume is in the Town of Mammoth Lakes
- Station Readiness Costs – 2015/16
- Committee Recommendations Adopted
  - Modifications to enhance revenues
  - Modifications to reduce costs
  - Modifications to enhance deployment
  - Modifications to enhance management capacity
- Ad Hoc Model Recommendations
- Barriers to Change
- Options
- Key Considerations

**Penny Galvin (power point):**

EMS Billing

- History
- Coding and Billing Process
- Collection Procedures
- Total Calls
- Total Billed and Collected
- Payer Mix
- Questions and Comments
  - Board asked various questions

**Stacey Simon:**

- Anything we charge has to be related to services provided.
- Need to put together some numbers, then have a public hearing and get a resolution approved.

**Note:**

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- Isn't sure that locals shouldn't be allowed a discount.

**DISCUSSION:**

**Supervisor Corless:**

- Asked for detail of each option in depth.
- Reminded everyone what the Ad Hoc recommendation was; she understood Ad Hoc recommended to Board that we work with current system.
- Need to decide which direction to go and maybe rely on consultants.
- We have agreed we want to expand service to underserved parts of county.
- Asked about scope of work on RFP. What are risks to county? What are experiences of other counties?
- Should we get some numbers from SYMONS for Fred's district?
- Would like pros and cons/risks and benefits of all options, including numbers.

**Supervisor Peters:**

- If there are options that majority of Board would NOT like to use, it might be easier to focus.
- Gave suggestions on how to bring in money for program.
- Walker is greatly motivated to keep their medic station and response times.
- Suggested board members do research/homework prior to the next scheduled special meeting.

**Supervisor Johnston:**

- Doesn't feel that there was any consensus on the recommended options by Ad Hoc Committee.
- Not thinking about doing a tax.
- In studies done, we're \$350,000 over what it costs other stations to run. Why the difference in personnel costs?
- If what we need is \$500,000 because we're choosing the Status Quo Option, how do we get there?
- Really just trying to determine *what* the options are.
- Why would anyone do an RFP unless they are expecting some subsidy?
- Feels we need to take whatever time it takes to figure this out.
- What about partial closure of two stations?
- Is response time related to time of day of call?
- Feels overtime is an issue that needs to be addressed.

**Supervisor Gardner:**

- Feels we're jumping into a solution without trying to solve the problem.
- Raising taxes may not be a good idea as no one will get anything more. Need to figure out who is getting the service.
- Seems that there are a lot more non-residents getting services than residents – not sure if that's true, would like to see the data.
- Need to define "fiscally sustainable".
- Conversation needs to be about response times.
- Asked about making a decision to recruit the chief now (no, because it's not agendaized). Need to agendaize that item for a meeting soon.

**Supervisor Stump:**

- Pointed out that percentages of contribution from county general fund out of various areas of county is around 83%, areas of county not being reached by medics are helping support the program.
- Doesn't want anyone to lose service, isn't looking to pull Medic 1.
- He's not rigid when it comes to service in District #2, he's not asking for full medic station.
- Brought up the possibility of Town contributions, they don't contribute now.
- Maybe look at revenue increases in areas of town where the stations are: increased TOT?

**Chief Frank Frievalt:**

- 3 options forwarded by Ad Hoc Committee – not one weighted more heavily than another but put in this order: remain status quo with modifications, integration of EMS with Fire Districts,

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Privatization of EMS.

- Mono has only system of our type in California; found something similar in Colorado. Board needs to tell them what they need to know in order to proceed.
- Feels we have to put out an RFP to see what the interest is.

**Lynda Salcido:**

- Feels we need to consider the four new options, the “more” – not what the Ad Hoc Committee originally recommended.

**Bob Rooks:**

- Status Quo Option: need a minimum of \$500,000 to make a difference and there's no money in this option. Is it cost effective? Is it fiscally sustainable? Where is more money going to come from? Increase in taxes – TOT or specifically earmarked.
  - Asked Frievalt about our cost per station vs. others?
  - Residents vs. visitors on calls and collections.
  - His goal was to find a minimum of \$500,000.
- Contract for Services: can only estimate cost: need to do RFP and have folks bid on that and say what they'd charge. There is interest: REMSA, SEMSA, SYMONS and AMR.
  - Need to question what is allowable on response time?
- Close 1 Full Time Station: potential to save \$1 million, just a rough number. Will cause greater call load on Medic 7 (Bridgeport).
  - East Fork Fire Protection has a very robust program – maybe they'd be willing to pick up calls in Northern area of Mono County.
  - Cost savings comes from laying off six employees.
  - Dispatch needs to be part of the overall discussion.
- Alternate Staffing Model: Maybe two stations open 24 hours and two dark at night.
  - This isn't a brown out, it's rather meeting some of the requirements in Ad Hoc Committee report.
  - Problems: If at night and there are high number calls, you take a chance you can't cover your calls.
  - The cost savings then comes from employees working less, not from operational budget.
  - Goes back to response times.
- May have until end of March, or into April until he's done working for county. Cautions to not set time limits on this. It's too important.

**Stacey Simon:**

- Gave additional information regarding RFP process.
- Inyo just completed RFP process.

**Leslie Chapman:**

- This is a cyclical thing; always coming up in relation to the economy.
- This program is not mandated so it always comes under a microscope.
- Looks like economy is on the mend again.
- Do we value this program? Is it important to county and citizens? If it is, we need to commit to it and determine what the county needs to do to keep it going.
- Always comes back to YES, it is important.

**B. Afternoon Session**

**THE AFTERNOON SESSION WILL RECONVENE NO EARLIER THAN 1:00 P.M.**

**C. Mono County Cemeteries**

Departments: Public Works

(Peter Chapman) - Presentation by Peter Chapman regarding the Mono County Cemeteries.

**Note:**

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**Action: None.**

**Peter Chapman:**

Power Point

- Presentation Outline:
  - Information on the current status of the cemeteries and the draft ordinance.
  - Identify challenges and solutions
  - Discuss plot fees
  - Prioritize next steps
- Currently not accepting reservations (since 2007)
- GPR mapping has been done (unmarked graves located)
- Maps for Bridgeport and Mono Lake are mostly consolidated
- Draft Ordinance is 90% complete
- Details of draft ordinance
- Mapping and Plotting Requirements
- Discussion re: Mt. Morrison, Mono Lake, and Bridgeport Cemeteries
- Monument and Headstone Policy
- Fees and Establishment of Maintenance Fund
- Record Keeping Requirements
- Interment and Disinterment Procedure
- Purpose of Cemeteries: To honor loved ones, provide a history of the area, for the health of the community
- Plot Confirmation and Burial Process and Challenges
- GIS Database
- Survey
- Policy
- Layout, installing markers and building the GIS database will take time
- Plot Fee Analysis
- Revenue and Expenditure
- Comparison Study: Small County Cemetery Operations
- Plot Fee Comparison Study
- Small Counties
- Nearby Cemeteries
- Averages
- Proposed Fees (Informal)
- What is correct order of operations?
- Questions & Comments?

Further Discussion:

- Feels that Ordinance is 90% done.
- He doesn't feel the Ordinance is a big hurdle; more concerned about the fee structure?
- Bring the fee structure back to RPACs or no?

**Paul Ravino (works at Mt Morrison):**

- In first two working groups that worked on Ordinance, goal was to minimize height and width.
- He would just be happy with some action.

**Leslie Chapman:**

- Cemeteries can be treated by a business.
- Feels like the messenger is getting killed here; she appreciates Peter's work on this. He has spent a lot of time on it.
- She will get with Public Works and work on maintenance schedule.

**BOARD DISCUSSION**

**Supervisor Gardner:**

- Shouldn't cost taxpayer anything but the cost of doing business.

**Note:**

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**Supervisor Peters:**

- Has Bridgeport RPAC been approached to do something similar to what Antelope Valley has done?
- Asked additional fee questions?
- This is his first run at this – feels people should be able to reserve a plot.
- Needs to be brought back to Bridgeport RPAC.

**Supervisor Stump:**

- Feels we need to act on either A or B.
- We're in the cemetery business, feels we should have this addressed by now.
- We might need to look into a spin off district.
- Feels we should encourage option B and move on with it. This has gone on way too long.
- He doesn't want to go back to RPACS.

**Supervisor Johnston:**

- Supports Option B.

**Supervisor Corless:**

- Suggests we direct staff to do begin maintenance.
- Asked what realistic timeframe for finalizing ordinance.
- Shoot for first meeting in April?

**Christy Milovich:**

- Explained Ordinance timing

**ADJOURN at 3:07 p.m.**

**ATTEST**

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**STACY CORLESS  
CHAIRMAN OF THE BOARD**

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**SHANNON KENDALL  
CLERK OF THE BOARD**



OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Clerk of the Board**

**TIME REQUIRED**

**SUBJECT** Board Minutes

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

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### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Approve minutes of the Regular Meeting held on February 21, 2017.

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### RECOMMENDED ACTION:

---

### FISCAL IMPACT:

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**CONTACT NAME:** Shannon Kendall

**PHONE/EMAIL:** x5533 / skendall@mono.ca.gov

---

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

### SEND COPIES TO:

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### MINUTE ORDER REQUESTED:

YES  NO

---

### ATTACHMENTS:

Click to download

[02-21-17 Draft Mins](#)

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### History

Time	Who	Approval
3/1/2017 4:50 AM	County Administrative Office	Yes
2/28/2017 4:31 PM	County Counsel	Yes
3/1/2017 5:30 PM	Finance	Yes



**DRAFT MINUTES  
BOARD OF SUPERVISORS, COUNTY OF MONO  
STATE OF CALIFORNIA**

Regular Meetings: The First, Second, and Third Tuesday of each month. Location of meeting is specified just below.

MEETING LOCATION Suite Z, 2nd Floor Minaret Mall, 437 Old Mammoth Rd., Suite Z, Mammoth Lakes, CA 93546

**Regular Meeting  
February 21, 2017**

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<b>Flash Drive</b>	<b>Board Room Recorder</b>
<b>Minute Orders</b>	<b>M17-40 to M17-45</b>
<b>Resolutions</b>	<b>R17-17</b>
<b>Ordinance</b>	<b>ORD17-04 – Not used</b>

9:08 AM Meeting Called to Order by Chairwoman Corless.

*Supervisors Present: Corless, Gardner, Johnston, and Stump (at Mammoth Lakes teleconference location, Suite "Z"); Peters (in Bridgeport).*

*Supervisors Absent: None.*

*\*All votes done by roll call vote, facilitated by the clerk of the board.*

*Closed Session: 9:55 a.m.*

*Reconvene: 12:00 p.m.*

*Break: 1:59 p.m.*

*Reconvene: 2:10 p.m.*

*Adjourn: 3:07 p.m.*

**The Mono County Board of Supervisors stream all of their meetings live on the internet and archives them afterward. To listen to any meetings from June 2, 2015 forward, please go to the following link:  
<http://www.monocounty.ca.gov/meetings>**

Pledge of Allegiance led by Supervisor Stump.

**Supervisor Corless:**

- Mentioned that Items #9a and #9b have been postponed until the

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regularly scheduled meeting on March 7, 2017.

1. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD

**Eric McCann (Washoe Paiute of Antelope Valley):**

- Here to discuss staking receivership of Antelope. He wants this on record so this can be taken care of. Gave some history.
- Supervisor Stump: Who are you demanding receivership from?
- Supervisor Corless: can't take action on public comment but appreciates update.

2. APPROVAL OF MINUTES - NONE

3. RECOGNITIONS - NONE

4. BOARD MEMBER REPORTS

**Supervisor Corless:**

- Close meeting in memory of Erin Willingham, June Lake Resident, Town of Mammoth Lakes employee who died 2/17, and (added in afternoon agenda discussion) Saul Morales of Mammoth Lakes.
- EMS discussion, continued—Wednesday, March 8 in Bridgeport, 10am.
- 2/16: Eastern Sierra Child Support Services Regional Oversight Committee special meeting, with agency staff Ashlee Alex and Emily Casabian, Rebecca Buccowich from our CAO office, Inyo County Supervisor Mark Tillemans and CAO Kevin Carunchio: Collection rate of 71%, top 15-20 agencies in the state (there are 49); approved the 17/18 budget recommendation/changes from prior year's budget.
- ESCSS had to move offices in Bishop twice in January but still maintained work/collections levels; they are interested and would like to be included in discussions of South County facilities in Mammoth.
- 2/17: Eastern Sierra Council of Governments
  - Approved first quarter work plan for new Inyo-Mono Broadband consortium, including formation of provider and community advisory councils, to which Mono County will need to appoint members (will bring this back for further discussion in March).
  - Approved letter of support to legislators re: Outdoor Rec Act.
  - Directed City of Bishop officials/staff to look at creating a stable web presence for ESCOG; currently there isn't one place to find meeting information, agendas, minutes, etc.
  - Discussion of regional air service: not too much to report due to weather.
  - Cannabis regulation: review of policy will be on agenda for August meeting.
  - YARTS JPS meets 2/22.
  - NACo legislative conference 2/24-3/1.

**Supervisor Gardner:**

- Attended the First 5 Commission meeting last Thursday and met the other Commissioners. The Chair is the County Supt. of Education, Stacy Adler. He was impressed with the various programs First 5 operates, and their efforts to track progress achieved.
- Attended the monthly meeting of the Eastern Sierra Transit Board. We discussed several items, including continuation of the June Lake Community Shuttle service this summer.
- ESTA also operated a shuttle in June Lake from several locations to June Mountain, in an effort to reduce some of the parking crunch this last Saturday and Sunday. June Mountain supported this special service.
- He has received several emails and calls regarding the sheep grazing issue before the Board. There is clearly much concern about this issue in the County.
- He continues to be impressed with county staff's dedication and hard work during these storms.

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**Supervisor Johnston:**

- Has been receiving a number of emails and has been reviewing numerous reports and background studies related to the Big Horn sheep issue coming up on March 7.
- Along with other supervisors participated in the EMS workshop held last week; follow up will be on March 8th special meeting.
- Also along with other supervisors participated in the Cemetery workshop held last week.
- Attended the ESCOG meeting last Friday; Supervisor Corless has reported on this meeting.
- Attended the CSAC Board of Directors meeting; main items included road funding legislation and possible effects on the IHSS program as currently contained in the Governor's budget. Provided handouts from the meeting including a graphic one that describes California's Uneven Recovery.
- As other Supervisors have commented, thanked the staff for efforts during the recent storms. Noted and thanked the Town for supplying CCC crews for snow removal work.

**Supervisor Peters:**

- Held 2 Town Halls in Walker and Bridgeport. At the Bridgeport Town Hall, there was a Behavioral Health Social organized by Debra Stewart.
- Attended the Cal Trans Aspen Fales Public Hearing.
- Bridgeport RPAC last Thursday – Banner Project
- Met separately with Fire Chiefs Mike Curti and Mike Booher.
- On Thursday visited the Bridgeport Parks/Facilities Shop and observed the training for the new Mono County Thermal Bio Mass Project which provides heat for the Road and Facilities shop. On site was a Rep from Viessman (acknowledged Joe Blanchard and the Facilities Team led by Jason Davenport Project Manager, Don Nunn, Electrical, Jesse Hale, Tom Music, Eric Ellets, Tony Iniguez, John Hauter, and Claude Fiddler).
- Recognized Animal Control for all their work during difficult weather challenges.
- Thanked Public Works, Cal Trans, Sheriffs and Highway Patrol.
- Toured the Bridgeport Cemetery.
- Met with our DA Tim Kendall.
- Scheduled a meeting with Jim Donallen at MWTC for 28<sup>th</sup>.

**Supervisor Stump:**

- Continued work on the SGMA and its impact on the County, Tri Valley, and Swall Meadows. On Thursday, had a long conversation with Bob Harrington of the Inyo County Water Department. I was informed that the Department of Water Resources has issued new and quite strict guidelines on what a sustainability plan should contain.
- Continued work with Frontier on phone service issues in Hammil Valley. Hammil Valley has no cell service and there are many landline problems that have been documented by the community. Basic 911 service is at risk. He will go to the Public Utilities Commission if Frontier's response is inadequate.
- Thoughts on the Oroville Dam situation: The Sacramento Bee has reported that the flood plan for the dam has not been updated for 50 years. This is in addition to the 10 year recognition that the spillways needed repair and upgrades. Hwy 70 has a 20+ mile streak of two lane road that has been on an upgrade list for many years. When the evacuation order was issued this stretch of road became gridlocked. Our State Government has ignored these issues, of course after evacuating 180,000 people they are now getting attention. We have been discussing the need to evaluate our performance during this winter and create improvements in communication and coordination. I hope that when this happens we are more proactive than the State of California has been around the Oroville Dam and implement constructive changes to improve our operations. We have done an admirable job this winter but there is always room for improvement.

**5. COUNTY ADMINISTRATIVE OFFICE**

**CAO Report regarding Board Assignments**

**Note:**

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Receive brief oral report by County Administrative Officer (CAO) regarding work activities.

**Leslie Chapman:**

- 2/15 – special board meeting EMS workshop; 3/8 another special meeting for EMS scheduled.
- Consent item on agenda today to hire new EMS Chief.
- 2/15 Town Council meeting p.m. – mostly there for South County Facility discussion.
- ICEMA – met with them, they provide retirement benefits. Asked to meet with this group by Deputy Sheriff Association, will bring back further information.
- 2/17 – attended ESCOG meeting.
- Today in Inyo County, we have planning department representatives at their board meeting regarding State Groundwater Management Act.
- Expecting to have bound copies of Leg Platform delivered tomorrow in Mammoth; shoot her an email if you want one.
- Trying to keep on top of storms and damage; Town and County doing all they can; Red Cross here through Thursday. Plan for worst, hope for best.

6. DEPARTMENT/COMMISSION REPORTS

**Sheriff Braun:**

- Swore in new deputy: Ralston; also reported that she swore in Brent Gillespie several months ago.

7. CONSENT AGENDA

(All matters on the consent agenda are to be approved on one motion unless a board member requests separate action on a specific item.)

A. Out of State Travel Request - Penny Galvin

Departments: Finance

This conference will provide Penny Galvin with enhanced knowledge on the EMS billing software ImageTrend and allow her to share her knowledge of EMS billing in order to assist in the expansion and fine tuning of the ImageTrend software.

**Action:** Approve out of state travel request for Penny Galvin, in order to attend ImageTrend Connect 2017 Conference in St. Paul, Minnesota, leaving July 18, 2017 and returning on July 21, 2017.

**Stump moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**M17-40**

B. Out of State Travel Request - Janet Dutcher

Departments: Finance

This annual conference features many opportunities for finance officers to hone their leadership and management skills with a chance to learn about fiscal strategies, policies and practices for managing governmental financial resources and to implement these best practices here in Mono County.

**Action:** Approve out of state travel request for Janet Dutcher, to attend the Government Finance Officers' Association (GFOA) annual conference being held in Denver, Colorado this year, leaving May 21 and returning May 24, 2017.

**Note:**

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**Stump moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**M17-41**

C. Out of State Travel NADCP Training Conference

Departments: Probation

(Karin Humiston) - Seeking approval for out of state travel from July 9, 2017 through July 12, 2017 for the National Association of Drug Court Professionals (NADCP) Annual Training Conference in Washington D.C. Attendees are Jon Himelhoch, Stacie Casabian and Rich Bonneau.

**Action:** Approve out of state travel for Probation employees Jon Himelhoch and Stacie Casabian and for Behavioral Health employee Rich Bonneau to attend the NADCP Annual Training Conference in Washington DC July 9-12, 2017 with a travel day July 8, 2017.

**Stump moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**M17-42**

D. Planning Commission Appointments

Departments: Community Development and Board of Supervisors

Appointment of three planning commissioners to new four-year terms.

**Action:** 1. Reappoint Roberta Lagomarsini, with term expiring March 1, 2021, to the Mono County Planning Commission as recommended by Supervisor Stump; 2. Reappoint Daniel Roberts, with term expiring March 1, 2021, to the Mono County Planning Commission as recommended by Supervisor Gardner; 3. Reappoint Scott Bush, with term expiring March 1, 2021, to the Mono County Planning Commission as recommended by Supervisor Peters.

**Stump moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**M17-43**

**Supervisor Peters:**

- Commended Scott Bush for all his years of service.

E. Recruitment of EMS Chief

Departments: EMS Department

The current EMS Chief, Robert Rooks, will exceed his 960 hours allocated in his employment contract by the end of April, 2017. Therefore, recruitment for his replacement should begin as soon as possible.

**Action:** Authorize the Mono County Human Resources Department to begin recruitment for a full-time EMS Chief.

**Stump moved; Johnston seconded**

**Vote: 5 yes; 0 no**

**M17-44**

**Note:**

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**Pulled by Supervisor Johnston:**

- An EMS chief may not be necessary in light of options that are out there.
- Doesn't feel discussion has been completed.
- He thought there was a caveat involved.
- He's in support but if there is an option chosen that doesn't require a chief, this needs to be clearly communicated to potential chief.
- Maybe once we discuss in March, this will become clearer.

**Leslie Chapman:**

- Feels that regardless of which option is chosen that there was a lot left to do that would benefit from having a chief. We could benefit from having someone lead us through that process.
- Even if we do a RFP, she feels that we'd need help, i.e. a chief.
- We have the money in the budget.
- If it's not the board's intention to hire a chief, she needs to know as soon as possible.

**Lynda Salcido:**

- This position cannot be left vacant, there is too much to this position.
- This is an At-Will position and would be subject to whatever option the Board chooses.
- Encourages to do this ASAP so as not to leave program unattended.
- Feels we should be transparent in the process with all recruits for chief.

**Supervisor Stump:**

- After recruitment, will there be some information given to prospects regarding what's going on?

8. CORRESPONDENCE RECEIVED - NONE

9. REGULAR AGENDA – MORNING

A. Presentation on Sierra Nevada Bighorn Sheep

Departments: Public Works

(CA DFW staff and USFWS staff) - Presentation by CA DFW and USFWS regarding Sierra Nevada Bighorn Sheep Recovery efforts.

**Action:** None, item postponed until March 7, 2017.

B. Direction to Staff re Conway Ranch Request for Grazing Proposals

Departments: Public Works

(Tony Dublino) - Presentation by Tony Dublino regarding potential issuance by County of a Request for Proposals for Grazing at Conway Ranch.

**Action:** None, item postponed until March 7, 2017.

10. OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD

*No one spoke.*

11. CLOSED SESSION – BEGAN AT 9:55 A.M.

*There was nothing to report out of closed session.*

A. Closed Session--Human Resources

CONFERENCE WITH LABOR NEGOTIATORS. Government Code Section

**Note:**

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54957.6. Agency designated representative(s): Stacey Simon, Leslie Chapman, and Dave Butters. Employee Organization(s): Mono County Sheriff's Officers Association (aka Deputy Sheriff's Association), Local 39--majority representative of Mono County Public Employees (MCPE) and Deputy Probation Officers Unit (DPOU), Mono County Paramedic Rescue Association (PARA), Mono County Public Safety Officers Association (PSO), and Mono County Sheriff Department's Management Association (SO Mgmt). Unrepresented employees: All.

## 12. REGULAR AGENDA - AFTERNOON

### A. Review of Need for Continuation of Local Emergency

Departments: CAO, Sheriff

(Leslie Chapman, Ingrid Braun) - On January 31, 2017 the Mono County Sheriff declared a state of local emergency as a result of extreme winter weather. The Board of Supervisors ratified this declaration on February 7, 2017, and further declared a continuing state of emergency. Mono County Code Section 2.60.080 requires that the Board of Supervisors review the need for continuing the local emergency every 14 days until it is terminated. This item is provided for that purpose.

**Action:** None (state of emergency continues).

**Sheriff Braun:**

- Feels we are still in a state of emergency.
- Her intention is to continue emergency until we see how much damage has been caused.
- They will come back every 14 days to continue the state of emergency.

**Supervisor Stump:**

- Encourages continuing emergency into run-off season.

**Leslie Chapman:**

- There will be times when this might not be on an exact 14 day frequency but we'll work around it.

### B. Mid-Year Budget Review

Departments: CAO, Finance

(Leslie Chapman, Janet Dutcher) - Receive analysis of the County's General Fund fiscal performance for the year ended June 30, 2016. Present mid-year budget review and discuss budget updates.

To view documents related to this item which are too large to attach to the agenda, please click on the link below:

<http://www.monocounty.ca.gov/auditor/page/2016-17-mono-county-mid-year-budget-review>

**Action:** Receive analytical analysis of General Fund fiscal performance for the year ended June 30, 2016. Hear budget updates and approve the mid-year budget adjustments (4/5ths vote required).

**Note:**

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**Garner moved; Peters seconded**

**Vote: 5 yes; 0 no**

**M17-45**

**Janet Dutcher:**

**MID-YEAR BUDGET REVIEW POWER POINT:**

- GF Fiscal Performance FY 2015-16
- Mid-Year Budget Review FY 2016-2017
- Budget updates and requested mid-year changes
- Why are we comparing last year's budget with actual year-end results?
  - Assess GF fiscal health
  - Analyze budget preciseness
  - Evaluate trends
  - Carryover balance
  - Long-term financing needs
- GF Fiscal Overview for FY 2016
  - Unassigned fund balance: \$6,920,037
- Highlights
- GF Revenues – two types (Program and Discretionary)
- GF Revenues Budget vs. Actual 2016
- Discretionary Revenues Recovering FY 2013 – FY 2016
- Changes in Program Revenues FY 2013 – FY 2016
- How did we do controlling spending?
- Salary, Wages, Overtime and Benefits FY 2013 – FY 2016
- Other Expenditures FY 2013 – FY 2016
- Fiscal Sustainability (ability to sustain spending when revenues are insufficient).
- General Reserve Balance
- What is carryover available for future spending or saving?
- What's not included in the budget (long-term financing needs)?
- How are we doing on FY 2017 discretionary revenues – so far?
- Budget status?

**Other Discussion:**

- Entire presentation is only General Fund.
- We have sufficient contingency funds that Supervisor Stump's extra road requests can be funded with.
- Budget calendar will be coming in the next couple months.

**Supervisor Johnston:**

- Asked about dates on various slides.
- Asked Prop 8 questions.
- New growth or recuperation of growth?
- Where is allocation of CAO positions?
- Had an avalanche earlier this year – had potential to take out all power in town: fueling stations could have been shut down. He believes it is essential that county working with town, have hookups available to designated stations to enable people to get fuel if necessary. Not sure of cost. Needs to be structured as a county owned tool that public owners at gas stations could access in an emergency.
- Can we ask Avalanche Consultant what her budget is now? Adjust accordingly?
- School District request (Footsteps2Brilliance): reluctant for county to be funding school kinds of things; should be a way to fund through other school sources.
- Didn't like what we did creating the Economic Stabilization Fund. When we get to point of considering how much to put into reserves, need to look at where we are, etc. at state and federal levels.

**Note:**

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**Supervisor Stump:**

- Overtime questions.
- Services is only General Fund?
- This year we will be faced with the issue of Tioga Pass.
- Concerned about funding for road rehabilitation and sandbags etc.; needs assurance that contingency funds can fund additional emergency needs.
- Discussed Avalanche Consultant.

**Supervisor Gardner:**

- Asked how policy items came about?
- Staff should bring back plan for backup generators.
- He agrees that supporting the Footsteps2Brilliance initially is important to help get it off the ground.
- His experience with what “reserves” are used for is different than Supervisor Johnston’s.

**Supervisor Peters:**

- How much overtime is scheduled?
- School District request: jump start funding request, will tie into first five. Something Stacey Adler identified after budget was approved; it’s separate from the traditional funding request stream. He supports the \$10,000 appropriation.
- Clarified the unassigned fund balance.

**Supervisor Corless:**

- Request today is to approve mid-year budget recommendations.

**Leslie Chapman:**

- \$1.7% was GDP or COLA, what we don’t know is amount of Prop 8 vs. new sales.
- What is the carryover available for future spending or saving?
- Recommends we bring road supplies back as extra contingencies?
- Combo of increased revenues and contingencies.
- She did a little research about back-up generator at gas stations: the issue of a gift of public funds came up; county counsel has done some research on this. She’s happy to take this up again and get more information.
- Public Works has money to purchase another 10,000 sandbags.
- Avalanche consultant contract: doesn’t it even out?

**Bruce Woodworth:**

- Antelope Valley Emergency Response Team
- Asking for radio system specific to needs of Antelope Valley but would be integrated through AV Fire Dept.
- To his knowledge, they have not asked for county funds before.
- This is for a radio communications system to maintain interoperability and reliable radio communications.
- Asking for \$3,500.
- Supervisor Johnston: believes there were some start-up funds initially for this; could do a tentative allocation.
- Supervisor Gardner: Asked to hear from Nate Greenberg, IT Director.
- Nate Greenberg: thinks in concept it is a good idea but this is the first he’s heard of this. Would like more information. He’d be happy to work with Antelope Valley. Need to determine how dispatch response works with all this. Our dispatch is responsible for all areas in Mono County. Seems like a good opportunity to explore coordination; feels it needs to be looked at on context of overall communications.
- He’d like more information on GIS aspect, would be interested in working with Nate’s office.
- Other speaker (no name given): looking for something that will cover only the valley. His understanding is that they are coordinating with state OES system with already licensed portable units.
- Supervisor Stump: proposal here doesn’t specify which frequencies you’d be on. Not necessarily opposed to their request but he has concerns and is worried that the radios they

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want to use are out of date. He sees the benefits of covering the valley but he sees need for further analysis.

- Leslie Chapman: we wouldn't release monies without invoice.
- Supervisor Peters: needs to be coordinated with IT.

### C. SB 844 Jail Project Proposal Package

Departments: Public Works

(Garrett Higerd) - Update on proposal for jail revenue bond funds to construct a new jail facility on the site of the old County hospital on Twin Lakes Road. The Mono County General Plan is available at: <http://monocounty.ca.gov/planning/page/general-plan-eir>

The contract documents (in template form) for the project are located at [http://www.bscc.ca.gov/s\\_cfcformofdocuments.php](http://www.bscc.ca.gov/s_cfcformofdocuments.php). These documents would be approved as to form in the proposed resolution and then finalized and executed if the grant were awarded. County Counsel has reviewed the contracts and finds them to be legally adequate and acceptable as to form.

**Action:** Receive update on status of SB 844 Jail Project Proposal Package to construct a new jail facility on the site of the old County hospital on Twin Lakes Road. Approve Resolution R17-17 authorizing application for adult detention facility construction funds under SB 844 from the Board of State and Community Corrections and adopting a General Plan EIR Addendum.

**Peters moved; Johnston seconded**

**Vote: 5 yes; 0 no**

#### **R17-17**

**Garrett Higerd:**

- Here to walk everyone through SB 844 Jail Proposal package.
- Wants to make sure everyone understands application package.
- Gave information regarding Site Plan (showed map).
- Big change since last site plan, whole jail's structure has been moved to the north. Puts it closer to existing Bridgeport medical clinic which creates better access between the clinic and the new jail facility, including parking options. Lowers footprint.
- New site plan is much better from an engineering point of view.
- Went over all costs associated with building jail.
- Between now and contract for construction is a long time; there is a cash flow component.
- Applications are due February 28<sup>th</sup> and they will give notice to people that have been successful in June. This money would not need to be funded until well after June 2017.
- Scheduled included in packet (attachment 4 in packet) showing detailed timeline.
- EIR attachment also very pertinent; this is important as it is a large part of our score.

**Janet Dutcher:**

- Besides having to pay for expenditures which are our responsibility, we will have to pay 25,000,000 over period of times; idea is to put into fund to pay out of.
- Fanny Mono Loan – only thing available to us at this point. We can fund with stabilization fund but that could impact our operating budget.
- Short-term borrowing: Fanny Mono or some kind of bank loan which we haven't initiated conversations on that as of yet.
- Funding source needs to be secure and separate.
- Went over loan numbers.
- There will be a separate agenda item to approve loan, not sure of timing. May need to be in

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place prior to being approved.

- TOT tax might be impacted during construction phase.
- Hopeful we can find outside funding and be creative with budgeting: contingent funding.

**Supervisor Stump:**

- Asked about term of loan (Fanny Mono).
- Added as line item where?
- Asked about kitchen and dining area.
- Supports this but Bridgeport's gain will come at a cost to the rest of the county. He acknowledges liability concerns and also that our other option has been taken off the table.

**Supervisor Corless:**

- Resolution today approves applying for grant and budget amendment?
- She still wishes that we could fund something other than the jail, it's a lot of money.
- Finance mechanism discussion: we demonstrate clearly to public all options that have been exhausted to get us to this point.
- We need to continually make sure we can afford this and be cognizant of sticking to our budget.

**Supervisor Johnston:**

- Asked general funding/other questions.
- What is Garrett's sense of this being approved?
- Can we guarantee \$1.4 million another way and then do rest with Fanny Mono?
- Feels this is very significant for county.

**Supervisor Gardner:**

- This addresses deficiencies in current jail. This new facility will correct those?
- We could be subject to potential litigation without corrections, correct?
- Asked about jobs that this might generate?

**Supervisor Peters:**

- Ready to make a motion.

**Mike Booher:**

- Gave number of female beds (currently at 4). Can go to 10, as high as 12.
- Intent is to enclose walkway for dining.

**Sheriff Braun:**

- Thanked staff and Mike Booher for all their work.
- Thanked Janet and Leslie too for helping put this together.
- Feels this is a great opportunity for county overall.
- Bridgeport needs jail as much as jail needs Bridgeport.

**Hector Gonzalez:**

- Spoke to Judge Magit about court's input and is her to convey those.
- Feels this is an overall improvement in infrastructure.
- Discussed various issues including inclusion of a facility for juvenile detention.
- Multi-Purpose room for video arraignments, willing to coordinate costs with county assuming equipment is appropriate.
- Logistics: there might be increased costs for transporting inmates.
- Collaborative group of justice partners should come together.

**Joe Blanchard:**

- Old hospital is cold storage, would be a win for county to get rid of that. Not dealing with maintenance in old jail would also be a win.
- Public Works is strong advocate for this project.

**Abagael Giles (The Sheet):**

- Asked whether we had to commit to funding prior to being approved?

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ADJOURN 3:07 p.m. in memory of Erin Willingham and Saul Morales.

**ATTEST**

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**STACY CORLESS**  
**CHAIRWOMAN OF THE BOARD**

---

**SHANNON KENDALL**  
**CLERK OF THE BOARD**





OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Health Department**

**TIME REQUIRED**

**SUBJECT** Mono County Children's Medical  
Services (CMS) Plan Fiscal Year  
2016-2017

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Proposed contract with California Department of Health Care Services (DHCS) Children's Medical Services (CMS) branch pertaining to the CMS Plan Fiscal Year 2016-2017.

### RECOMMENDED ACTION:

Approve County entry into proposed contract with DHCS and authorize the BOS Chairperson to execute said contract on behalf of the County through signing the California Children Services (CCS) and Child Health and Disability Prevention Program (CHDP) Certification Statements.

### FISCAL IMPACT:

There is zero impact to the Mono County General Fund. These programs are funded with a mix of Federal Title XIX (Medicaid), Federal Title XXI funds, State General Fund, and Realignment dollars totaling \$252,558.

**CONTACT NAME:** Jody Martin

**PHONE/EMAIL:** 760 924-1841 / jmartin@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

### SEND COPIES TO:

Jody Martin, Kimberly Bunn, and Lynda Salcido

### MINUTE ORDER REQUESTED:

YES  NO

### ATTACHMENTS:

Click to download

[BOS Staff Report](#)

[CMS Certification Statements for BOS Signature](#)

**History**

<b>Time</b>	<b>Who</b>	<b>Approval</b>
2/28/2017 12:32 PM	County Administrative Office	Yes
3/1/2017 4:26 PM	County Counsel	Yes
3/1/2017 5:27 PM	Finance	Yes

DATE: February 3, 2017  
TO: Honorable Board of Supervisors  
FROM: Jody Martin, CMS Administrator

SUBJECT: Mono County Children's Medical Services (CMS) Plan  
Fiscal Year 2016-2017.

**RECOMMENDED ACTION:** That the Board of Supervisors approve and authorize Chairman to sign the Mono County Children's Medical Services (CMS) Plan for fiscal year 2016-17.

**DISCUSSION:** In Mono County, California Children's Services (CCS), California Health and Disability Prevention Program (CHDP) and Health Care Program for Children in Foster Care (HCPCFC) services are provided through the Mono County Health Department. All three programs are integrated within the California Department of Health Care Services (DHCS) under Children's Medical Services (CMS). These programs provide a variety of medical services to eligible children. The Mono County Health Department receives funding to provide administration and case management services in support of these programs.

The CCS Program provides diagnostic and treatment services to financially eligible children with qualifying medical conditions. Case management, provided by a Mono County Public Health CCS nurse, includes finding appropriate providers; obtaining authorizations for care, equipment, supplies and medications; assistance with scheduling; reviewing medical reports; and acting on recommendations and referrals. Additionally, a Medical Therapy Conference is held twice a year to coordinate referrals for care, physical and occupational therapy, and the ordering and creation of specialized equipment for children with chronic orthopedic or neuromuscular conditions.

The CHDP Program provides periodic, well child exams for financially eligible children. The program includes physical exams and immunizations; and referrals for treatment. CMS staff at Mono County Public Health review all reports, and make referrals to appropriate agencies and specialists as needed.

The HCPCFC Program provides medical case management for Mono County children who are placed in Foster Care through Child Welfare Services or the Probation Department. The HCPCFC nurse at Mono

County Public Health provides medical case management services to ensure each child's health needs are met until the child returns to his or her family; is emancipated at age 18; is placed in extended Foster Care through AB 12; or finishes high school.

**FISCAL IMPACT:** There is zero impact to the Mono County General Fund. These programs are funded with a mix of Federal Title XIX (Medicaid), Federal Title XXI funds, State General Fund, and Realignment dollars totaling \$252,558.

If there any questions regarding this item, please contact Jody Martin at 924-1841.

Submitted by:

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Jody Martin

CMS Administrator

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Lynda Salcido

Public Health Director

**Certification Statement - California Children's Services (CCS)**

County/City:     Mono     Fiscal Year:   2016-2017  

I certify that the CCS Program will comply with all applicable provisions of Health and Safety Code, Division 106, Part 2, Chapter 3, Article 5, (commencing with Section 123800) and Chapters 7 and 8 of the Welfare and Institutions Code (commencing with Sections 14000-14200), and any applicable rules or regulations promulgated by DHCS pursuant to this article and these Chapters. I further certify that this CCS Program will comply with the Children's Medical Services Plan and Fiscal Guidelines Manual, including but not limited to, Section 9 Federal Financial Participation. I further certify that this CCS Program will comply with all federal laws and regulations governing and regulating recipients of funds granted to states for medical assistance pursuant to Title XIX of the Social Security Act (42 U.S.C. Section 1396 et seq.) and recipients of funds allotted to states for the Maternal and Child Health Services Block Grant pursuant to Title V of the Social Security Act (42 U.S.C. Section 701 et seq.). I further agree that this CCS Program may be subject to all sanctions or other remedies applicable if this CCS Program violates any of the above laws, regulations and policies with which it has certified it will comply.



Signature of CCS Administrator

10/20/16

Date Signed



Signature of Director or Health Officer

10-20-16

Date Signed

Signature and Title of Other – Optional

Date Signed

I certify that this plan has been approved by the local governing body.

Signature of Local Governing Body Chairperson

Date

**Certification Statement - Child Health and Disability Prevention (CHDP) Program**

County/City:  Mono  Fiscal Year:  2016-2017

I certify that the CHDP Program will comply with all applicable provisions of Health and Safety Code, Division 106, Part 2, Chapter 3, Article 6 (commencing with Section 124025), Welfare and Institutions Code, Division 9, Part 3, Chapters 7 and 8 (commencing with Section 14000 and 14200), Welfare and Institutions Code Section 16970, and any applicable rules or regulations promulgated by DHCS pursuant to that Article, those Chapters, and that section. I further certify that this CHDP Program will comply with the Children's Medical Services Plan and Fiscal Guidelines Manual, including but not limited to, Section 9 Federal Financial Participation. I further certify that this CHDP Program will comply with all federal laws and regulations governing and regulating recipients of funds granted to states for medical assistance pursuant to Title XIX of the Social Security Act (42 U.S.C. Section 1396 et seq.). I further agree that this CHDP Program may be subject to all sanctions or other remedies applicable if this CHDP Program violates any of the above laws, regulations and policies with which it has certified it will comply.



Signature of CHDP Director

10/20/16

Date Signed



Signature of Director or Health Officer

10-20-16

Date Signed

Signature and Title of Other – Optional

Date Signed

I certify that this plan has been approved by the local governing body.

Signature of Local Governing Body Chairperson

Date

# CHILDREN'S MEDICAL SERVICES PLAN

## **MONO COUNTY**

### FISCAL YEAR

### **2016-2017**







**Agency Information Sheet**

**County/City:** Mono

**Fiscal Year:** 2016-2017

**Official Agency**

<b>Name:</b>	Mono County Health Department	<b>Address:</b>	437 Old Mammoth Rd, Suite Q PO Box 3329
<b>Health Officer</b>	Richard O. Johnson, MD		Mammoth Lakes, CA 93546

**CMS Director (if applicable)**

<b>Name:</b>	Jody Martin RN, BSN, PHN	<b>Address:</b>	437 Old Mammoth Rd, Suite Q PO Box 3329
<b>Phone:</b>	760-924-1841		Mammoth Lakes, CA 93546
<b>Fax:</b>	760-924-1831	<b>E-Mail:</b>	<a href="mailto:jmartin@mono.ca.gov">jmartin@mono.ca.gov</a>

**CCS Administrator**

<b>Name:</b>	Jody Martin RN, BSN, PHN	<b>Address:</b>	437 Old Mammoth Rd, Suite Q PO Box 3329
<b>Phone:</b>	760-924-1841		Mammoth Lakes, CA 93546
<b>Fax:</b>	760-924-1831	<b>E-Mail:</b>	<a href="mailto:jmartin@mono.ca.gov">jmartin@mono.ca.gov</a>

**CHDP Director**

<b>Name:</b>	Richard O. Johnson, MD	<b>Address:</b>	437 Old Mammoth Rd, Suite Q PO Box 3329
<b>Phone:</b>	760-924-1830		Mammoth Lakes, CA 93546
<b>Fax:</b>	760-924-1831	<b>E-Mail:</b>	<a href="mailto:rjohnson@mono.ca.gov">rjohnson@mono.ca.gov</a>

**CHDP Deputy Director**

<b>Name:</b>	Jody Martin RN, BSN, PHN	<b>Address:</b>	437 Old Mammoth Rd, Suite Q PO Box 3329
<b>Phone:</b>	760-924-1841		Mammoth Lakes, CA 93546
<b>Fax:</b>	760-924-1831	<b>E-Mail:</b>	<a href="mailto:jmartin@mono.ca.gov">jmartin@mono.ca.gov</a>

**Clerk of the Board of Supervisors or City Council**

<b>Name:</b>	Bob Musil	<b>Address:</b>	PO Box 237
<b>Phone:</b>	760-932-5538		Bridgeport, CA 93517
<b>Fax:</b>	760-932-5531	<b>E-Mail:</b>	<a href="mailto:bmusil@mono.ca.gov">bmusil@mono.ca.gov</a>

**Director of Social Services Agency**

Name:	Kathy Peterson	PO Box 2969
Phone:	760.924.1763	Mammoth Lakes, CA 93546
Fax:	760.932-5287	E-Mail: kpeterson@mono.ca.gov

**Chief Probation Officer**

Name:	Karin Humiston	PO Box 596
Phone:	760-932-5572	Bridgeport, CA 93517
Fax:	760-932-5571	E-Mail: khumiston@mono.ca.gov

**Certification Statement - California Children's Services (CCS)**

County/City:     Mono     Fiscal Year:     2016-2017    

I certify that the CCS Program will comply with all applicable provisions of Health and Safety Code, Division 106, Part 2, Chapter 3, Article 5, (commencing with Section 123800) and Chapters 7 and 8 of the Welfare and Institutions Code (commencing with Sections 14000-14200), and any applicable rules or regulations promulgated by DHCS pursuant to this article and these Chapters. I further certify that this CCS Program will comply with the Children's Medical Services Plan and Fiscal Guidelines Manual, including but not limited to, Section 9 Federal Financial Participation. I further certify that this CCS Program will comply with all federal laws and regulations governing and regulating recipients of funds granted to states for medical assistance pursuant to Title XIX of the Social Security Act (42 U.S.C. Section 1396 et seq.) and recipients of funds allotted to states for the Maternal and Child Health Services Block Grant pursuant to Title V of the Social Security Act (42 U.S.C. Section 701 et seq.). I further agree that this CCS Program may be subject to all sanctions or other remedies applicable if this CCS Program violates any of the above laws, regulations and policies with which it has certified it will comply.



Signature of CCS Administrator

    10/20/16    

Date Signed



Signature of Director or Health Officer

    10-20-16    

Date Signed

Signature and Title of Other – Optional

Date Signed

I certify that this plan has been approved by the local governing body.

Signature of Local Governing Body Chairperson

Date

**Certification Statement - Child Health and Disability Prevention (CHDP) Program**

County/City:     Mono     Fiscal Year:   2016-2017  

I certify that the CHDP Program will comply with all applicable provisions of Health and Safety Code, Division 106, Part 2, Chapter 3, Article 6 (commencing with Section 124025), Welfare and Institutions Code, Division 9, Part 3, Chapters 7 and 8 (commencing with Section 14000 and 14200), Welfare and Institutions Code Section 16970, and any applicable rules or regulations promulgated by DHCS pursuant to that Article, those Chapters, and that section. I further certify that this CHDP Program will comply with the Children's Medical Services Plan and Fiscal Guidelines Manual, including but not limited to, Section 9 Federal Financial Participation. I further certify that this CHDP Program will comply with all federal laws and regulations governing and regulating recipients of funds granted to states for medical assistance pursuant to Title XIX of the Social Security Act (42 U.S.C. Section 1396 et seq.). I further agree that this CHDP Program may be subject to all sanctions or other remedies applicable if this CHDP Program violates any of the above laws, regulations and policies with which it has certified it will comply.

*July A. Martin*

\_\_\_\_\_  
Signature of CHDP Director

*10/20/16*

\_\_\_\_\_  
Date Signed

*Sandra Salcedo, Debbie Hallock Dir*

\_\_\_\_\_  
Signature of Director or Health Officer

*10-20-16*

\_\_\_\_\_  
Date Signed

\_\_\_\_\_  
Signature and Title of Other – Optional

\_\_\_\_\_  
Date Signed

I certify that this plan has been approved by the local governing body.

\_\_\_\_\_  
Signature of Local Governing Body Chairperson

\_\_\_\_\_  
Date

### Agency Brief Narrative

As Mono County is an extremely rural county, specialist medical care requires out of county travel of at least 5 hours or more. Travel out of county can be very difficult at times of the year due to heavy snow fall, road closures, or travel restrictions. Very few specialists practice in Mono County, especially pediatric specialists. In addition to the three pediatricians, the only local clinic with pediatric specialists is the dental clinic.

Since many families are at or below the federal poverty level in Mono County, out of pocket payments and out of county travel have significant financial impact and often families are not able to follow through with the recommended specialist care as a result. For our out of town specialist referrals, families may not be able to take the needed days off from work or have the transportation and must coordinate with other family and friends to travel, thus adding to the delay in receiving care. We have also found that some specialists have more than a month long wait list and, finally, fewer and fewer local providers accept Managed Care Medi-Cal for payment.

The California Children's Services (CCS) program provides diagnosis and treatment services at Loma Linda University Medical Center; Lucille Packard; University of California at Davis; and Children's Hospitals of Orange County, Los Angeles, and Central California for special needs children to age 21 in Mono County. The CCS program is mandated by the Welfare and Institutions Code and the California Code of Regulations (Title 22, Section 51013) to act as an "agent of Medi-Cal" for Medi-Cal beneficiaries with CCS medically eligible conditions. Services to children with CCS eligible medical conditions are 'carved out', which means that children receive treatment directly related to their CCS medical condition through the CCS program; primary care and other medical services are provided through their Medi-Cal Managed Care plan. The CCS administrator at Mono County Public Health Department coordinates medical eligibility through the California DHCS Systems of Care Division, Southern California Regional Office; provides case management services; and coordinates physical and occupational therapy with Mammoth Hospital and Mono County Office of Education.

A Medical Therapy Conference is held twice a year for children in Inyo and Mono Counties with neuromuscular, musculoskeletal, or muscular disabilities. Families and children consult with a pediatric orthopedic surgeon, pediatrician, registered dietician, physical and occupational therapists, an orthotist, and a durable medical equipment provider. The goal of the Medical Therapy Program is to assist each eligible child to obtain his or her maximum physical potential by evaluating needs for therapy, special equipment, or bracing.

Due to the small population size of Mono County, the structure of the Child Health and Disability Prevention (CHDP) program is the interface between two agencies: Mono County Public Health and Department of Social Services. In Mono County, the Health Department handles the administrative aspects of CHDP; the Department of Social Services educates and refers their clients to CHDP when appropriate; and Sierra Park Pediatric pediatricians are the providers. The CHDP Deputy Director works with the Medi-Cal eligibility program manager in Social Services as well as the physicians within the CHDP program. The CHDP Deputy Director meets quarterly with Managed Care Medi-Cal providers to facilitate case coordination with the medical referrals documented on the CHDP exam. Managed Care Medi-Cal providers in Mono County are California Health and Wellness and Anthem Blue Cross. The CHDP case worker handles the data input and vision, dental, and other pediatric specialty referrals.

The CHDP Deputy Director coordinates both Social Services and the CHDP providers for the most accurate and comprehensive care to the CHDP clients and their families. Reviews for audiology, vision screening, and anthropometric BMI training are completed by Sierra Park Pediatric nurses. In-services for Social Services eligibility workers consisted of a history of CHDP and the referral process. CHDP staff use the MEDS system to ensure the best collaboration with the Department of Social Services.

In order to best serve our CHDP clients and families, Public Health Department staff participate in the following taskforce coalitions: Breastfeeding, Nutrition and Physical Activity, Strengthening Families, Safe Kids, and Oral Health. The Oral Health Taskforce was reinstated in May 2009 and is comprised of numerous local agencies. The Oral Health Taskforce works to reduce the number of childhood caries and increase knowledge on oral health practices by providing prevention strategies throughout Mono County. Activities include: education; topical fluoride varnish; provision of dental health supplies for preschools and in-home day care providers, and "Miles of Smiles."

The Breastfeeding Taskforce was established in August 2010 and has developed a widely used Breastfeeding Resource Guide as well as partnered with local businesses to make our community more "breastfeeding friendly," including designated breastfeeding areas in various businesses.

The Nutrition and Physical Activity Taskforce Began in 2009 with such activities as Screen turnoff week, and "75210" simple steps to better health. Current school events and health fairs include activities such as "My Plate" SNAP-ED nutrition education in all Mono County elementary schools and a Food Day Celebration each October 24<sup>th</sup>.

Strengthening families Task Force created a resource guide based on the 5 Protective Factors, and worked with IMACA on resources for child care during crisis for families at risk for abuse. The four areas of special focus for this Task Force are: *Promotion of Personal Safety; Parent Education and Support; Parent Coaching; and Community Development.*

Safe Kids Task Force is made up of personnel throughout the county to explore Safety Measures for children and sponsors an annual Health and Safety Fair for families.

The Health Care Program for Children in Foster Care is housed at the Public Health Department with collaboration between the Health Department and Department of Social Services for case management purposes. The Foster Care Nurse works with CPS and Probation during out-of-home placement of children 0-18 and those young adults who are part of AB 12 (California Fostering Connections to Success Act) to ensure that developmental, medical, dental and mental health needs are met. As required, all medical information obtained by the Foster Care Nurse is then entered into CWS/CMS by Child Welfare Services for documentation purposes.

The Foster Care Nurse participates in APS visits; CPS visits; and 'Wraparound Services.' The latter is a family-centered process which focuses on the needs of the family and child who has been or is at risk of placement in a higher level of care. The desired outcome is for more children to be able to remain with their families or relatives in the community.



# CHILDREN'S MEDICAL SERVICES PLAN

## MONO COUNTY

## INCUMBENT LISTS

State of California - Health and Human Services Agency Department of Health Care Services - Children's Medical Services

### **Incumbent List - California Children's Services**

For FY 2016-17, complete the table below for all personnel listed in the CCS budgets. Use the **same** job titles for both the budget and the incumbent list. Total percent for an individual incumbent should **not be over 100 percent**.

Mono County Children's Medical Services Plan and Fiscal Guidelines 2016-2017

Specify whether job duty statements or civil service classification statements have been revised or changed. Only submit job duty statements and civil service classification statements that are new or have been revised. This includes (1) changes in job duties or activities, (2) changes in percentage of time spent for each activity, and (3) changes in percentage of time spent for enhanced and non-enhanced job duties or activities.

Identify Nurse Liaison positions using: **MCMC** for Medi-Cal Managed Care; **IHO** for In-Home Operations, and; **RC** for Regional Center.

**County/City: Mono**

**Fiscal Year: 2016-2017**

<b>Job Title</b>	<b>Incumbent Name</b>	<b>FTE % on CCS Admin Budget</b>	<b>Have Job Duties Changed? (Yes or No)</b>	<b>Has Civil Service Classification Changed? (Yes or No)</b>
CCS Administrator	Jody Martin	.05	No	No
CCS Case Manager	Jody Martin	.60	No	No
MTP Liaison	Jody Martin	.03	No	No
CCS Coordinator	Olivia Wilson	.67	No	No
Clerical/Interpreter	Nancy Cruz-Garcia	.03	No	No
Clerical/Interpreter	Maria Gonzalez	.03	No	No
CMS Fiscal Agent	Kimberly Bunn	.10	No	No
Public Health Director	Lynda Salcido	.03	No	No
Director of Public Health Nursing	Sandra Pearce	.03	No	No

**Incumbent List - Child Health and Disability Prevention Program**

For FY 2016-17, complete the table below for all personnel listed in the CHDP budgets. Use the same job titles for both the budget and the incumbent list. Total percent for an individual incumbent should **not be over 100 percent**.

Specify whether job duty statements or civil service classification statements have been revised or changed. Only submit job duty statements and civil service classification statements that are new or have been revised. This includes (1) changes in job duties or activities, (2) changes in percentage of time spent for each activity, and (3) changes in percentage of time spent for enhanced and non-enhanced job duties or activities.

County/City: **Mono**

Fiscal Year: **2016-17**

Job Title	Incumbent Name	FTE % on CHDP No County/City Match Budget	FTE % on CHDP County/City Match Budget	FTE % in Other Programs (Specify)	Have Job Duties Changed ? (Yes or No)	Has Civil Service Classification Changed? (Yes or No)
CHDP Director	Dr. Richard Johnson	.01	-	.99 other	No	No
CHDP Deputy Director	Jody Martin	.08	-	.65 CCS .03 MTP .055 HCPCFC .045 Foster Care .06 Other	No	No
CHDP Case Manager	Jody Martin	.08	-	.65 CCS .03 MTP .055 HCPCFC .045 Foster Care .06 Other	No	No
CHDP Coordinator	Olivia Wilson	.21	-	.67 CCS .12 Other	No	No
Clerical/Interpreter	Nancy Cruz-Garcia	.01	-	.03 CCS .96 Other	No	No
Clerical/Interpreter	Maria Gonzalez	.01	-	.03 CCS .96 Other	No	No

Mono County Children's Medical Services Plan and Fiscal Guidelines 2016-2017

County/City: **Mono**

Fiscal Year: **2016-17**

Job Title	Incumbent Name	FTE % on CHDP No County/City Match Budget	FTE % on CHDP County/City Match Budget	FTE % in Other Programs (Specify)	Have Job Duties Changed ? (Yes or No)	Has Civil Service Classification Changed? (Yes or No)
CMS Fiscal Agent	Kimberly Bunn	.03	-	.10 CCS .87 Other	No	No
Public Health Director	Lynda Salcido	.02	-	.03 CCS .95 Other	No	No
Director of Public Health Nursing	Sandra Pearce	.01	-	.03 CCS .02 HCPCFC .94 Other	No	No

**Incumbent List - Health Care Program for Children in Foster Care**

For FY 2016-17 complete the table below for all personnel listed in the HCPCFC and CHDP Foster Care Administrative (County/City) budgets. Use **the same** job titles for both the budget and the incumbent list. Total percent for an individual incumbent should **not be over 100 percent**.

Specify whether job duty statements or civil service classification statements have been revised or changed. Only submit job duty statements and civil service classification statements that are new or have been revised. This includes (1) changes in job duties or activities, (2) changes in percentage of time spent for each activity, and (3) changes in percentage of time spent for enhanced and non-enhanced job duties or activities.

County/City: **Mono**

Fiscal Year:  
**2016-17**

Job Title	Incumbent Name	FTE % on HCPCFC Budget	FTE % on FC Admin County/City Match Budget	FTE % in Other Programs (Specify)	Have Job Duties Changed? (Yes or No)	Has Civil Service Classification Changed? (Yes or No)
Foster Care PHN	Jody Martin	.055	.045	.16 CHDP .65 CCS .03 MTP .06 Other	No	No
Director of Nursing	Sandra Pearce	.02	-	.01 CHDP .03 CCS .94 Other	No	No

CMS PLAN  
MONO COUNTY  
DUTY  
STATEMENTS  
FISCAL YEAR  
**2016-2017**

**COUNTY OF MONO  
CCS PROGRAM**

**CCS ADMINISTRATOR– DUTY STATEMENT**

**(HEALTH PROGRAM MANAGER)**

**Jody Martin .05 CCS**

The public health nurse administers the CCS program in the local dependent county. The public health nurse has direct contact with the family, acting as an advocate in obtaining the appropriate health services and as a liaison between the medical provider, the community, and the regional office that provides the administrative component of the program.

- 5% Prepare and submit the annual CCS administrative plan and budget including required documents and reports.
- 5% Provide consultation and technical assistance for program administration. Assess and evaluate CCS program on a continuing basis. Assess, plan for and develop any needed CCS specialty clinics.
- 5% Recruit CCS providers, including the paneling process and orientation to CCS, and support to maintain ongoing provider commitment to CCS.
- 10% Supervise CCS staff in case management and in the maintenance of the CCS program, assuring program compliance, including performance evaluations and scheduling.
- 5% Provide training and orientation to new CCS staff. Provide outreach and education to providers about CCS program and paneling opportunities.
- 3% Supervise local CCS activities and referrals in coordination with SCRO.
- 2% Attend interagency and community meetings to enhance and integrate CCS services into the community.

**COUNTY OF MONO  
CCS PROGRAM**

**CCS CASE MANAGER – DUTY STATEMENT**

(HEALTH PROGRAM MANAGER)

Jody Martin .60 CCS

The public health nurse administers the CCS program in the local dependent county. The public health nurse has direct contact with the family, acting as an advocate in obtaining the appropriate health services and as a liaison between the medical provider, the community, and the regional office that provides the administrative component of the program.

- 5% Identify children with potential CCS medically eligible conditions and assists with the referral/application process.
- 10% Act as liaison between the family, medical provider, community and the Southern California Regional Office through a case management plan developed with the family.
- 3% Participate in conferences on behalf of CCS clients as necessary to coordinate service needs and program benefits.
- 15% Using skilled professional medical expertise, review CCS medical reports to coordinate appropriate action with regional office.
- 5% Coordinate client care by referring to other appropriate agencies. Coordinate client care between specialty CCS clinics and providers.
- 5% Attend training programs provided by CCS to stay current with policy/procedure and case management.
- 2% Direct clerical staff in correspondence to families, providers and the regional office.



**COUNTY OF MONO  
CCS PROGRAM**

**MTP LIAISON – DUTY STATEMENT**

**(HEALTH PROGRAM MANAGER)**

Jody Martin .03 CCS

The public health nurse administers the CCS program in the local dependent county. The public health nurse has direct contact with the family, acting as an advocate in obtaining the appropriate health services and as a liaison between the medical provider, the community, and the regional office that provides the administrative component of the program.

**Administration:**

- 5% Act as Medical Therapy Program (MTP) liaison to the Local Education Agency (LEA) to coordinate activities with special education. Participate in interagency meetings for planning, coordination of client care, and training.
- 5% Assist in development and maintenance of an IAA with MCOE.
- 5% Coordinate the biannual MTCs for CCS clients. Direct clerical assistance for MTP liaison and MTC activities.

**Case Management:**

- 5% Attend IEP and IFSP meetings for MTP clients when requested by the parent or LEA to coordinate client care, or supervise designee.
- 2% Attend training and updates for CCS-MTP liaison activities.
- 3% Coordinate client care and follow-up services from the MTC.

**COUNTY OF MONO  
CCS PROGRAM**

**CCS COORDINATOR - DUTY STATEMENT**

(Community Health Outreach Specialist)

Olivia Moreno .67 CCS

This is a non-professional position under the direct supervision of the CCS Administrator that assists with various components and client case management of the CCS program. The State CMS refers to this county position as a Case Management/Program Eligibility Technician. This position includes but is not limited to identification of potential medically eligible children, assistance in case management including application process, insurance coverage, financial/residential eligibility, maintenance of records and program timelines. It also assists with coordination of clinics, outreach and health education promotion, reporting and administrative assistance, and translation.

**PROGRAM ELIGIBILITY**

- 10% Receive and process CCS referrals. Utilize CMSNet for client data and communication with regional office. Obtain necessary medical documentation from family/provider to ensure a completed CCS referral as required by the program. Give to skilled medical staff for review. Provide correspondence to the family and providers regarding client eligibility.
- 15% Determine financial and residential CCS eligibility through MEDS, EDS, and interviews of the applicant and family. Do annual CCS financial and residential eligibility re-determinations.
- 5% Communicate effectively with Medi-Cal and HFI eligibility as needed. Help family problem-solve with Medi-Cal/HFI when needed. Must have a working knowledge of EDS and MEDS system.

**CASE MANAGEMENT**

- 15% Work closely with and under the direction of the local nurse case manager and regional office to provide case management activities for the client/family, obtain medical reports, request and monitor authorizations, coordinate appointments to CCS providers, record-keeping and CMSNet updates.

- 2% Maintain a tracking system to ensure a timely response to the family and compliance with CCS case management timelines. Process case closures when applicable. Send county CCS Notice of Action letters.
- 3% Identify barriers to client services, including family's need for transportation, food and lodging assistance; need for interpreter. Refer family for assistance.
- 5% Assist with interpretation for CCS case management work with Spanish-speaking families. Some of this may be strictly translation and some may be independent case management in Spanish as directed by the PHN.
- 10% Refer to Medi-Cal and other services if potentially eligible.
- 5% Assist in coordination of specialty CCS clinics, i.e. MTC. Assist in preparation, scheduling, collection of medical documents and reports, authorizations for clinics and IEP.

#### PROVIDER SUPPORT

- 5% Assist with CCS orientation and trainings to providers, and ongoing staff education.
- 10% Respond to inquiries by clients and providers regarding program difficulties (billing, missing authorizations, scheduling appointments) and help to problem-solve.
- 3% Participate in required training by county/state including CCS program and case management, including HFI, MEDS, CMSNet and EDSNet training.
- 2% Monitor and verify CCS claims on monthly expenditure reports. Follow-up if claim problems noted for specific providers.

#### ADMINISTRATIVE SUPPORT

- 10% Maintain CCS databases and do data entry for case management, analysis and reporting. Assist in preparation of annual CMS plan. Prepare required census reports; prepare quarterly reports for state and budget requirements.

**COUNTY OF MONO  
CCS PROGRAM**

**CLERICAL/INTERPRETER—DUTY STATEMENT**

(Fiscal and Technical Specialist, WNA)

Maria Gonzalez, Nancy Cruz-Garcia FTE .08 CMS (CCS, CHDP)

- 10% Word processing of documents and correspondence as directed by CCS administrator. Develop meeting notices, etc. for distribution.
- 5% Provide CCS general support services by ordering CCS supplies.
- 10% Translation for case manager.
- 20% Respond to inquiries of clients and providers regarding program and help to problem-solve under direction of CCS administrator.
- 30% Receive by fax CCS referrals and medical reports and forward to case manager for processing.
- 20% Refer children to CHDP, EPSDT services or other services if appropriate.
- 5% Assist in organization and set-up of specialty CCS clinic, MTC.

**COUNTY OF MONO  
CHILDREN'S MEDICAL SERVICES**

**CMS FISCAL AGENT – DUTY STATEMENT**

(Public Health Fiscal and Administrative Officer)

Kimberly Bunn .13 CMS (CCS, CHDP)

The Children's Medical Services Program fiscal agent performs all fiscal duties in support of the CMS program. The duties include but are not limited to:

1. Preparation of budget and any budget revisions.
2. Prepare materials necessary for submission to the Board of Supervisors for approval.
3. Prepares invoices.
4. Processes all invoices for payment through the Auditor's office.
5. Oversees the data entry of time studies.
6. Deposits all receipts in appropriate accounts.
7. Maintains inventory of program equipment.
8. Prepares fiscal information for periodic reports.
9. Other duties as required.

**COUNTY OF MONO  
CCS PROGRAM**

**PUBLIC HEALTH DIRECTOR – DUTY STATEMENT**

Lynda Salcido PHN .05 CMS (CCS, CHDP)

The public health director supervises all Public Health staff in the local county, including supervision of the CMS and HCPCFC programs. The director is responsible for planning, organizing and directing the activities of all county-wide public health programs.

Oversee the planning, organization, and coordination of the Public Health Division in the local county.

Supervise, train, assign and evaluate staff including new employee orientation.

Plan, develop, justify and manage a program budget according to division and funding source requirements; maintain budgetary control.

Ascertain program needs and leads staff in setting goals, vision and objectives.

Coordinate ongoing emergency response activities with other county departments.

Serve as a resource and technical consultant, and explains the health department role and policies, laws, and regulations in assigned area to officials, groups and individuals.

Develop, write and implement grant proposals.

**COUNTY OF MONO  
CCS PROGRAM**

**DIRECTOR OF PUBLIC HEALTH NURSING – DUTY STATEMENT**

Sandra Pearce PHN .06 CMS (CCS,CHDP, HCPCFC)

The Director of Public Health Nursing (DPHN) supervises all nursing staff in the local county, including supervision of the CMS and HCPCFC programs. The DPHN is responsible for planning, organizing and directing the activities of all county-wide public health nursing programs. The DPHN is supervised by the Public Health Director.

Oversee the planning, organization, and coordination of CMS and HCPCFC programs in the local county.

Supervise, train, assign and evaluate staff including new employee orientation.

Plan, develop, justify and manage a program budget according to division and funding source requirements; maintain budgetary control.

Ascertain program needs and leads staff in setting goals, vision and objectives.

Coordinate ongoing emergency response activities with other county departments.

Serve as a resource and technical consultant, and explains the health department role and policies, laws, and regulations in assigned area to officials, groups and individuals.

Develop, write and implement grant proposals.

**COUNTY OF MONO  
CHDP PROGRAM**

**CHDP DIRECTOR – DUTY STATEMENT**

**(COUNTY HEALTH OFFICER)**

**Richard O. Johnson MD .01 CHDP**

The County Health Officer is to direct the enforcement of Federal, State, and local health laws and relations and has responsibility for planning and providing direction to the County as a professional medical consultant. The health officer also fulfills the CHDP Director position for the CHDP program in the local county.

- 5% CHDP Director – help plan and evaluate the CHDP Gateway program and its interaction within the community and other organizations/agencies involved in the delivery of health services to the target population. Provide consultation and medical direction for local CHDP Deputy Director, other health professional and ancillary staff in CHDP program
- NA local health orders, ordinances, and regulations prescribed by the State Department of Services and State statutes relating to public health.
- NA Assesses community health status and reports on the health status of the community using multiple epidemiologic, survey and statistical methods.
- NA Must legally respond to public health emergencies and develop an integration plan for Health Department staff into the County Disaster Management Team.
- NA Plans, develops, approves, and implements medical protocols and procedures for Public Health programs and services, for Sheriff emergency services and for jail inmate screening and sick calls.
- NA Acts in an advisory and public relations capacity on the administration of Federal, State and County medical care programs
- NA Provides medical consultation and health information to the public, community and county staff, health providers, and may offer Public Health education.



**COUNTY OF MONO  
CHDP PROGRAM**

**CHDP DEPUTY DIRECTOR – DUTY STATEMENT**

**(HEALTH PROGRAM MANAGER)**

Jody Martin PHN .08 CHDP

The public health nurse administers the CHDP program in the local county. This position includes but is not limited to deputy director duties and administration of program policies and procedures, data analysis and program planning, supervision of case management, provider enrollment/disenrollment, and supervision of health professional and ancillary staff activities.

**PROVIDER ORIENTATION AND TRAINING**

- 5% Provider Recruitment – outreach and recruitment for CHDP providers.
- 15% Provider Orientation and Education – orient providers to CHDP PM 160 health assessments, utilization of program, staff training and technical assistance.
- 5% Provider Audits –review medical records (PM 160, etc) for documentation of services, identify training needs and provide medical/technical assistance.
- 5% Medical Quality Assurance – review qualifications and standards with CHDP providers and compliance with the CHDP Provider Manual.

**LIAISON ACTIVITIES**

- 3% Regional Meetings – share local county health issues, methodology and implementation of the CHDP Program, and outreach efforts to the target population.
- 15% Community/Interagency Liaison – coordinate CHDP activities with Welfare (Child Protective Services, Foster Care, Medi-Cal and AFDC), IZ, WIC, CCS, Head Start, Department of Education, including defining health needs of the children of mutual concern and sharing problems and solutions the delivery of services.
- 20% Administration and Supervision: provide data for documentation required by the county and state, including time studies, input on budgets, claims, and the supervision and training of the local CHDP staff. Administrative duties including staff performance evaluations and staff scheduling.

#### CARE COORDINATION

- 5% Supervision of CHDP staff for PM 160 case management to ensure the completion of any referrals for diagnosis and treatment.
- 10% Supervision of local CMS health professional and ancillary staff in CHDP program activities of informing and linking children/families to services and accessing health care. This also includes identifying potential clients, and supporting the application process for Medi-Cal Insurance by clients.
- 5% HCPCFC – supervise the HCPCFC program and case management for foster care children with CWS/Probation.

#### INFORMING/LINKING ACTIVITIES

- 3% Newsletter Development – write articles on medical issues or program changes impacting our network of local organizations and agencies.
- 2% Education Materials – identify and evaluate existing sources of education materials for their appropriateness and local use; consult with providers regarding materials most appropriate for clients; utilize with training and orientation of providers.
- 5% Promote outreach within the community, linking the target population to CHDP services and providers.

**COUNTY OF MONO  
CHDP PROGRAM**

**CHDP CASE MANAGER—DUTY STATEMENT**

**(HEALTH PROGRAM MANAGER)**

**Jody Martin PHN .08 CHDP**

Under the direction of the CHDP Deputy Director, the public health nurse provides skilled medical expertise for the CHDP Gateway program in the local county. The public health nurse has direct contact with the family, acting as an advocate in obtaining the appropriate health services, **case management** and liaison between the medical provider, community, and the state offices. This position also includes provider education and support.

**PROVIDER SUPPORT**

- 15% Assist in orienting providers to CHDP enrollment, PM 160 health assessments, and provide ongoing staff training and technical assistance.
- 5% Provide ongoing consultation and technical assistance to CHDP providers.

**LIAISON and LINKING/INFORMING**

- 5% Promote outreach for CHDP within the community. Oversee local CHDP program activities informing and linking the target population to services and accessing health care.
- 5% Attend interagency and community meetings to enhance and integrate CHDP services into the community. Act as liaison for CHDP program, providing direction and support to providers, social services, other health department programs (WIC, MCH, IZ etc) and state regional office.
- 5% Attend state trainings for CHDP to keep current on policy/procedure and changes.
- 3% Write articles for newsletters on medical issues or program changes impacting our network of local organizations and agencies.
- 2% Identify and evaluate existing resources of CHDP educational and outreach materials for their appropriateness and local use; consult with providers regarding materials most appropriate for clients; utilize with training and orientation of providers.

- 10% Identify potential CHDP clients, and support the application process for Medi-Cal Insurance by clients. Work closely with social services and eligibility workers.

CASE MANAGEMENT

- 5% Identify children with potential need of CHDP exams and assist with the referral/application process.
- 20% Case management and care coordination of CHDP PM 160s to ensure the completion of any referrals for diagnosis and treatment.
- 10% Maintain case data documentation, and formulate necessary state and local reports as directed.

HEALTH EDUCATION

- 5% Collaborate with WIC clinics and other community events to provide health education and outreach to target population regarding CHDP services.
- 10% Provide community health education on various health topics such as Lead Poisoning, Anemia, Early Childhood Caries (ECC), and other health topics.

## CHDP PROGRAM

### CHDP COORDINATOR - DUTY STATEMENT

(CHOS – Community Health Outreach Specialist)

Olivia Wilson .21 CHDP

This is a non-professional position under the direct supervision of the CHDP Deputy Director that assists with various CHDP program components and client case management. This position includes but is not limited to assistance in case management including application process, insurance coverage, referrals and diagnosis/treatment follow-up, maintenance of records and data base. It also assists with outreach and education, reporting and administrative assistance, and translation as needed.

#### LINKING/INFORMING

- 5% Follow-up on CHDP PM357s from Social Services and maintain record of informed eligible clients. Contact families requesting more information about CHDP, transportation and scheduling assistance, and document in database.
- 5% Communicate effectively with Medi-Cal system for eligibility as needed. Help family problem-solve with Medi-Cal when needed. Must have a working knowledge of EDS and MEDS system.
- 3% Assist in CHDP program outreach and education to families, providers, agencies and in the community.
- 2% Refer children to CCS, EPSDT Services, or other services if potentially eligible.
- 10% Assist the family with the joint application for Medi-Cal Insurance when appropriate for CHDP to access future health care.

#### CARE COORDINATION

- 10% Assist with CHDP PM 160 referrals for further diagnosis/treatment and provide case management under the direction of skilled nurse expertise.
- 10% Determine financial and residential CHDP eligibility through MEDS, EDS, or family interviews for diagnosis/treatment referrals.
- 2% Maintain a tracking system to ensure a timely response to the family and compliance with PM 357 and PM 160 case management timelines.

- 3% Identify barriers to client services, including family's need for transportation and/or interpreter services. Refer family for assistance.
- 5% Assist with interpretation for CHDP case management work with Spanish-speaking families. Some of this may be strictly translation and some may be independent case management in Spanish as directed by the PHN.

PROVIDER ORIENTATION AND TRAINING

- 5% Assist with CHDP orientation and training to providers.
- 5% Respond to inquiries by clients and providers regarding program difficulties (billing, missing authorizations, scheduling appointments) and help to problem-solve.
- 5% Participate in required training by county/state including program and case management, HFI, MEDS and EDS Net for provider support.
- 2% Monitor CHDP provider claims on monthly expenditure reports. Follow-up if claim problems noted for specific providers.
- 3% Distribution of CHDP Provider Information Notices, Provider list and state approved brochures to the County Department of Social Service's, and information to individuals as directed by the CHDP Deputy Director.

ADMINISTRATIVE SUPPORT

- 15% Receive necessary medical documentation from provider to ensure a complete CHDP PM 160 exam and/or referral as required by the program. Enter into database and give to skilled medical staff for review.
- 10% Maintain CHDP databases and data entry for case management, analysis and reporting. Assist in preparation of annual CMS plan. Prepare required census reports; prepare quarterly reports for state and budget requirements.

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## Health Care Program for Children in Foster Care (HCPCFC)

### FOSTER CARE PHN—DUTY STATEMENT

(HEALTH PROGRAM MANAGER)

Jody Martin PHN .055 HCPCFC, .045 Foster Care

This is a skilled nursing position under the direct supervision of the CHDP Deputy Director to assist with medical case management of children placed in foster care. The nurse works closely with Child Welfare Services (CWS) and Probation during out-of-home placement of children 0-18 years old, and those placed in extended Foster Care through AB12, following the Mono County HCPCFC MOU and SOW.

#### Duties:

#### CASE MANAGEMENT

- 25% Obtain health information (PM 357s, IZ records, exam reports) for children placed in foster care through CWS or Probation.
- 25% Provide current information to CWS to update health history, health information, and needs in Health Passport for each foster child.
- 10% Provide training and education for professionals and para-professionals in agencies, including court system, to increase awareness and interest in health needs for foster children and coordination of care.
- 10% Provide training and education to SCP regarding special health needs, health care and services desired for the foster child. Provide health recommendations to the child's biological parents upon reunification or to the foster child upon emancipation, including health providers and resources.
- 10% Assist social workers in developing the required court plans, for inclusion of health needs if appropriate. Collaborate in preparation of the written plan (usually every 6 months).
- 10% Collaborate with in-county and out-of-county CHDP providers and CHDP staff to identify adequate of providers to see foster care children.
- 10% Maintain a tracking system to follow health care for the foster child in placement, and follow up on changes in the health status. Collaborate with the social worker or probation officer.

# CHILDREN'S MEDICAL SERVICES PLAN

## PERFORMANCE MEASURES

FISCAL YEAR  
**2016-2017**



**CHDP Performance Measure 1 - Care Coordination**

The degree to which the local CHDP program provides effective care coordination to CHDP eligible children.

**Definition:** CHDP health assessments may reveal condition(s) requiring follow-up care for diagnosis and treatment. Effective CHDP care coordination is measured by determining the percentage of health condition(s), coded 4 or 5, where follow-up care is initiated<sup>1</sup> within 120 days of local program receipt of the PM 160.

**Numerator:** Number of conditions, coded 4 or 5, where the follow-up care was initiated within 120 days of receipt of the PM 160.

**Denominator:** Total number of conditions, coded 4 or 5, on a PM 160, excluding children lost to contact.

**Data Source:** Local program tracking system.

**Reporting Form:**

<b>Element</b>	<b>Number of conditions coded 4 or 5 where follow-up care was initiated (Numerator)</b>	<b>Total number of conditions coded 4 or 5, excluding children lost to contact (Denominator)</b>	<b>Percent (%) of conditions where follow-up care was initiated within 120 days</b>
Conditions found on children eligible for Medi-Cal that required follow-up care	33	34	97%
Conditions found on children eligible for State-funded CHDP services only (Aid code 8Y) that required follow-up care	0	0	N/A

<sup>1</sup> Centers for Medicare and Medicaid Services, Publication #45, the State Medicaid Manual, Chapter 5 EPSDT, Section 5310 A <http://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Paper-Based-Manuals-Items/CMS021927.html>

**CHDP Performance Measure 2 - New Provider Orientation**

The percentage of new CHDP providers with evidence of quality improvement monitoring by the local CHDP program through a New Provider Orientation.

**Definition:** The number of new CHDP providers (i.e., M.D., D.O., N.P., P.A.) added within the past fiscal year who were oriented by the local program staff.

**Numerator:** The number of new CHDP providers who completed an orientation within the past fiscal year.

**Denominator:** The number of new CHDP providers in the county or city (local program) added within the past fiscal year.

**Data Source:** Local program tracking system.

**Reporting Form:**

<b>Number of New Providers who Completed Orientation</b> (Numerator)	0
<b>Number of New Providers</b> (Denominator)	0
<b>Percent (%) of New Providers Oriented</b>	N/A

**CHDP Performance Measure 3 - Provider Site Recertification**

The percentage of CHDP provider sites (excludes newly enrolled providers) who have completed recertification within the past fiscal year. Provider site visits may occur for other reasons. These can be documented for workload activities. The purpose of this performance measure is to ensure that all providers are recertified at least once every three (3) years. This performance measure is a benchmark to ensure that providers are recertified using the Facility and Medical Review Tools. These tools ensure that providers maintain CHDP standards for health assessments.

**Definition:** An office visit which includes a medical record review and a facility review or Critical Element Review with a Managed Care Plan.

**Numerator:** The number of CHDP provider sites who have completed the Recertification within the past fiscal year using the facility review tool and medical record review tool.

**Denominator:** The number of active CHDP provider sites in the county/city due for recertification within the fiscal year.

**Data Source:** Local program tracking system.

**Reporting Form:**

<b>Number of Completed Site Recertifications</b> (Numerator)	0
<b>Number of Active CHDP Provider Sites Due for Recertification (Denominator)</b>	0
<b>Percent (%) with Completed Recertifications</b>	N/A

**Optional Workload Data Tracking Form:**

(Other reasons for a provider site visit by local program. This identifies workload.)

<b>Other reasons for provider site visits:</b>	<b>Number of Visits</b>
1. Provider change in location or practice	0
2. Problem resolution such as, but not limited to, billing issues, parental complaints, facility review and/or other issues. <sup>2</sup>	0
3. Medical record review.	0
4. Office visits for CHDP updates or in-service activities	0
5. Other Please Specify: Inservice reviews:, BMI, audiology, vision	0

**CHDP Performance Measure 4 - Desktop Review: Dental, Lead**

Within the past fiscal year, identify the percentage of PM 160s with documentation indicating compliance with the CHDP Periodicity Schedule and Health Assessment Guidelines. Local programs may choose to evaluate the same provider sites over the 5-year Performance Measure cycle, or select different provider sites each year.

**Definition:** A targeted desktop review for three high volume providers within the county/city by determining the percent of PM 160s that have documentation for:

- Referral to a dentist at 1 year exam (12-14 months of age)
- Lead testing or a referral for the test at 1 year exam (12-14 months of age)

**Numerator:** The number of PM 160 elements recorded correctly per selected providers for the specific ages.

**Denominator:** The total number of PM 160s reviewed per selected providers for the specific ages.

**Data Source:** Local program tracking system.

**Reporting Form:**

	Dental Referral			Lead Test or a Referral		
	Number of PM 160s w/ Dental	Total PM 160s		Number of PM160s w/ Lead Test or Referral	Total PM 160s	
<b>Sierra</b>	32	32	100%	4	32	12.5%

**CHDP Performance Measure 5 – Desktop Review: BMI**

Within the past fiscal year, identify the percentage of PM 160s with documentation indicating compliance with the CHDP Periodicity Schedule and Health Assessment Guidelines. Local programs may choose to evaluate the same provider sites over the five-year Performance Measure cycle, or select different provider sites each year.

**Definition:** A targeted desktop review for three (3) high volume providers within the county/city by determining the percent of PM 160s that have documentation for:

- Body Mass Index (BMI) Percentile for ages two (2) years and over.
- If BMI Percentile is abnormal, the description of weight status category<sup>3</sup> and/or a related diagnosis are listed in the Comments Section.

BMI percentile	Weight status category
< 5 <sup>th</sup> %ile	Underweight
85 <sup>th</sup> - 94 <sup>th</sup> %ile	Overweight
95 <sup>th</sup> - 98 <sup>th</sup> %ile	Obese
≥ 99 <sup>th</sup> %ile	Obesity ( <i>severe</i> )

**Numerator:** The number of PM 160s BMI-related elements correctly documented for ages two (2) years and over.

**Denominator:** The total number of PM 160s reviewed per selected providers for ages two (2) years and over.

**Data Source:** Local program tracking system.

<sup>3</sup> **CHDP Provider Information Notice No.: 07-13:** Childhood Obesity Implementation Guide from the Expert Committee Recommendations on the Assessment, Prevention and Treatment of Child and Adolescent Overweight and Obesity- 2007.

<http://www.dhcs.ca.gov/services/chdp/Documents/Letters/chdppin0713.pdf>

**Reporting Form for Performance Measure 5 – Desktop Review: BMI**

**Reporting Form for Performance Measure 5 – Desktop Review: BMI**

Provider	BMI percentile recorded on PM 160s for children ages 2 (two) and older			If BMI percentile is < 5 %, 85 - 94 %, or ≥ 95 %, abnormal weight status category and/or related diagnosis listed in		
	Number of PM 160s with BMI %ile	Number of PM 160s		Number of PM 160s with abnormal weight status category/ diagnosis	Number of PM 160s with abnormal weight status reviewed for, diagnosis	
Sierra Pk	50	50	100%	5	9	56%

**CHDP Performance Measure 6 - County/City Use of Childhood Obesity Data**

1. Childhood obesity data shared with CHDP Providers to inform about overweight and obesity prevalence rates: <i>(If yes, underline all that apply)</i>	YES	NO
Presentations, in-services, trainings---SNAP-ED	x	
Newsletters, media outreach----Counseling by Sierra park Pediatrics	x	
Provide educational and resource materials related to healthy eating/active living Food Day activities	x	
2. Childhood obesity data shared to support local assistance grants and implementation of multi-sector policy strategies to create healthy eating and active living community environments (Goal 3, California Obesity Prevention Plan 2010): <i>(If yes, underline all that apply)</i>		
<b>Academic:</b> Universities, Academic Institutions, Educators and Researchers <i>Other (Please specify):</i>		
<b>Community Coalitions/Committees:</b> Health Advisory Committee, Health Collaboratives/Coalitions <i>Other (Please specify):</i> Nutrition and Physical Activity Task Force	x	
<b>Community Planning:</b> City Planners, County Land Use Staff, Built Environmental Groups <i>Other (Please specify):</i>		
<b>Community Programs:</b> Faith-based Groups. YMCA/YWCA, After School programs, Parks and Recreation programs, Child Care, University Cooperative Extension <i>Other (Please specify):</i>		
<b>Health Care:</b> Managed Care Health Plans and Insurers, Hospitals, CCS Program/Special Care Centers, Medical Provider Groups, Medical Societies, Health Associations <i>Other (Please specify):</i> Newsletters to Providers	x	
<b>Policy Makers:</b> County Board of Supervisors, City Councils, Community Planners, Legislators <i>Other (Please specify):</i> Food Day Celebration Support	x	
<b>Projects or Funding Entities:</b> First Five Commission, Public and Private Foundations/Endowments/Grants <i>Other (Please specify):</i>		

Mono County Children’s Medical Services Plan and Fiscal Guidelines 2016-2017

<p><b>Public Health Programs:</b> WIC, Foster Care, MCAH, Nutrition Network Funded Projects, Health Officers, Epidemiologists, Program Directors</p> <p>Other (<i>Please specify</i>): Health and Safety Fair Booth Spring 2015 with “75210”</p> <p>“7” Eat a Healthy Breakfast 7 days a week</p> <p>“5” Eat 5 fruits and vegetables every day</p> <p>“2” Only 2 hours of screen time per day</p> <p>“1” One hour of physical activity each day</p> <p>“0” No sugar-sweetened beverages</p>	x	
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**HPCFC Performance Measure 1 - Care Coordination**

The degree to which the local HPCFC provides effective care coordination to CHDP eligible children.

**Definition:** CHDP health assessments may reveal condition(s) requiring follow-up care for diagnosis and treatment. Effective HPCFC care coordination is measured by determining the percentage of health condition(s) coded 4 or 5 where follow-up care is initiated within 120 days of local program receipt of the PM 160.

**Numerator:** Number of conditions coded 4 or 5 where the follow up care was initiated within 120 days of receipt of the PM 160.

**Denominator:** Total number of conditions coded 4 or 5 on a PM 160, excluding children lost to contact.

**Reporting Form:**

Number of conditions coded 4 or 5 where the follow-up care was initiated within 120 days of receipt of the PM 160. (Numerator)	3
Total number of conditions coded 4 or 5 on a PM 160, excluding cases lost to no contact. (Denominator)	3
<b>Percent</b> of conditions coded 4 or 5 where the client received follow-up care within 120 days of receipt of the PM 160.	100%

**Data Source:** Child Welfare Services Case Management System (CWS/CMS), and county specific data for Probation Department

**HCPCFC Performance Measure 2 - Health and Dental Exams for Children in Out-of-Home Placement**

The degree to which the local HCPCFC program ensures access to health and dental care services for eligible children according to the CHDP periodicity schedule.

**Definition:** This measure is based on characteristics that demonstrate the degree to which the PHN in the HCPCFC facilitates access to health and dental services as evidenced by documentation of a health and dental exam in the Health Education Passport.

**Numerator 1:** Number of children in out-of-home placement with a preventive health exam, according to the CHDP periodicity schedule documented in the Health and Education Passport, and

**Numerator 2:** Number of children in out-of-home placement with a preventive dental exam, according to the CHDP dental periodicity schedule documented in the Health and Education Passport.

**Denominator:** Number of children in out-of-home placement during the previous fiscal year supervised by Child Welfare Services or Probation Department.

**Reporting Form:**

Element	Number of Children With Exams (Numerator)	Number of Children (Denominator)	Percent of Children with Exams
Number of children in out-of-home placement with a preventive health exam according to the CHDP periodicity schedule documented in the Health and Education Passport. (Numerator)	5	5	100%
Number of children in out-of-home placement with a preventive dental exam according to the CHDP dental periodicity schedule documented in the Health and Education Passport.	5	5	100%

**Data Source/Issue:** Child Welfare Services Case Management System (CWS/CMS), and county specific data for Probation Department.

**CMS Plan 2016-2017 Fiscal Year Performance Measure Narrative**

**CHDP Performance Measure 1 – Care Coordination**

The local tracking system utilizes an Access database created specifically for Mono County CHDP program. The data is inputted by the CHOS and CHDP deputy director.

As Mono County is an extremely rural county, specialist care most often requires out of county travel of at least 5 hours. Travel out of county can be very difficult at times of the year due to heavy snow fall, road closures, or travel restrictions. Very few specialists practice in Mono County, especially pediatric specialists. We are working with Managed Care Medi-Cal to re-recruit specialists in Inyo County for optometry and ophthalmology. Dental care is provided through Sierra Park Dental locally. Children with all other referrals must travel out of the area, often to Los Angeles, Sacramento, Pomona or Orange County. This year one of the Manage Care provides subsidized cost to bring "Vision to Learn" mobile unit and staff to complete eye exams for any child in Mono County who, after being screened, was determined to need an in-depth eye exam. These children subsequently received these exams and glasses from "Vision to Learn" at no cost to the families.

As many families are at or below the federal poverty level in Mono County, out of county travel and taking time away from job responsibilities have significant financial impact and often families are not able to follow through with the recommended medical care within the 120 day goal of CHDP. One Managed Care provider, California Health and Wellness, has been able to assist some families with transportation to Southern California for specialist appointments. We have also found that some specialists have more than a month long wait list that has caused a delay in receiving care.

The Deputy Director is communicating with Managed Care representatives through quarterly meetings and is seeking additional providers who will accept the newly-implemented Medi-Cal Managed Care programs in Mono County---- Anthem Blue Cross and California Health and Wellness.

**CHDP Performance Measure 2 – New Provider Orientation**

There were no new CHDP providers in Mono County for the fiscal year 2015-2016.

**CHDP Performance Measure 3 – Provider Recertification**

Recertification, due every three years, at Sierra Park Pediatrics was due and accomplished in July, 2014. Re-certification included renewal training in audiometry, Anthropometric BMI, and vision screening.

**CHDP Performance Measure 4 – Desktop Review**

The local tracking system utilized for data collection is the same as described above for CHDP Performance Measure 1.

- A. The percent compliance for accurate recording of the BMI percentile increased due to close monitoring, initial return of forms missing BMI, and education of staff regarding protocol for ages requiring BMI documentation.
- B. The percent of compliance for the number of children referred to a dentist continues to be high with follow up phone calls and documentation by CHOS.
- C. The lead testing is ordered in a timely manner due to the diligence of the head nurse at the Sierra Park Pediatrics Clinic. Reporting of lead levels by Mammoth Hospital Lab consists of a paper format, sent to Billing, and delivered to CHDP Deputy Director.

**HPCFC Performance Measure 1 – Care Coordination**

The local tracking system used to gather the data for this performance measure was chart review and review of Health and Education Passport through CWS/CMS.

**HPCFC Performance Measure 2 – Health and Dental Exams for Children in Out-of-Home Placement**

The local tracking system used to gather the data for this performance measure was a chart review and review of Health and Education Passport through CWS/CMS.

## **CCS Performance Measures**

The degree to which local CCS programs provide effective utilization review and management to eligible CCS children; the local programs will evaluate and rate **each** of the five (5) components as individual indicators of program effectiveness.

The five components for review are:

1. Medical Home
2. Determination of CCS Eligibility
3. Special Care Center
4. Transition Planning
5. Family Participation

**CCS Performance Measure 1 – Medical Home**

Children enrolled in the CCS Program will have documented Medical homes/primary care providers. The goal is to have 100% compliance.

**Definition:** Children in the CCS program will have a designated primary care physician and/or a physician who provides a medical home.

**Numerator:** The total number of children with a completed field with identification of a primary care physician and/or a physician that provides a medical home.

**Denominator:** The total number of children in the local CCS county program.

**Data Source:** Sample of 100 charts or 10% of caseload if caseload under 1,000.

**Reporting Form:**

<b>Number of children with a primary care physician/ Medical Home</b> (Numerator)	<b>Number of children in the local CCS program</b> (Denominator)	<b>Percentage of compliance</b>
33	74	45%**

\*\* Mono County plans to contact all CCS families and inquire about their current medical home and update their records.

\* Note: If county percentage of compliance is under 80%, counties need to submit with the annual report a plan for how they will work to improve this result.

## **CCS Performance Measure 2 – Determination of CCS Program Eligibility**

Children referred to CCS have their program eligibility determined within the prescribed guidelines per Title 22, California Code of Regulations, Section 42000, and according to CMS Branch policy. Counties will measure the following:

**Numerators:**

- a. Medical eligibility within five working days of receipt of all medical documentation necessary to determine whether a CCS-eligible condition exists.
- b. Residential eligibility within 30 days of receipt of documentation needed to make the determination.
- c. Financial eligibility within 30 days of receipt of documentation make the determination.

**Denominator:** Number of CCS unduplicated new referrals to the CCS program assigned a pending status in the last fiscal year.

**Data Source:** 10% of the county CCS cases or 100 cases (which ever number is less).

**Reporting Form: Year 16-17**

<b>MEDICAL ELIGIBILITY</b>	Number of referrals determined medically eligible within 5 days (Numerator)		Number of new unduplicated referrals (Denominator)		Percentage of compliance
Medical eligibility determined within 5 days of receipt of all necessary documentation	<i>Data unavailable as we are a dependent county and medical eligibility is determined in SCRO</i>				Unavailable
<b>PROGRAM ELIGIBILITY</b>	Number of cases determined eligible within 30 days of receipt of documentation needed to make the determination (Numerator)		Number of new unduplicated referrals (Denominator)		Percentage of compliance
Financial eligibility determined within 30 days	FSMC/MC 7	CCS only 1	FSMC /MC 7	CCS only 1	100%
Residential eligibility determined within 30 days	8		8		100%

## CCS Performance Measure 3 (A & B) – Special Care Center

This Performance Measure is evaluated in two parts.

**Part A: Annual Team Report**

**Definition:** This performance measure is based on the CCS requirement for an annual team report for each child enrolled in CCS whose condition requires Special Care Center services and has received an authorization to a Special Care Center. County CCS programs will evaluate this measure by the presence of an annual team conference report in the child's medical file.

**Numerator:** Number of children that received a Special Care Center authorization and were seen at least annually at the appropriate Special Care Center as evidenced by documentation and completion of the interdisciplinary team report.

**Denominator:** Number of children enrolled in CCS whose condition as listed in categories defined in Numbered Letter 01-0108 requires CCS Special Care Center services and has received an authorization to a Special Care Center.

**Data source:** 10% of the county CCS cases authorized to SCC or 100 cases (whichever number is less).

**Part B: Referral of a Child to SCC**

**Definition:** This measure is based on the CCS requirement that certain CCS eligible medical conditions require a referral to a CCS Special Care Center for ongoing coordination of services.

**Numerator:** Number of children in CCS, with medical conditions in the categories as listed in Numbered Letter 01-0108 requiring a Special Care Center Authorization, who actually received an authorization for services.

**Denominator:** Number of children enrolled in CCS, with medical conditions, requiring Special Care Center Authorizations.

**Data source:** Counties shall identify and use four or five specific diagnosis categories (cardiac, pulmonary, etc) as listed in the Special Care Center Numbered Letter 01-0108 as it relates to the SCC(s) identified for your client population. The county shall identify one or more diagnostic codes and use the diagnosis codes indicated for the SCC categories selected for this PM.



Mono County Children's Medical Services Plan and Fiscal Guidelines 2016-2017

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**Reporting Form - Part A:**

<b>Category selected (cardiac, pulmonary, etc.)</b>	<b>Number of children with annual team report in client's medical records</b>  (Numerator)	<b>Number of children with SCC authorization</b>  (Denominator)	<b>Percentage of compliance</b>
SCG 02 (except NICU admissions, SCG 04, and SCG 06)	7	8	88%

Mono County Children's Medical Services Plan and Fiscal Guidelines 2016-2017

<b>Category selected (cardiac, pulmonary etc.)</b>	<b>Number of children with authorization to SCC</b>	<b>Number of children with medical conditions that require SCC</b>	<b>Diagnostic Code Chosen</b>	<b>Percentage of compliance</b>
<b>Communication</b>	<b>9</b>	<b>9</b>	<b>389.0;270.4;744.23; f80.1, 315.39</b>	<b>100%</b>
<b>Craniofacial</b>	<b>7</b>	<b>7</b>		<b>100%</b>
<b>Endocrine</b>	<b>0</b>	<b>0</b>	<b>389.00;744.23; M26.9</b>	
<b>Spina Bifida</b>	<b>1</b>	<b>1</b>	<b>Q05.9</b>	<b>100%</b>
<b>CF/Pulmonary</b>	<b>2</b>	<b>2</b>	<b>770.9, 770.7</b>	<b>100%</b>
<b>Cardiac Center</b>	<b>3</b>	<b>3</b>	<b>270.4</b>	<b>100%</b>

\* Counties may select four (4) to five (5) specific medical conditions as outlined in the SCC NL to use as the basis for clients that should have a referral to a CCS SCC.

## CCS Performance Measure 4 – Transition Planning

**Definition:** Children, 14 years and older who are expected to have chronic health conditions that will extend past the twenty-first birthday will have documentation of a biannual review for long term transition planning to adulthood.

**Numerator:** Number of CCS charts for clients 14, 16, 18, or 20 years containing the presence of a Transition Planning Checklist completed by CCS program staff within the past 12 months for children aged 14 years and over whom requires long term transition planning.

**Denominators:**

- a. Number of CCS charts reviewed of clients 14, 16, 18, and 20 years in (10% of children aged 14 and over) whose medical record indicates a condition that requires a transition plan.
- b. Number of MTP charts reviewed of clients 14, 16, 18, and 20 years in (10% of children aged 14 and over) whose medical record indicates a condition that requires a transition plan.

**Data Source:** Chart Audit, Completion of Transition Planning Checklist.

- \* Due to caseload numbers in Los Angeles County, LA County should work with the Regional Office to select an appropriate number of clients to be included in their sample size.

**Transition Planning Checklist**

Transition Documentation	YES	NO	Comments
1. Client has an identified need for long-term transition planning.			
2. Transition planning noted in child's medical record.			
3. Transition planning noted in SCC reports.			
4. Vocational Rehab noted in child's reports.			
5. Adult provider discussed or identified for children 17 years of age or older.			
6. Transition planning noted in SELPA for those children that are in the MTP.			

\* Note: Not all of the items in the Checklist will be applicable for each chart review.

**Reporting Form:**

Number of CCS charts reviewed 8	Number with transition planning 8	Percentage of compliance 100%
Number of MTP charts reviewed N/A	Number with transition planning N/A	Percentage of compliance N/A

## CCS Performance Measure 5 – Family Participation

The degree to which the CCS program demonstrates family participation.

**Definition:** This measure is evaluated based on each of the following four (4) specific criteria that documents family participation in the CCS program. Counties need to indicate based on the level of implementation.

the score

Checklist documenting family participation in the CCS program.	Yes	No	Comments
1. Family members are offered an opportunity to provide feedback regarding their satisfaction with the services received through the CCS program by participation in such areas as surveys, group discussions, or individual consultation.	x		April 2015 MTC Survey.
2. Family members participate on advisory committees or task forces and are offered training, mentoring and reimbursement when appropriate.		x	No advisory committee or task force exists at this time. Survey sent to every CCS family inquiring their interest in participating in committees. 2 out of 81 responses received were interested and thus no committee was created.
3. Family members are participants of the CCS Special Care Center services provided to their child through family participation in SCC team meeting and/or transition planning.	x		Family given opportunity to participate in SCC meetings.
4. Family advocates, either as private individuals or as part of an agency advocating family centered care, which have experience with children with special health care needs, are contracted or consultants to the CCS program for their expertise.		x	

Mono County Children's Medical Services Plan and Fiscal Guidelines 2016-2017

**Reporting Form:**

<b>Criteria</b>	<b>Performing (25% for each criteria)</b>	<b>Not Performing</b>
<b>1. Feedback</b>	25%	
<b>2. Advisory Committee</b>		25%
<b>3. Special Care Center Family participation</b>	25%	
<b>4. Resource Center</b>		25%
<b>Total</b>	<b>50%</b>	

# CHILDRENS MEDICAL SERVICES

## PLAN

FY 2016-2017

MONO COUNTY

DATA FORMS

**California Children's Services Caseload Summary Form**

County:  Mono

Fiscal Year:  2016-2017

	CCS Caseload 0 to 21 Years	A		B		15-16 Caseload	% of Grand Total
		13-14 Caseload	% of Grand Total	14-15 Caseload	% of Grand Total		
<b>MEDI-CAL</b>							
<b>1</b>	Average of Total Open (Active) Medi- Cal Children	52	76.4%	54	77.15%	74	56.48%
<b>2</b>	Potential Case Medi-Cal	14	20.5%	12	14.15%	19	14.50%
<b>3</b>	<b>TOTAL MEDI-CAL</b> (Row 1 + Row 2)	66	97%	66	94.30%	93	70.99%
<b>NON-MEDI-CAL</b>							
<b>HEALTHY FAMILIES (Transitioned to Medi-Cal F/Y 13-14)</b>							
<b>4</b>	Average of Total Open (Active) Healthy Families	0	0	0	0	0	0
<b>5</b>	Potential Cases Healthy Families	0	0	0	0	0	0
<b>6</b>	<b>Total Healthy Families</b> (Row 4 + Row 5)	0	0	0	0	0	0
<b>STRAIGHT CCS</b>							
<b>7</b>	Average of Total Open (Active) Straight CCS Children	2	2.9%	2	2.85%	27	20.61%
<b>8</b>	Potential Cases Straight CCS Children	0	0	0	0	11	8.40%
<b>9</b>	<b>Total Straight CCS</b> (Row 7 + Row 8)	2	2.9%	2	2.85%	38	29.01%
<b>10</b>	<b>TOTAL NON MEDI- CAL</b> (Row 6 + Row 9)	2	2.9%	2	2.85%	38	29.01%
<b>GRAND TOTAL</b>							
<b>11</b>	(Row 3 + Row 10)	68	100%	70	100%	131	100%



**Performance Measure Profile**

	2012-13		2013-14		2014-15		2015-16		2016-17	
	MC	N-MC	MC	N-MC	MC	N-MC	MC	N-MC	MC	N-MC
<b>CHDP</b> 1	100%		100%		82.75%		97%			
2	N/A		N/A		N/A		N/A			
3	100%		100%		N/A		N/A			
4 Average for all three providers	BMI	100%	BMI	85%	BMI	84%	BMI	100%	BMI	
	Dental	100%	Dental	100%	Dental	90%	Dental	100%	Dental	
	Lead	99%	Lead	98%	Lead	100%	Lead	100%	Lead	
5	1. 63% 2. 90%		100%		100%		1. 100% 2. 56%			
6 (Optional)										
E (Optional)										
<b>HPCFC</b> 1	100%		n/a		n/a		100%			

Performance Measure Number

Mono County Children's Medical Services Plan and Fiscal Guidelines 2016-2017

2	Health	88%	Health	100%	Health	100%	Health	100%	Health	
	Dental	77%	Dental	77%	Dental	80%	Dental	100%	Dental	

**Performance Measure Profile – Continued**

	2012-13		2013-14		2014-15		2015-2016			
<b>CCS</b>	95%		96%		97%		45%			
1										
2	MED	N/A	MED	N/A	MED	N/A	MED	N/A		
	RES	99%	RES	93%	RES	96%	RES	100%		
	FIN	97%	FIN	100%	FIN	100%	FIN	100%		
3 (A)	56%		80%		82%		88%			
3 (B)	100%		100%		100%		100%			
4	CCS	100%	CCS	100%	CCS	100%	CCS	100%		
	MTP	50%	MTP	n/a	MTP	n/a	MTP	n/a		
5	68%		68%		75%		50%			

Mono County Children's Medical Services Plan and Fiscal Guidelines 2016-2017

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**CHDP Program Referral Data**

Complete this form using the instructions found on page 4-8 through 4-10.

County: Mono	FY 13-14		FY 14-15		FY 15-16	
<b>Basic informing and CHDP Referrals</b>						
1. Total number of CalWORKs/Medi-Cal cases informed and determined eligible by Department of Social Services	563	Transition from HF to Medi-Cal	491		470	
2. Total number of cases and recipients in "1" requesting CHDP services	Cases	Recipients	Cases	Recipients	Cases	Recipients
Number of CalWORKs cases/recipients	0	0	9	14	8	19
Number of Foster Care cases/recipients	1	1	7	7	7	7
Number of Medi-Cal only cases/recipients	44	77	52	87	81	142
3. Total number of EPSDT eligible recipients and unborn, referred by Department of Social Services' workers who requested the following:						
Medical and/or dental services	99		45		107	
Medical and/or dental services with scheduling and/or transportation	26		18		51	
Information only (optional)	19		64		59	
4. Number of persons who were contacted by telephone, home visit, face-to-face, office visit or written response to outreach letter	104		125		192	
<b>Results of Assistance</b>						
5. Number of recipients actually provided scheduling and/or transportation assistance by program staff	24		29		46	
6. Number of recipients in "5" who actually received medical and/or dental services	63		65		82	

**CASES ESTIMATED TO BE AFFECTED BY ON-LINE APPLICATIONS**

**CHILDRENS MEDICAL SERVICES  
PLAN  
FY 2016-2017  
MONO COUNTY**

**MEMORANDA OF UNDERSTANDING AND  
INTERAGENCY AGREEMENTS**

State of California - Health and Human Services Agency Department of Health Care Services - Children's Medical Services

**Memoranda of Understanding/Interagency Agreement List**

List all current Memoranda of Understanding (MOU) and/or Interagency Agreements (IAA) in California Children's Services, Child Health and Disability Prevention Program, and Health Care Program for Children in Foster Care. Specify whether the MOU or IAA has changed. Submit only those MOU and IAA that are new, have been renewed, or have been revised. For audit purposes, counties and cities should maintain current MOU and IAA on file.

**County/City: Mono Fiscal Year 2016-17**

Title or Name of MOU/IAA	Is this a MOU or an IAA?	Effective Dates From/To	Date Last Reviewed by County/ City	Name of Person Responsible for this MOU/IAA?
CCS MTP/SELPA DHCS. Per Systems of Care Division: <b>No renewals of IAA MTP until further notice.</b>	IAA	July 2012-2014	6/30/14	Jody Martin, BSN, RN
CHDP/DSS	IAA	July 2015-June 2017	June 2015	Jody Martin BSN, RN
HCPCFC/CWS & Probation	MOU	July 2015-June 2017	June 2015	Jody Martin BSN, RN



**CHILDREN'S MEDICAL SERVICES**  
**CMS PLAN**  
**Fiscal Year 2016-2017**

**Part III**  
**Budget Forms**

**Budget Justification Narrative**

**Children's Medical Services  
Mono County  
Budget Narrative  
Fiscal Year 2016-2017**

<b>I. PERSONNEL EXPENSES</b>		<b>Identify and explain any changes in Personnel including FTE percentage changes.</b>
Total Salaries:	\$130,147	2% COLA effective 1/1/2017
Total Benefits:	\$69,905	Benefits are estimated. Medical insurance premiums increase effective 1/1/2017.
<b>Total Personnel Expenses:</b>	<b>\$200,052</b>	

Health Program Manager	Increased CMS FTE from .90 to .94. CCS Program Administration FTE decreased by .10 and CCS Medical Case Management FTE increased by .20 to reflect a better estimate of actual time spent performing each activity. CHDP Deputy Director FTE decreased by .02 and CHDP Case Manager FTE decreased by .02 to reflect a better estimate of actual time spent performing each activity. Foster Care PHN FTE increased by .05 to reflect a better estimate of actual time spent performing foster care administrative functions.	
Community Health Outreach Specialist	A decrease of .12 FTE in CMS. CCS Coordinator FTE increased by .1075 to reflect a better estimate of actual time spent performing CCS functions. CHDP FTE decreased by .04 to reflect a better estimate of actual time spent in the program.	
Director of Public Health	CMS FTE increased by .02. CCS FTE increased by .01 and time was budgeted in Program Administration instead of Other Health Care Professionals. CHDP FTE decreased by .03 to reflect a better estimate of actual time spent performing CHDP administrative functions.	
Director of Public Health Nursing	CMS FTE decreased by .01. CCS FTE increased by .01 and personnel expense was moved from Other Health Care Professionals to Program Administration in an effort to reflect a better estimate of actual time spent performing CCS functions. CHDP FTE decreased by .04 to reflect a better estimate of actual time spent in the program. Included in the HCPCFC at .02 FTE.	
Public Health Fiscal and Administrative Officer	CMS FTE increased by .03. CCS FTE increased by .08 to reflect a better estimate of actual time spent on CCS fiscal duties. CHDP FTE decreased by .02 to reflect a better estimate of actual time spent performing CHDP fiscal duties.	
Fiscal and Technical Specialist	CHDP FTE decreased by .06 to reflect a better estimate of actual time spent working in the program.	

<b>II. OPERATING EXPENSES</b>		<b>List all Operating Expense line items. Identify and explain any increase, decrease, or newly listed line item.</b>
Travel	\$2,113	Includes per diem, lodging, and mileage (IRS rate) for CCS and Foster Care related travel.
Training	\$0	
Office Expense	\$1,000	Misc office supplies
Communications	\$1,134	CCS cost of staff cell phone allowances. Allowances are based on the annual rate multiplied by the employee's FTE.
Space Rental	\$0	Rent included in the FY 2016-17 California Department of Public Health ICR.
Computers	\$2,000	Desktop computer replacement in 2017 (2). Current desktop computers are over 4 years old and are scheduled to be replaced via our IT Tech Refresh Program.
<b>Total Operating Expenses:</b>	<b>\$6,247</b>	

<b>III. CAPITAL EXPENSES</b>		<b>List all Capital Expense line items. Identify and explain any newly listed Capital Expense. Include County/City Capital Expenses Justification Form.</b>
<b>Total Capital Expenses:</b>	0	Not applicable

<b>IV. INDIRECT EXPENSES</b>		
A. Internal @ 25%	\$46,259	California Department of Public Health FY 2016-17 approved ICR (25% of personnel)
B. External @ 0%	\$0	
<b>Total Indirect Expenses:</b>	<b>\$46,259</b>	

<b>V. OTHER EXPENSES</b>		<b>List all Other Expense line items. Identify and explain increased, decreased, or newly listed line items. Include County/City Other Expenses Justification Form.</b>
Maintenance and Transportation	\$0	
Student Internship	\$0	
<b>Total Other Expenses:</b>	<b>\$0</b>	

<b>Budget Grand Total</b>	<b>\$252,558</b>
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CCS CASELOAD	Actual Caseload	Percent of Total CCS Caseload
<b>STRAIGHT CCS -</b> Total Cases of Open (Active) Straight CCS Children	5	6.10%
<b>OTLIPC -</b> Total Cases of Open (Active) OTLIPC Children	20	24.39%
<b>MEDI-CAL -</b> Total Cases of Open (Active) Medi-Cal (non-OTLIPC) Children	57	69.51%
<b>TOTAL CCS CASELOAD</b>	<b>82</b>	<b>100%</b>

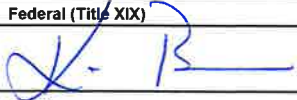

### CCS Administrative Budget Summary

Fiscal Year: 2016-17

County: Mono

	Col 1 = Col 2+3+4	Straight CCS	OTLIPC	Medi-Cal (non-OTLIPC) (Column 4 = Columns 5 + 6)		
Column	1	2	3	4	5	6
Category/Line Item	Total Budget	Straight CCS State/County (50/50)	Optional Targeted Low Income Children's Program (OTLIPC) State/County/Federal (6.0/6.0/88)	Medi-Cal State/Federal	Enhanced Medi-Cal State/Federal (25/75)	Non-Enhanced Medi-Cal State/Federal (50/50)
I. Total Personnel Expense	143,768	8,766	35,065	99,936	36,640	63,296
II. Total Operating Expense	5,934	362	1,448	4,124	459	3,665
III. Total Capital Expense	0	0	0	0		0
IV. Total Indirect Expense	35,942	2,192	8,766	24,984		24,984
V. Total Other Expense	0	0	0	0		0
<b>Budget Grand Total</b>	<b>185,644</b>	<b>11,320</b>	<b>45,279</b>	<b>129,044</b>	<b>37,099</b>	<b>91,945</b>

	Col 1 = Col 2+3+4	Straight CCS	OTLIPC	Medi-Cal (non-OTLIPC) (Column 4 = Columns 5 + 6)		
Column	1	2	3	4	5	6
Source of Funds	Total Budget	Straight CCS State/County (50/50)	Optional Targeted Low Income Children's Program (OTLIPC) State/County/Federal (6.0/6.0/88)	Medi-Cal State/Federal	Enhanced Medi-Cal State/Federal (25/75)	Non-Enhanced Medi-Cal State/Federal (50/50)
<b>Straight CCS</b>						
State	5,660	5,660				
County	5,660	5,660				
<b>OTLIPC</b>						
State	2,717		2,717			
County	2,717		2,717			
Federal (Title XXI)	39,845		39,845			
<b>Medi-Cal</b>						
State	55,248			55,248	9,275	45,973
Federal (Title XIX)	73,796			73,796	27,824	45,972

	Kimberly Bunn	10/18/2016	kbunn@mono.ca.gov
Prepared By (Signature)	Prepared By (Printed Name)	Date	Email Address
	Jody Martin	10/21/16	martin@mono.ca.gov
CCS Administrator (Signature)	CCS Administrator (Printed Name)	Date	Email Address

CCS CASELOAD	Actual Caseload	Percent of Total CCS Caseload
<b>STRAIGHT CCS -</b> Total Cases of Open (Active) Straight CCS Children	5	6.10%
<b>OTLICP -</b> Total Cases of Open (Active) OTLICP Children	20	24.39%
<b>MEDI-CAL -</b> Total Cases of Open (Active) Medi-Cal (non-OTLICP) Children	57	69.51%
<b>TOTAL CCS CASELOAD</b>	<b>82</b>	<b>100%</b>



### CCS Administrative Budget Worksheet

Fiscal Year: 2016-17

County: Mono

Column				Straight CCS		Optional Targeted Low Income Children's Program (OTLICP)		Medi-Cal (Non-OTLICP)					
	1	2	3	4A	4	5A	5	6A	6	7A	7	8A	8
Category/Line Item	% FTE	Annual Salary	Total Budget (1 x 2 or 4 + 5 + 6 + 7)	Caseload %	Straight CCS County/State (50/50)	Caseload %	Optional Targeted Low Income Children's Program (OTLICP) State/County/Federal (6.0/6.0/88)	Caseload %	Medi-Cal State/Federal	Enhanced % FTE	Enhanced Medi-Cal State/Federal (25/75)	Non-Enhanced % FTE	Non-Enhanced Medi-Cal State/Federal (50/50)
<b>I. Personnel Expense</b>													
<b>Program Administration</b>													
1. Jody Martin, CCS Administrator	5.00%	60,595	3,030	6.10%	185	24.39%	739	69.51%	2,106			100.00%	2,106
2. Lynda Salcido, Public Health Director	3.00%	129,879	3,896	6.10%	238	24.39%	950	69.51%	2,708			100.00%	2,708
3. Sandra Pearce, Director of Nursing	3.00%	78,063	2,342	6.10%	143	24.39%	571	69.51%	1,628			100.00%	1,628
4. Olivia Wilson, CCS Coordinator	2.00%	57,914	1,158	6.10%	71	24.39%	282	69.51%	805			100.00%	805
5. Kimberly Bunn, Fiscal & Administrative Officer	10.00%	66,946	6,695	6.10%	408	24.39%	1,633	69.51%	4,654			100.00%	4,654
Subtotal		393,397	17,121		1,045		4,175		11,901				11,901
<b>Medical Case Management</b>													
1. Jody Martin, CCS Case Manager	60.00%	60,595	36,357	6.10%	2,217	24.39%	8,868	69.51%	25,273	95.00%	24,009	5.00%	1,264
2. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
3. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
4. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
5. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
6. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
7. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
8. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
Subtotal		60,595	36,357		2,217		8,868		25,273		24,009		1,264
<b>Other Health Care Professionals</b>													
1. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
2. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
3. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
Subtotal		0	0		0		0		0		0		0
<b>Ancillary Support</b>													
1. Olivia Wilson, CCS Coordinator	65.00%	57,914	37,644	6.10%	2,295	24.39%	9,181	69.51%	26,167			100.00%	26,167
2. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
3. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
4. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
5. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
Subtotal		57,914	37,644		2,295		9,181		26,167				26,167
<b>Clerical and Claims Support</b>													
1. Maria Gonzalez, FTS IV	3.00%	55,790	1,674	6.10%	102	24.39%	408	69.51%	1,164	0.00%	0	100.00%	1,164
2. Nancy Cruz-Garcia, FTS III	3.00%	47,002	1,410	6.10%	86	24.39%	344	69.51%	980	0.00%	0	100.00%	980
3. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0

Column				Straight CCS		Optional Targeted Low Income Children's Program (OTLICP)		Medi-Cal (Non-OTLICP)					
	1	2	3	4A	4	5A	5	6A	6	7A	7	8A	8
Category/Line Item	% FTE	Annual Salary	Total Budget (1 x 2 or 4 + 5 + 6 + 7)	Caseload %	Straight CCS County/State (50/50)	Caseload %	Optional Targeted Low Income Children's Program (OTLICP) State/County/Federal (6.0/6.0/88)	Caseload %	Medi-Cal State/Federal	Enhanced % FTE	Enhanced Medi-Cal State/Federal (25/75)	Non-Enhanced % FTE	Non-Enhanced Medi-Cal State/Federal (50/50)
4. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
5. Employee Name, Position	0.00%	0	0	6.10%	0	24.39%	0	69.51%	0	0.00%	0	100.00%	0
Subtotal		102,792	3,084		188		752		2,144		0		2,144
Total Salaries and Wages			94,206	6.10%	5,744	24.39%	22,977	69.51%	65,485	36.66%	24,009	63.34%	41,476
Staff Benefits (Specify %)	52.61%		49,562	6.10%	3,022	24.39%	12,088	69.51%	34,451		12,631		21,820
<b>I. Total Personnel Expense</b>			143,768	6.10%	8,766	24.39%	35,065	69.51%	99,936		36,640		63,296
<b>II. Operating Expense</b>													
1. Travel			1,800	6.10%	110	24.39%	439	69.51%	1,251	36.66%	459	63.34%	792
2. Training			0	6.10%	0	24.39%	0	69.51%	0	36.66%	0	63.34%	0
3. Staff Cell Phone Allowance			1,134	6.10%	69	24.39%	277	69.51%	788			100.00%	788
4. Office Expense			1,000	6.10%	61	24.39%	244	69.51%	695			100.00%	695
5. Misc. Computer Equipment			2,000	6.10%	122	24.39%	488	69.51%	1,390			100.00%	1,390
6.			0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
7.			0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
<b>II. Total Operating Expense</b>			5,934		362		1,448		4,124		459		3,665
<b>III. Capital Expense</b>													
1.			0	6.10%	0	24.39%	0	69.51%	0				0
2.			0	6.10%	0	24.39%	0	69.51%	0				0
3.			0	6.10%	0	24.39%	0	69.51%	0				0
<b>III. Total Capital Expense</b>			0		0		0		0				0
<b>IV. Indirect Expense</b>													
1. Internal	25.00%		35,942	6.10%	2,192	24.39%	8,766	69.51%	24,984			100.00%	24,984
2. External	0.00%		0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
<b>IV. Total Indirect Expense</b>			35,942		2,192		8,766		24,984				24,984
<b>V. Other Expense</b>													
1. Maintenance & Transportation			0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
2.			0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
3.			0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
4.			0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
5.			0	6.10%	0	24.39%	0	69.51%	0			100.00%	0
<b>V. Total Other Expense</b>			0		0		0		0				0
<b>Budget Grand Total</b>			185,644		11,320		45,279		129,044		37,099		91,945

	<b>Kimberly Bunn</b>	10/18/2016	<a href="mailto:kbunn@mono.ca.gov">kbunn@mono.ca.gov</a>	760.932.5587
Prepared By (Signature)	Prepared By (Printed Name)	Date Prepared	E-Mail address	Telephone Number with Area Code
	<b>Jody Martin</b>	10/20/16	<a href="mailto:jmartin@mono.ca.gov">jmartin@mono.ca.gov</a>	760.924.1841
CCS Administrator (Signature)	CCS Administrator (Printed Name)	Date Signed	E-Mail address	Telephone Number with Area Code



**CHDP Administrative Budget Worksheet**  
**No County/City Match**  
**State and State/Federal**  
**Fiscal Year 2016-17**

Mono County											
Column	1A	1B	1	2A	2	3A	3	4A	4	5A	5
Category/Line Item	% or FTE	Annual Salary	Total Budget (1A x 1B or 2 + 3)	CHDP % or FTE	Total CHDP Budget	Total Medi- Cal %	Total Medi-Cal Budget (4 + 5)	% or FTE	Enhanced State/Federal (25/75)	% or FTE	Nonenhanced State/Federal (50/50)
<b>Personnel Expenses</b>											
1. Jody Martin, CHDP Deputy Director	8%	\$60,595	\$4,926	0%		99%	\$4,877.11	85%	\$4,187	15%	\$739
2. Jody Martin, CHDP Case Manager	8%	\$60,595	\$4,848	0%		100%	\$4,848	0%	\$0	100%	\$4,848
3. Olivia Wilson, CHDP Coordinator	21%	\$57,914	\$12,162	0%		100%	\$12,162	0%		100%	\$12,162
4. Lynda Salcido, Public Health Director	2%	\$129,879	\$2,598	0%		100%	\$2,598	0%		100%	\$2,598
5. Sandra Pearce, Director of Public Health Nursing	1%	\$78,063	\$781	0%		100%	\$781	0%		100%	\$781
6. Kimberly Bunn, Fiscal Agent	3%	\$66,946	\$2,008	0%		100%	\$2,008	0%		100%	\$2,008
7. Maria Gonzalez, Clerical	1%	\$55,790	\$558	0%		100%	\$558	0%		100%	\$558
8. Nancy Cruz-Garcia, Clerical	1%	\$47,002	\$470	0%		100%	\$470	0%		100%	\$470
9. Richard O. Johnson, M.D., CHDP Director	1%	\$158,413	\$1,584			100%	\$0	0%		0%	\$0
<b>Total Salaries and Wages</b>			\$28,350		\$0		\$28,350		\$4,187		\$24,163
Less Salary Savings			\$0		\$0		\$0		\$0		\$0
<b>Net Salaries and Wages</b>			\$28,350		\$0		\$28,350		\$4,187		\$24,163
Staff Benefits (Specify %)   56.14%			\$15,916		\$0		\$15,916		\$2,351		\$13,565
<b>I. Total Personnel Expenses</b>			\$44,266		\$0		\$44,266		\$6,538		\$37,728
<b>II. Operating Expenses</b>											
1. Travel			\$0		\$0		\$0				\$0
2. Training			\$0		\$0		\$0				\$0
3. Communications			\$0		\$0		\$0				\$0
4. Equipment Mntnce			\$0		\$0		\$0				\$0
5. Office			\$0		\$0		\$0				\$0
6. Rent			\$0		\$0		\$0				\$0
<b>II. Total Operating Expenses</b>			\$0		\$0		\$0		\$0		\$0
<b>III. Capital Expenses</b>											
1.			\$0		\$0		\$0				\$0
<b>III. Total Capital Expenses</b>			\$0		\$0		\$0				\$0
<b>IV. Indirect Expenses</b>											
1. Internal (Specify %)   25.00%			\$9,432		\$0		\$9,432				\$9,432
2. External (Specify %)   0.00%			\$0		\$0		\$0				\$0
<b>IV. Total Indirect Expenses</b>			\$9,432		\$0		\$9,432				\$9,432
<b>V. Other Expenses</b>											
<b>V. Total Other Expenses</b>			\$0		\$0		\$0				\$0
<b>Budget Grand Total</b>			\$53,698		\$0		\$53,698		\$6,538		\$47,160



	1/25/17	760.932.5587	kbunn@mono.ca.gov
Prepared By (Signature)	Date Prepared	Phone Number	Email Address
	2/2/2017	760.924.1841	imartin@mono.ca.gov
CHDP Director or Deputy Director (Signature)	Date	Phone Number	Email Address

**CHDP Administrative Budget Summary  
No County/City Match  
Fiscal Year 2016-17**

**County/City Name: Mono County**

Column	1	2	3	4	5
Category/Line Item	Total Budget (2 + 3)	Total CHDP Budget	Total Medi-Cal Budget (4 + 5)	Enhanced State/Federal (25/75)	Nonenhanced State/Federal (50/50)
<b>I. Total Personnel Expenses</b>	\$44,266	\$0	\$44,266	\$6,538	\$37,728
<b>II. Total Operating Expenses</b>	\$0	\$0	\$0	\$0	\$0
<b>III. Total Capital Expenses</b>	\$0	\$0	\$0		\$0
<b>IV. Total Indirect Expenses</b>	\$9,432	\$0	\$9,432		\$9,432
<b>V. Total Other Expenses</b>	\$0	\$0	\$0		\$0
<b>Budget Grand Total</b>	\$53,698	\$0	\$53,698	\$6,538	\$47,160

Column	1	2	3	4	5
Source of Funds	Total Funds	Total CHDP Budget	Total Medi-Cal Budget	Enhanced State/Federal	Nonenhanced State/Federal
<b>State General Funds</b>	\$0	\$0			
<b>Medi-Cal Funds:</b>	\$53,698		\$53,698		
<b>State Funds</b>	\$25,215		\$25,215	\$1,635	\$23,580
<b>Federal Funds (Title XIX)</b>	\$28,484		\$28,484	\$4,904	\$23,580



	1/25/2017	760.932.5587	<a href="mailto:kbunn@mono.ca.gov">kbunn@mono.ca.gov</a>
Prepared By (Signature)	Date Prepared	Phone Number	Email Address
	2/2/2017	760.924.1841	<a href="mailto:jmartin@mono.ca.gov">jmartin@mono.ca.gov</a>
CHDP Director or Deputy Director (Signature)	Date	Phone Number	Email Address

**HCPCFC Administrative Budget Summary  
Fiscal Year 2016**

**County/City Name: Mono County**

Column	1	2	3
Category/Line Item	Total Budget (2 + 3)	Enhanced State/Federal (25/75)	Nonenhanced State/Federal (50/50)
<b>I. Total Personnel Expenses</b>	\$7,880	\$5,366	\$2,514
<b>II. Total Operating Expenses</b>	\$275	\$200	\$75
<b>III. Total Capital Expenses</b>			
<b>IV. Total Indirect Expenses</b>	\$628		\$628
<b>V. Total Other Expenses</b>			
<b>Budget Grand Total</b>	\$8,783	\$5,566	\$3,217

Column	1	2	3
Source of Funds	Total Funds	Enhanced State/Federal (25/75)	Nonenhanced State/Federal (50/50)
<b>State Funds</b>	\$3,000	\$1,392	\$1,609
<b>Federal Funds (Title XIX)</b>	\$5,783	\$4,175	\$1,609
<b>Budget Grand Total</b>	\$8,783		


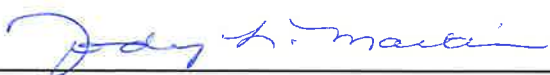
	<i>10/18/16</i>	760.932.5587	<a href="mailto:kbunn@mono.ca.gov">kbunn@mono.ca.gov</a>
Prepared By (Signature)	Date Prepared	Phone Number	Email Address
	<i>10/20/16</i>	760.924.1841	<a href="mailto:jmartin@mono.ca.gov">jmartin@mono.ca.gov</a>
CHDP Director or Deputy Director (Signature)	Date	Phone Number	Email Address



**HCPCFC Administrative Budget Worksheet  
Fiscal Year 2016**

**County/City Name: Mono County**

Column	1A	1B	1	2A	2	3A	3
Category/Line Item	% or FTE	Annual Salary	Total Budget (1A x 1B or 2 + 3)	% or FTE	Enhanced State/Federal (25/75)	% or FTE	Nonenhanced State/Federal (50/50)
<b>I. Personnel Expenses</b>							
1. Jody Martin, Health Program Manager	5.5%	\$60,595	\$3,333	100%	\$3,333	0%	\$0
2. Sandra Pearce, Director of Public Health Nursing	2%	\$78,063	\$1,561	0%	\$0	100%	\$1,561
3.				0%	\$0		\$0
Total Salaries and Wages			\$4,894		\$3,333		\$1,561
Less Salary Savings							
Net Salaries and Wages			\$4,894		\$3,333		\$1,561
Staff Benefits (Specify %)	61.00%		\$2,985		\$2,033		\$952
<b>I. Total Personnel Expenses</b>			<b>\$7,879</b>		<b>\$5,366</b>		<b>\$2,514</b>
<b>II. Operating Expenses</b>							
1. Travel			\$275		\$200		\$75
2. Training			\$0		\$0		\$0
3.			\$0		\$0		\$0
<b>II. Total Operating Expenses</b>			<b>\$275</b>		<b>\$200</b>		<b>\$75</b>
<b>III. Capital Expenses</b>							
1.							
2.							
<b>III. Total Capital Expenses</b>							
<b>IV. Indirect Expenses</b>							
1. Internal (Specify %)	25.00%		\$628				\$628
2. External							
<b>IV. Total Indirect Expenses</b>			<b>\$628</b>				<b>\$628</b>
<b>V. Other Expenses</b>							
1.							
2.							
<b>V. Total Other Expenses</b>							
<b>Budget Grand Total</b>			<b>\$8,783</b>		<b>\$5,566</b>		<b>\$3,217</b>

	10/18/16	760.932.5587	kbunn@mono.ca.gov
Prepared By (Signature)	Date prepared	Phone Number	Email Address
	10/20/16	760.924.1841	jmartin@mono.ca.gov
CHDP Director or Deputy Director (Signature)	Date	Phone Number	Email Address



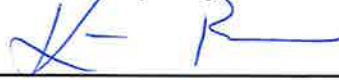

**Foster Care Administrative Budget Summary  
County/City Match  
County/Title XIX Federal Funds  
Fiscal Year 2016**

**County/City Name: Mono County**

Column	1	2	3
Category/Line Item	Total Budget (2 + 3)	Enhanced County/City/Federal (25/75)	Nonenhanced County/City/Federal (50/50)
I. Total Personnel Expense	\$4,185	\$3,139	\$1,046
II. Total Operating Expense	\$0	\$0	\$38
III. Total Capital Expense			
IV. Total Indirect Expense	\$262		\$262
V. Total Other Expense			
<b>Budget Grand Total</b>	<b>\$4,485</b>	<b>\$3,139</b>	<b>\$1,346</b>

Column	1	2	3
Source of Funds	Total Funds	Enhanced County- City/Federal (25/75)	Nonenhanced County- City/Federal (50/50)
County/City Funds	\$1,458	\$785	\$673
Federal Funds (Title XIX)	\$3,027	\$2,354	\$673
<b>Budget Grand Total</b>	<b>\$4,485</b>		



**Source County-City Funds: County child welfare**

	10/18/16	760.932.5587	<a href="mailto:kbunn@mono.ca.gov">kbunn@mono.ca.gov</a>
Prepared By (Signature)	Date Prepared	Phone Number	Email Address
	10/20/16	760.924.1841	<a href="mailto:jmartin@mono.ca.gov">jmartin@mono.ca.gov</a>
CHDP Director or Deputy Director (Signature)	Date	Phone Number	Email Address

**Foster Care Administrative Budget Worksheet  
County-City/Federal Match  
County/Title XIX Federal Funds  
Fiscal Year 2016**

County/City Name: **Mono County**

Column	1A	1B	1	2A	2	3A	3
Category/Line Item	% or FTE	Annual Salary	Total Budget (1A x 1B or 2 + 3)	% or FTE	Enhanced County-City/Federal (25/75)	% or FTE	Nonenhanced County-City/Federal (50/50)
<b>I. Personnel Expenses</b>							
1. Jody Martin, Health Program Manager	4.5%	\$60,595	\$2,727	75%	\$2,045	25%	\$682
2.							
3.							
4.							
5.							
<b>Total Salaries and Wages</b>			\$2,727		\$2,045		\$682
Less Salary Savings		\$0	\$0		\$0		\$0
Net Salaries and Wages			\$2,727		\$2,045		\$682
Staff Benefits (Specify %)	53.49%		\$1,459		\$1,094		\$365
<b>I. Total Personnel Expenses</b>			<b>\$4,185</b>		<b>\$3,139</b>		<b>\$1,046</b>
<b>II. Operating Expenses</b>							
1. Travel			\$38		\$0		\$38
2. Training			\$0		\$0		\$0
<b>II. Total Operating Expenses</b>			<b>\$38</b>		<b>\$0</b>		<b>\$38</b>
<b>III. Capital Expenses</b>							
1.							
2.							
<b>III. Total Capital Expenses</b>							
<b>IV. Indirect Expenses</b>							
1. Internal (Specify %)	25.00%		\$262				\$262
2. External							
<b>IV. Total Indirect Expenses</b>			<b>\$262</b>				<b>\$262</b>
<b>V. Other Expenses</b>							
1.							
2.							
<b>V. Total Other Expenses</b>							
<b>Budget Grand Total</b>			<b>\$4,485</b>		<b>\$3,139</b>		<b>\$1,346</b>

	10/18/16	760.932.5587	kbunn@mono.ca.gov
Prepared By (Signature)	Date Prepared	Phone Number	Email Address
	10/20/16	760.924.1840	omoreno@mono.ca.gov
CHDP Director or Deputy Director (Signature)	Date	Phone Number	Email Address



**OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS**

**REGULAR AGENDA REQUEST**

Print

**MEETING DATE** March 7, 2017

**Departments: Mono County Sheriff's Office**

**TIME REQUIRED**

**SUBJECT** 2017-2018 Boating Safety and  
Enforcement Financial Aid Program  
Agreement Board Resolution

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

**AGENDA DESCRIPTION:**

(A brief general description of what the Board will hear, discuss, consider, or act upon)

2017-2018 Boating Safety and Enforcement Financial Aid Program Agreement Resolution.

**RECOMMENDED ACTION:**

Adopt Resolution #17-\_\_ authorizing Mono County's participation in the FY 2017-2018 Boating Safety and Enforcement Financial Aid Program Agreement and designating the Sheriff-Coroner, Emergency Services Coordinator, and the Sheriff's Finance Officer as authorized agents to sign for and administer Boating Safety and Enforcement Financial Aid Program Agreement. Provide any desired direction to staff.

**FISCAL IMPACT:**

This resolution will assist with meeting the program guidance for participation in the Boating Safety and Enforcement Financial Aid Program Agreement for Fiscal Year 2017-2018. When the agreement is awarded, the award will not exceed \$131,065.00. There is no match requirement for this grant.

**CONTACT NAME:** Ingrid Braun

**PHONE/EMAIL:** 760-616-4580 / ibraun@monosheriff.org

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR

***PRIOR TO 5:00 P.M. ON THE FRIDAY  
32 DAYS PRECEDING THE BOARD MEETING***

**SEND COPIES TO:**

Sheriff Ingrid Braun

**MINUTE ORDER REQUESTED:**

YES  NO

**ATTACHMENTS:**

Click to download
<a href="#">Staff Report</a>
<a href="#">Resolution</a>

---

**History**

<b>Time</b>	<b>Who</b>	<b>Approval</b>
3/1/2017 5:08 AM	County Administrative Office	Yes
2/28/2017 4:21 PM	County Counsel	Yes
3/1/2017 5:32 PM	Finance	Yes

**MONO COUNTY**  
**SHERIFF**  
*A Commitment to Community Safety and Service*



**Ingrid Braun**  
Sheriff-Coroner

**MONO COUNTY SHERIFF'S OFFICE**

**Michael Moriarty**  
Undersheriff

DATE: March 7, 2017  
TO: The Honorable Board of Supervisors  
FROM: Ingrid Braun, Sheriff-Coroner  
SUBJECT: California Department of Parks and Recreation, Division of Boating and Waterways, Fiscal Year 2017-2018 Boating Safety and Enforcement Financial Aid Program Agreement

**RECOMMENDATION:**

Approve Resolution 17-xx authorizing the Mono County Sheriff-Coroner, Mono County Sheriff's Office Emergency Services Coordinator, and/or the Mono County Sheriff's Office Finance Officer to apply for and administer the Boating Safety and Enforcement Financial Aid Program Agreement for Fiscal Year 2017-18. The Boating Safety and Enforcement Financial Aid Program Agreement will not exceed \$131,065.00.

**DISCUSSION:**

The purpose of the Boating Safety and Enforcement Financial Aid Program is to provide State financial aid to local governmental agencies whose waterways have high usage by transient boaters and an insufficient tax base to fully support a boating safety and enforcement program. The program is intended to augment existing local resources for boating safety and enforcement activities and is not intended to fully fund Boating Safety and Enforcement programs. Eligible costs include: personnel; operations, maintenance and equipment; and administration.

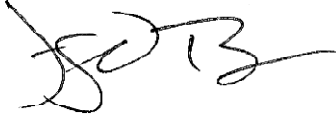
The California Department of Parks and Recreation, Division of Boating and Waterways, has requested a governing body resolution for participation in the Boating Safety and Enforcement Financial Aid Program Agreement. The resolution should specifically identify the following personnel as administrators to administer and sign documents related to the Boating Safety and Enforcement Financial Aid Program Agreement:

Mono County Sheriff-Coroner  
Mono County Sheriff's Office Emergency Management Coordinator  
Mono County Sheriff's Office Finance Officer

**FINANCIAL IMPACT:**

This resolution will assist with meeting the program guidance for participation in the Boating Safety and Enforcement Financial Aid Program Agreement for Fiscal Year 2017-2018. When the agreement is awarded, the award will not exceed \$131,065.00. There is no match requirement for this grant.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'IB' with a stylized flourish extending to the right.

Ingrid Braun, Sheriff-Coroner





**RESOLUTION NO. R17-\_\_\_**

**A resolution authorizing Mono County's participation in the FY 2017-2018 Boating Safety and Enforcement Financial Aid Program Agreement and designating the Sheriff-Coroner, Emergency Services Coordinator, and the Sheriff's Finance Officer as authorized agents to sign for and administer Boating Safety and Enforcement Financial Aid Program Agreement.**

**WHEREAS**, Mono County, a political subdivision of the State of California, wishes to participate in the 2017-2018 Boating Safety and Enforcement Financial Aid Program Agreement and to authorize the Mono County Sheriff-Coroner to act as its agent to sign for and administer agreements thereunder; and

**NOW, THEREFORE BE IT RESOLVED BY THE MONO COUNTY BOARD OF SUPERVISORS** that:

**SECTION ONE:** The County of Mono's participation in the 2017-18 Boating Safety and Enforcement Financial Aid Program Agreement is hereby authorized; and

**SECTION TWO:** The Mono County Sheriff-Coroner, Emergency Services Coordinator, and the Sheriff's Finance Officer are authorized to execute for and on behalf of Mono County any documents necessary for the purpose of obtaining and administering financial assistance provided by the Department of Parks and Recreation, Division of Boating and Waterways, and sub-granted through the State of California and to act as the County's agents with respect thereto.

**PASSED AND ADOPTED this 7th day of March , 2017, by the following vote:**

**AYES :**  
**NOES :**  
**ABSTAIN :**  
**ABSENT :**

**ATTEST:**

\_\_\_\_\_  
**Clerk of the Board**

\_\_\_\_\_  
**Stacy Corless, Chair**  
**Board of Supervisors**

**APPROVED AS TO FORM:**

\_\_\_\_\_  
**COUNTY COUNSEL**



OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Finance**

**TIME REQUIRED**

**SUBJECT** Treasury Transaction Report for  
1/31/2017

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

---

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Treasury Transaction Report for the month ending 1/31/2017.

---

### RECOMMENDED ACTION:

Approve the Treasury Transaction Report for the month ending 1/31/2017.

---

### FISCAL IMPACT:

None.

---

**CONTACT NAME:** Gerald Frank

**PHONE/EMAIL:** 760-932-5483 / gfrank@mono.ca.gov

---

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

### SEND COPIES TO:

---

### MINUTE ORDER REQUESTED:

YES  NO

---

### ATTACHMENTS:

Click to download

[Treasury Transaction Report for the month ending 1/31/2017](#)

---

### History

Time	Who	Approval
3/1/2017 5:10 AM	County Administrative Office	Yes



2/28/2017 6:04 PM

County Counsel

Yes

2/14/2017 9:45 AM

Finance

Yes



## Mono County Transaction Summary by Action Investment Portfolio

Begin Date: 12/31/2016, End Date: 1/31/2017

Action	Settlement Date	CUSIP	Face Amount / Shares	Description	Purchase Price	Principal	Interest / Dividends	YTM @ Cost	Total
<b>Buy Transactions</b>									
Buy	1/4/2017	3136G3VG7	250,000.00	FNMA 1.5 9/29/2020-17	98.25	245,627.50	989.58	1.99	246,617.08
Buy	1/4/2017	3132X0BG5	225,000.00	FAMC 1.75 6/15/2020	99.99	224,977.50	207.81	1.75	225,185.31
Buy	1/13/2017	3137EADB2	1,000,000.00	FHLMC 2.375 1/13/2022	101.66	1,016,560.00	0.00	2.03	1,016,560.00
Buy	1/19/2017	717081DL4	500,000.00	Pfizer Corp 2.1 5/15/2019-14	101.19	505,935.00	1,866.67	1.58	507,801.67
Buy	1/27/2017	3134GAG73	500,000.00	FHLMC 2 10/27/2020-17	100.00	500,000.00	0.00	2.00	500,000.00
Buy	1/27/2017	3134GAM35	1,000,000.00	FHLMC 2.3 1/27/2022-17	100.00	1,000,000.00	0.00	2.30	1,000,000.00
Buy	1/27/2017	3134GAL85	1,000,000.00	FHLMC 2.25 1/27/2022-17	100.00	1,000,000.00	0.00	2.25	1,000,000.00
		<b>Subtotal</b>	<b>4,475,000.00</b>			<b>4,493,100.00</b>	<b>3,064.06</b>		<b>4,496,164.06</b>
Deposit	1/10/2017	OAKVALLEY0670	1,260.80	Oak Valley Bank Cash	100.00	1,260.80	0.00	0.00	1,260.80
Deposit	1/13/2017	LAIF6000Q	44,990.93	Local Agency Investment Fund LGIP- Quarterly	100.00	44,990.93	0.00	0.00	44,990.93
Deposit	1/31/2017	OAKVALLEY0670	2,027.47	Oak Valley Bank Cash	100.00	2,027.47	0.00	0.00	2,027.47
Deposit	1/31/2017	OAKVALLEY0670	12,809,487.11	Oak Valley Bank Cash	100.00	12,809,487.11	0.00	0.00	12,809,487.11
		<b>Subtotal</b>	<b>12,857,766.31</b>			<b>12,857,766.31</b>	<b>0.00</b>		<b>12,857,766.31</b>
<b>Total Buy Transactions</b>			<b>17,332,766.31</b>			<b>17,350,866.31</b>	<b>3,064.06</b>		<b>17,353,930.37</b>
<b>Interest/Dividends</b>									
Interest	1/1/2017	794881BQ4	0.00	SALDEV 1.25 7/1/2019		0.00	755.56	0.00	755.56
Interest	1/3/2017	9497486Z5	0.00	WELLS FARGO BK NA SIOUXFALLS SD 1.6 8/3/2021		0.00	332.93	0.00	332.93
Interest	1/5/2017	981571CE0	0.00	Worlds Foremost Bk Sidney NE 1.75 5/5/2021		0.00	297.26	0.00	297.26
Interest	1/8/2017	33583CTQ2	0.00	FIRST NIAGARA BK NATL ASSN 1.35 1/8/2018		0.00	1,667.34	0.00	1,667.34
Interest	1/10/2017	OAKVALLEY0670	0.00	Oak Valley Bank Cash		0.00	1,260.80	0.00	1,260.80
Interest	1/11/2017	20033APV2	0.00	COMENITY CAP BK SALT LAKE CITY UTAH 1.6 4/12/2021		0.00	332.93	0.00	332.93
Interest	1/12/2017	35633MAG7	0.00	FREEDOM BK OF VA VIENNA VA 0.75 11/14/2017		0.00	156.06	0.00	156.06
Interest	1/13/2017	31938QQ98	0.00	FIRST BUSINESS BK MADISON WIS 1.9 1/13/2021		0.00	2,346.63	0.00	2,346.63
Interest	1/15/2017	55266CQE9	0.00	MB FINANCIAL BANK, NATIONAL ASSN 1.8 1/15/2021		0.00	374.55	0.00	374.55
Interest	1/15/2017	717081DD2	0.00	Pfizer Inc 0.9 1/15/2017-14		0.00	2,250.00	0.00	2,250.00



## Mono County Transaction Summary by Action Investment Portfolio

Begin Date: 12/31/2016, End Date: 1/31/2017

Action	Settlement Date	CUSIP	Face Amount / Shares	Description	Purchase Price	Principal	Interest / Dividends	YTM @ Cost	Total
Interest	1/15/2017	34387ABA6	0.00	FLUSHING BANK N Y 1.8 12/10/2018		0.00	374.55	0.00	374.55
Interest	1/16/2017	94974BFG0	0.00	Wells Fargo 1.5 1/16/2018		0.00	3,750.00	0.00	3,750.00
Interest	1/17/2017	855736DA9	0.00	STATE BK & TR CO DEFIANCE OHIO 1.6 2/17/2021		0.00	332.93	0.00	332.93
Interest	1/21/2017	3135G0A78	0.00	FNMA 1.625 1/21/2020		0.00	8,125.00	0.00	8,125.00
Interest	1/22/2017	337630AZ0	0.00	FIRSTTRUST SVGS BK CONSHOCKENPA 0.7 10/23/2017		0.00	145.66	0.00	145.66
Interest	1/22/2017	140420RD4	0.00	CAPITAL ONE BANK USA NATL ASSN 1.8 1/22/2020		0.00	2,223.12	0.00	2,223.12
Interest	1/23/2017	05580ABB9	0.00	BMW Bank of North America 1.35 1/23/2018		0.00	1,667.34	0.00	1,667.34
Interest	1/26/2017	062683AC1	0.00	BBCN BANK 0.9 2/26/2018		0.00	187.27	0.00	187.27
Interest	1/26/2017	20070PHK6	0.00	COMMERCE ST BK WEST BEND WIS 1.65 9/26/2019		0.00	343.34	0.00	343.34
Interest	1/26/2017	91330ABA4	0.00	UNITY BK CLINTON NJ 1.5 9/26/2019		0.00	312.12	0.00	312.12
Interest	1/27/2017	3136G3H81	0.00	FNMA 1.45 1/27/2021-17		0.00	7,250.00	0.00	7,250.00
Interest	1/27/2017	27113PBG5	0.00	EAST BOSTON SVGS NK BOSTON MA 0.7 10/27/2017		0.00	145.66	0.00	145.66
Interest	1/27/2017	35637RCQ8	0.00	FREEDOM FIN BK W DES MOINES 1.5 7/26/2019		0.00	312.12	0.00	312.12
Interest	1/27/2017	596689EC9	0.00	MIDDLETON COMMUNITY BANK 1.4 11/27/2018		0.00	291.32	0.00	291.32
Interest	1/28/2017	3136G3C78	0.00	FNMA 1.55 7/28/2021-16		0.00	7,750.00	0.00	7,750.00
Interest	1/28/2017	3136G3L52	0.00	FNMA 1.3 1/28/2020-16		0.00	6,500.00	0.00	6,500.00
Interest	1/28/2017	20786ABA2	0.00	CONNECTONE BK ENGLEWOOD 1.55 7/29/2019		0.00	322.53	0.00	322.53
Interest	1/28/2017	46625HJR2	0.00	JPMORGAN CHASE 2.35 1/28/2019		0.00	11,750.00	0.00	11,750.00
Interest	1/28/2017	3130A8WC3	0.00	FHLB 1.15 1/28/2019-16		0.00	5,750.00	0.00	5,750.00
Interest	1/28/2017	464209CD5	0.00	ISABELLA BANK 0.75 3/28/2017		0.00	156.06	0.00	156.06
Interest	1/29/2017	11373QCC0	0.00	BROOKLINE BK MASS 0.75 10/30/2017		0.00	156.06	0.00	156.06
Interest	1/29/2017	2027505G6	0.00	COMMONWEALTH BUSINESS BK LOS ANGELES CALIF 0.75 8/		0.00	156.06	0.00	156.06
Interest	1/29/2017	139797FF6	0.00	CAPITAL BK LITTLE ROCK 0.9 2/28/2018		0.00	187.27	0.00	187.27
Interest	1/30/2017	843383AX8	0.00	SOUTHERN BANK 1 1/30/2018		0.00	208.08	0.00	208.08
Interest	1/30/2017	06414QVT3	0.00	BANK NORTH CAROLINA THOMASVILLE NC 1 6/30/2017		0.00	208.08	0.00	208.08



## Mono County Transaction Summary by Action Investment Portfolio

Begin Date: 12/31/2016, End Date: 1/31/2017

Action	Settlement Date	CUSIP	Face Amount / Shares	Description	Purchase Price	Principal	Interest / Dividends	YTM @ Cost	Total
Interest	1/30/2017	560160AQ6	0.00	MAHOPAC NATL BK N Y 1.45 7/30/2019		0.00	1,790.85	0.00	1,790.85
Interest	1/30/2017	59013JDB2	0.00	MERRICK BK SOUTH JORDAN UTAH 0.85 1/30/2017		0.00	176.87	0.00	176.87
Interest	1/31/2017	45340KDR7	0.00	INDEPENDENCE BK KY OWENSBORO 0.9 2/28/2018		0.00	187.27	0.00	187.27
Interest	1/31/2017	105245GN8	0.00	BRAND BKG CO LAWRENCEVILLE GA 0.85 11/30/2017		0.00	176.87	0.00	176.87
Interest	1/31/2017	29266N3Q8	0.00	ENERBANK USA SALT LAKE CITYUTAH 1.05 8/31/2018		0.00	218.49	0.00	218.49
Interest	1/31/2017	OAKVALLEY0670	0.00	Oak Valley Bank Cash		0.00	2,027.47	0.00	2,027.47
<b>Subtotal</b>			<b>0.00</b>			<b>0.00</b>	<b>72,956.45</b>		<b>72,956.45</b>
<b>Total Interest/Dividends</b>			<b>0.00</b>			<b>0.00</b>	<b>72,956.45</b>		<b>72,956.45</b>
<b>Sell Transactions</b>									
Matured	1/15/2017	717081DD2	500,000.00	Pfizer Inc 0.9 1/15/2017-14	0.00	500,000.00	0.00	0.00	500,000.00
Matured	1/30/2017	59013JDB2	245,000.00	MERRICK BK SOUTH JORDAN UTAH 0.85 1/30/2017	0.00	245,000.00	0.00	0.00	245,000.00
<b>Subtotal</b>			<b>745,000.00</b>			<b>745,000.00</b>	<b>0.00</b>		<b>745,000.00</b>
Withdraw	1/23/2017	LAIF6000Q	1,000,000.00	Local Agency Investment Fund LGIP-Quarterly	0.00	1,000,000.00	0.00	0.00	1,000,000.00
Withdraw	1/26/2017	LAIF6000Q	2,000,000.00	Local Agency Investment Fund LGIP-Quarterly	0.00	2,000,000.00	0.00	0.00	2,000,000.00
Withdraw	1/27/2017	LAIF6000Q	1,500,000.00	Local Agency Investment Fund LGIP-Quarterly	0.00	1,500,000.00	0.00	0.00	1,500,000.00
Withdraw	1/31/2017	OAKVALLEY0670	12,026,171.41	Oak Valley Bank Cash	0.00	12,026,171.41	0.00	0.00	12,026,171.41
<b>Subtotal</b>			<b>16,526,171.41</b>			<b>16,526,171.41</b>	<b>0.00</b>		<b>16,526,171.41</b>
<b>Total Sell Transactions</b>			<b>17,271,171.41</b>			<b>17,271,171.41</b>	<b>0.00</b>		<b>17,271,171.41</b>



OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Clerk of the Board**

**TIME REQUIRED**

**SUBJECT** Safety Seat Checkup Proclamation

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

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### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Stephanie M. Tombrello, LCSW, Executive Director, SafetyBeltSafe USA, has requested the Board adopt a proclamation recognizing the week of April 2 - April 8, 2017, as Safety Seat Checkup Week.

---

### RECOMMENDED ACTION:

Approve proposed proclamation.

---

### FISCAL IMPACT:

None.

---

**CONTACT NAME:** Helen Nunn

**PHONE/EMAIL:** x5534 / hnunn@mono.ca.gov

---

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

### SEND COPIES TO:

---

### MINUTE ORDER REQUESTED:

YES  NO

---

### ATTACHMENTS:

Click to download

[Staff Report](#)

[Proclamation](#)

[Safety Belt flyers](#)

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History

<b>Time</b>	<b>Who</b>	<b>Approval</b>
3/1/2017 5:05 AM	County Administrative Office	Yes
2/28/2017 4:48 PM	County Counsel	Yes
2/24/2017 1:46 PM	Finance	Yes



Larry Johnston~District One    Fred Stump~ District Two    Bob Gardner ~ District Three  
John Peters ~ District Four    Stacy Corless ~ District Five

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## **BOARD OF SUPERVISORS COUNTY OF MONO**

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P.O. BOX 715, BRIDGEPORT, CALIFORNIA 93517

(760) 932-5533 • FAX (760) 932-5531

*Shannon Kendall, Clerk of the Board*

To:            Honorable Board of Supervisors  
From:         Helen Nunn, Sr. Deputy Clerk of the Board  
Date:         March 7, 2017

Subject

Proclamation declaring April 2 – April 8, 2017, as Safety Seat Checkup Week.

Recommendation

Approve proposed proclamation.

Discussion

Stephanie M. Tombrello, LCSW, Executive Director, SafetyBeltSafe USA, has requested the Board adopt a proclamation recognizing the week of April 2 – April 8, 2017, as Safety Seat Checkup Week.

Fiscal Impact

None.

**PROCLAMATION of the MONO COUNTY  
BOARD OF SUPERVISORS DECLARING  
APRIL 2 – APRIL 8, 2017, AS SAFETY SEAT CHECKUP WEEK**

**WHEREAS**, the number one preventable cause of death and injury of children and young adults is the automobile collision; and,

**WHEREAS**, more than 90 child passengers under fifteen are killed and more than 10,000 injured in automobile collisions in California in each year; and,

**WHEREAS**, 71% of small children killed in crashes would be alive today if they had been properly restrained in child safety seats; and,

**WHEREAS**, 45% of injuries to child occupants ages four to eight could be prevented with the use of booster seats; and,

**WHEREAS**, more than 90% of child safety seats are used incorrectly; and,

**WHEREAS**, the State of California requires that all occupants be restrained properly in safety seats or safety belts with children in the back seat until at least age eight; and,

**WHEREAS**, the State of California requires all occupants of motor vehicles to be buckled up correctly on every ride; and,

**WHEREAS**, crash-tested safety seats are moderately priced and widely available for purchase at retail stores and, at low cost, from car safety seat distribution programs throughout California; and,

**WHEREAS**, SafetyBeltSafe U.S.A. has been dedicated for more than 37 years to protecting children from injury or death while being transported in a motor vehicle:

**NOW, THEREFORE**, the Mono County Board of Supervisors proclaims the week of April 2 – April 8, 2017, **SAFETY SEAT CHECKUP WEEK**.

**APPROVED AND ADOPTED** this 7<sup>th</sup> day of March, 2017, by the Mono County Board of Supervisors.

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Larry Johnston, Supervisor District #1

---

Fred Stump, Supervisor District #2

---

Bob Gardner, Supervisor District #3

---

John Peters, Supervisor District #4

---

Stacy Corless, Supervisor District #5



## BOARD OF DIRECTORS

PRESIDENT: Bonnie Oseas  
SECRETARY: Karen Proctor, CPNP, CPST  
TREASURER: John Nisbet, CPSTI

### Members-At-Large

#### Arkansas:

Betsy Mowery, CPSTI  
Rachel Stabler, CPSTI  
Holly Terry, CPSTI

#### California:

Zosia Chciuk, RNC, MSN, IBCLC  
Marc Cohen, CPSTI  
Anne Hamilton, CPST  
Bonnie Lovette, RN, MS, PNP, CPST, Sp.Needs  
Laura Simmons, PT, PCS, CPST, CLEC  
Becky Thams, MA

#### Colorado:

Vera Fullaway, CPSTI

#### Illinois:

Darren K. Qunell, CPST

#### Louisiana:

Annette Knobloch, DNS, RN, MPH, CPST, CNE

#### Maryland:

Emilie Crown, RN, CPSTI

#### Oregon:

Tamara Franks, MA, CPSTI

#### Texas:

Sharon Evans, RN, BSN, CPN, CPSTI

#### Washington:

Wendy Thomas, CPSTI

### ADVISORY BOARD

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Retired Commissioner

California Highway Patrol

David Horowitz

Fight Back! Productions

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Safety Research & Strategies, Inc.

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Harvey G. Knell

Deane Leavenworth

Vice President, Corporate Relations

Time Warner Cable

Sandra Tsing Loh, radio commentator

and author, "Mother on Fire"

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General Pediatrician

Teresa Samaniego

Public Affairs Director, KABC-TV

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Robert S. Vinetz, MD, FAAP

Queens Care Family Clinics

Gayle Wilson

Brett Wood, Chairman

Toyota Material Handling, U.S.A., Inc.

### STAFF

Stephanie M. Tombrello, LCSW, CPSTI

Executive Director

Kate Quirk, PhD, CPSTI

Project Coordinator

John Stubbs, CPSTI

Program Consultant

Heidi Heflin, RN, MN, CNS, CPSTI

Program Consultant

Enc: 130 Co.proclamation; 630CA; 172/s; 664/s

# SafetyBeltSafe U.S.A.

514 North Prospect Avenue, L-6, Redondo Beach, CA 90277

Mailing address: P. O. Box 553, Altadena, CA 91003 www.carseat.org  
(800) 745-SAFE 310/318-5111 (telephone & FAX) Spanish: (800) 747-SANO

February 9, 2017

To: Board of Supervisors

From: Stephanie M. Tombrello, LCSW, CPSTI  
Executive Director, SafetyBeltSafe U.S.A.

Re: Safety Seat Checkup Week, April 2 – 8, 2017

Motor vehicle crashes remain the number 1 cause of death and permanent injury for children in California. You can help save children from suffering preventable injuries by helping to make Safety Seat Checkup Week, April 2 – 8, a special event in your county.

With the passage of the new child restraint law requiring children under 2 to ride rear facing (unless 40" or 40 lbs. or more, enforced from 1/1/17), parents need more help than ever to know how to keep children safe.

SafetyBeltSafe U.S.A. is available to you as a resource for posters, pamphlets, speakers, program ideas, and information about California buckle-up laws. We would appreciate it if the Board of Supervisors would:

- Issue a proclamation in recognition of Safety Seat Checkup Week (sample enclosed). Your support for this effort, shared with your county media, may encourage them to publicize this subject more widely. Send your proclamation to us in advance for display at Safety Seat Checkup Day on April 8.
- Encourage law enforcement agencies to increase the focus on violations of child safety seat and safety belt laws during Special Enforcement Week, March 26 – April 1, sponsored by the Peace Officers Association of Los Angeles County, to protect children's welfare.
- Distribute posters and pamphlets, available from SafetyBeltSafe U.S.A., through county agencies and employees. Put up our permanent "Buckle-Up" parking lot signs.

In Los Angeles County, for example, SafetyBeltSafe U.S.A. is holding a major event as the culmination of the Week:

**Safety Seat Checkup Day on Saturday, April 8, from 10:00 a.m. to 2:00 p.m. at USC Verdugo Hills Hospital, Glendale.**

Families will receive a detailed inspection of the installation and use of their safety seats; be told of any recalls; and be shown how to use seats correctly. Error rates are typically more than 90%.

Your support for this effort, reported to newspapers in your county, may encourage them to publicize this subject more widely. Please share your ideas for Safety Seat Checkup Week with us.

*The national non-profit organization dedicated to child passenger safety since 1980*

# Protect Young Passengers – Ride Rear Facing



**Do you care about a child?**

**Then you need to know that the law on protecting young children in the car has changed.**

From January 1, 2017, children under age 2 must ride **rear facing** in safety seats (except those 40 inches tall or more or weighing 40 lbs. or more).

**Riding rear facing is 5 times safer** than riding facing the front of the car. Safety experts recommend that children ride rear facing for as long as possible.

Penalty after 1/1/17: fine with court fees is \$500 & a point on the license (enforced against the parent, or the driver if the parent is not present).

**Each one, teach one—or more!**

**Spread the word: share it, post it, tag it, tweet it...**

Make sure the children you care about have the best possible protection.

For help and advice on the correct way to buckle up all children, visit [www.carseat.org](http://www.carseat.org) or call 800/745 SAFE or 800/747-SANO.

*Congratulations to California Assembly member Cristina Garcia (Bell Gardens) whose successful introduction of the law will protect young children from the #1 cause of childhood death and injury.*

**SafetyBeltSafe U.S.A.** P.O. Box 553, Altadena, CA 91003 [www.carseat.org](http://www.carseat.org)  
310/318-5111 \* 800/745-SAFE (English) \* 800/747-SANO (Spanish)

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#664 (2-7-17)

## Proteja a sus Pasajeros Pequeños – Oriéntandolos Hacia Atrás cuando Viajan



**¿Le importa su hijo?**

**Entonces necesita saber que la ley sobre protección para niños pequeños dentro del auto ha cambiado.**

Empezando Enero 1, del 2017, los niños menores de 2 años deberán viajar **orientados hacia atrás** en asientos de seguridad (excepto aquellos cuya estatura es de 40 pulgadas o más o pesan 40 lbs. o más).

**El viajar orientados hacia atrás es 5 veces más seguro** que viajar orientados hacia el frente del vehículo. Los expertos en seguridad recomiendan que los niños viajen orientados hacia atrás tanto tiempo como sea posible.

La parte nueva de la ley de California no entrará en efecto hasta Enero 1 del 2017. Necesitamos enseñar esta ley a todas las personas antes de esa fecha.

La penalidad después de 1/1/17: la multa incluyendo cargos de la corte será de \$500 & un punto en su licencia de conducir (la multa será para el padre, o para el conductor si el padre no está presente).

**¡Cada uno, enseñe a uno—o más!**

**Difunda la palabra: compártala, publíquela, pásela, envíela por twitter...**

Asegúrese que los niños que están bajo su cuidado tengan la mejor protección posible.

Para obtener ayuda o consejos sobre la manera correcta de abrochar a sus niños, visite [www.carseat.org](http://www.carseat.org) o llame al 800/745 SAFE o 800/747-SANO.

*Felicitaciones al miembro de la Asamblea de California, Cristina Garcia (Bell Gardens) cuya exitosa introducción de la ley protegerá a los niños pequeños de la causa # 1 de muertes y lastimaduras en la infancia.*

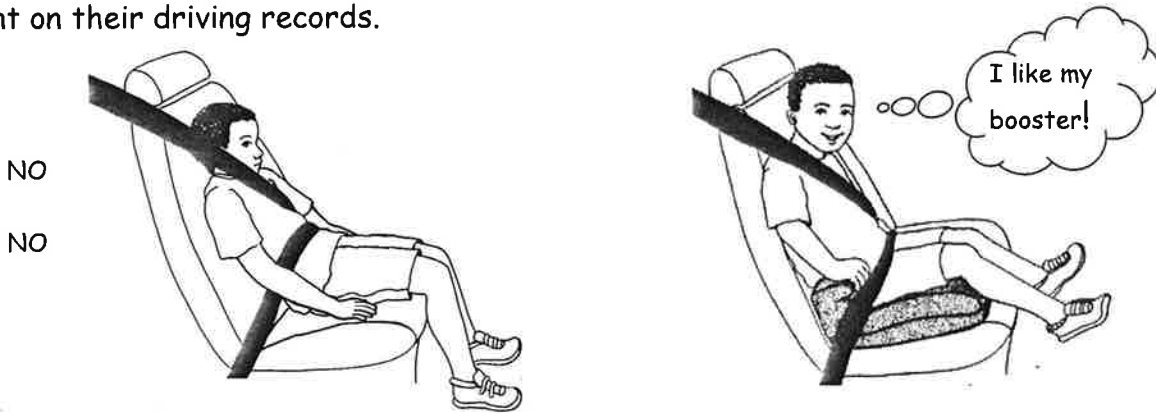
**SafetyBeltSafe U.S.A.** P.O. Box 553, Altadena, CA 91003 [www.carseat.org](http://www.carseat.org)  
310/222-6860, 800/745-SAFE (English) 310/222-6862, 800/747-SANO (Spanish)

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#664s (2-7-17)

# CALIFORNIA CHILD PASSENGER SAFETY LAW

- Children under age 8 must be properly buckled into a safety seat or booster in the back seat.
- Children under 2 must ride rear facing (unless 40" or 40 lbs. or more).
- Children age 8 or older may use the vehicle safety belt if it fits properly with the lap belt low on the hips, touching the upper thighs, and the shoulder belt crossing the center of the chest. If children are not tall enough for proper belt fit, they must ride in a booster or child safety seat.
- Everyone in the car must be properly buckled up. For each child under 16 who is not properly secured, parents (if in the car) or drivers can be fined more than \$500 and get a point on their driving records.



Most kids need to ride in a booster seat until age 10 to 12. Using a booster instead of just a belt prevents 45% of crash injuries.

If your child isn't using a booster, try the simple test below the next time you ride together in the car. You may find that your child is not yet ready to use a safety belt without a booster.

## The 5-Step Test

1. Does the child sit all the way back against the auto seat?
2. Do the child's knees bend comfortably at the edge of the auto seat?
3. Does the belt cross the shoulder between the neck and arm?
4. Is the lap belt as low as possible, touching the thighs?
5. Can the child stay seated like this for the whole trip?

If you answered "no" to any of these questions, your child needs a booster seat to make both the shoulder belt and the lap belt fit right for the best crash protection. Your child will be more comfortable, too.

For best protection, all children should ride in the back seat. It's twice as safe as the front!

For a list of programs with low-cost safety seats, call your local health department at \_\_\_\_\_  
For assistance with inspecting or installing a safety seat, visit [www.seatcheck.org](http://www.seatcheck.org) or [www.nhtsa.gov/cps/cpsfitting](http://www.nhtsa.gov/cps/cpsfitting) or call 866-SEAT-CHECK or your local CHP office.  
For more information: SafetyBeltSafe U.S.A. [www.carseat.org](http://www.carseat.org) 800-745-SAFE (English) 800-747-SANO (Spanish)

Funding for this program was provided by a grant from the California Office of Traffic Safety through the National Highway Traffic Safety Administration.

## California Buckle-Up Laws for Parents

Car crashes are the #1 preventable cause of death of children and young adults, as well as a major cause of permanent brain damage, epilepsy, and spinal cord injuries. A sudden stop at 30 miles per hour could cause the same crushing force on your child's brain and body as a fall from a three-story building. Fortunately, by buckling up children, we can prevent most of these deaths and serious injuries.

**(V.C. 27360) All children under age 8** must be properly buckled into a safety seat or booster in the back seat.

Exceptions: A child who weighs more than 40 pounds and is riding in a car without lap and shoulder belts in the back seat may wear just a lap belt. A child under age 8 who is at least 4'9" may wear a safety belt if it fits properly. Children under age 8 may ride in the front if there is no forward-facing rear seat in the vehicle, the child restraint cannot be properly installed in rear seat, all rear seats are occupied by other children age 7 or under, or for medical reasons. All children under 2 must ride in a rear-facing safety seat unless they are at least 40" in height or 40 lbs. in weight. A child in a rear-facing safety seat may not ride in front if there is an active passenger air bag.

**(V.C. 27360.5) Children age 8 or more** may use the vehicle safety belt if it fits properly with the lap belt low on the hips, touching the upper thighs, and the shoulder belt crossing the center of the chest. If children are not tall enough for proper belt fit, they must ride in a booster or safety seat.

### Consequences for failing to properly buckle up any child under 16

- **The parent** gets the ticket if a child under 16 is not properly buckled up.
- **The driver** gets the ticket if the parent is not in the car.
- The cost of a ticket could be more than \$500\* per child; the fine for a second offense could be more than \$1000\* per child. One point is added to the driving record, which could raise insurance rates. Part of the fine money goes to a special fund to help pay for local safety seat education and distribution programs.

### Recommendations

- Older babies and toddlers should ride in a rear-facing convertible seat until they are at least two years old or reach the maximum weight and height limits of their convertible safety seat.
- Children should ride in a safety seat with a harness as long as possible (40-90 lbs., depending on the model).
- Children who have outgrown their safety seats need a booster for proper belt fit (usually until age 10-12). To find out if a child is tall enough to wear just a safety belt, try the 5-Step Test (see other side).
- Auto insurers are required to replace safety seats that were in use or damaged during a crash.

**(V.C. 27315) Drivers and passengers 16 or older** must be **properly buckled up** in vehicle safety belts.

**The driver** may be ticketed for not wearing a belt and for each unbuckled passenger. Fine is more than \$140\* per person.

**Passengers** also may be ticketed for not being properly buckled up.

**(V.C. 23116) Pickup truck passengers** also must be **properly buckled up**.

**The driver** may be ticketed for letting passengers ride in the back of a pickup truck.

**Passengers** also may be ticketed for not being properly buckled up.

The cost of a ticket could be more than \$250\* for each unbuckled adult. No exemption for camper shells.

### Other Laws to Protect Children

- **Children left in vehicle (V.C. 15620):** A child 6 years old or younger may not be left alone in a vehicle if the health or safety of the child is at risk, the engine is running, or the keys are in the ignition. The child must be supervised by someone at least age 12. The cost of a ticket could be more than \$500.\*
- **Smoking in a vehicle [Health and Safety Code 118948(a)]** is prohibited if a child under 18 is present. The cost of a ticket could be more than \$500.\* (The vehicle must be pulled over for another potential violation.)
- **Helmets (V.C. 21212, 21204, 27803):** Children under age 18 who are skating or riding on a bicycle, scooter, or skateboard must wear a properly fitted and fastened helmet. All drivers and passengers on a motorcycle must wear a helmet that meets federal standards, fits correctly, and has the proper label.

\*Fine amounts shown include penalty assessments

<b>SafetyBeltSafe</b> U.S.A. P.O. Box 553, Altadena, CA 91003	www.carseat.org
310/318-5111	800/745-SAFE (English) 800/747-SANO

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OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Community Development-Planning**

**TIME REQUIRED**

**SUBJECT** Wheeler Crest Design Review  
Committee Appointments

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

---

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Consider Supervisor Stump's recommendations regarding reappointment of one new member and one existing member to the Wheeler Crest Design Review Committee.

---

### RECOMMENDED ACTION:

Appoint one new member, Bob Weiland, and re-appoint one existing member, Judy Beard, to the Wheeler Crest Design Review Committee, as recommended by Supervisor Stump.

---

### FISCAL IMPACT:

No fiscal impacts are expected.

---

**CONTACT NAME:** Jake Suppa

**PHONE/EMAIL:** 760.924.1813 / jsuppa@mono.ca.gov

---

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

### SEND COPIES TO:

Jake Suppa

---

### MINUTE ORDER REQUESTED:

YES  NO

---

### ATTACHMENTS:

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[Staff Report](#)

---

History

Time

Who

Approval

3/1/2017 5:11 AM	County Administrative Office	Yes
3/2/2017 1:22 PM	County Counsel	Yes
2/24/2017 1:44 PM	Finance	Yes

# Mono County Community Development Department

---

PO Box 347  
Mammoth Lakes, CA 93546  
760.924.1800, fax 924.1801  
commdev@mono.ca.gov

## Planning Division

PO Box 8  
Bridgeport, CA 93517  
760.932.5420, fax 932.5431  
[www.monocounty.ca.gov](http://www.monocounty.ca.gov)

March 7, 2017

**To:** Honorable Chair and Members of the Board of Supervisors

**From:** Jake Suppa, Permit Technician, for Fred Stump, Supervisor District 2

**Subject:** Wheeler Crest Design Review Committee (WCDRC)

**Recommended Action:**

1. Appoint one new member, Bob Weiland, and re-appoint one existing member, Judy Beard, to the Wheeler Crest Design Review Committee, as recommended by Supervisor Stump.

**Fiscal Impact:**

No fiscal impacts are expected.

**Membership Update Discussion:**

Supervisor Stump, District 2, requests Board consideration of the following recommendation for membership/ term for the Wheeler Crest Design Review Committee (6 members). The two appointments are for two-year terms.

Recommended Appointment:

Term Expires (all two-year terms):

Judy Beard	03-07-19
Bob Weiland	03-07-19

Existing Members:

Mike Day	02-01-18
Tom Hopkins	02-01-18
Bill Goodman	02-01-18
Chantel Hodges	02-01-18

If you have any questions regarding this item, please contact Jake Suppa at 760.924.1813 or Scott Burns at 760.924.1807.





OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Clerk of the Board**

**TIME REQUIRED**

**SUBJECT** Appointments in Lieu of Election

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

---

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Appointment of Directors of Special Districts in Lieu of Election. The following Special Districts have vacancies to be filled: Birchim Community Services District and Wheeler Crest Community Services District. These Special Districts have submitted names for appointment/reappointment, as outlined in the staff report. These terms will expire on 11/30/2020. The Board of Supervisors is the governing body under Elections Code Section 10515 to make these appointments.

---

### RECOMMENDED ACTION:

Appoint Robin Davis to Birchim Community Services District and William Dunlap to Wheeler Crest Community Services District, as recommended, to fill special district board vacancies.

---

### FISCAL IMPACT:

None.

---

**CONTACT NAME:** Helen Nunn

**PHONE/EMAIL:** x5534 / hnunn@mono.ca.gov

---

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**32 DAYS PRECEDING THE BOARD MEETING**

### SEND COPIES TO:

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### MINUTE ORDER REQUESTED:

YES  NO

---

### ATTACHMENTS:

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**History**

<b>Time</b>	<b>Who</b>	<b>Approval</b>
3/1/2017 5:14 AM	County Administrative Office	Yes
2/28/2017 4:22 PM	County Counsel	Yes
2/24/2017 1:43 PM	Finance	Yes



Larry Johnston~District One    Fred Stump~ District Two    Bob Gardner ~ District Three  
John Peters ~ District Four    Stacy Corless ~ District Five

---

## **BOARD OF SUPERVISORS COUNTY OF MONO**

---

P.O. BOX 715, BRIDGEPORT, CALIFORNIA 93517

(760) 932-5533 • FAX (760) 932-5531

*Shannon Kendall, Clerk of the Board*

To:            Honorable Board of Supervisors  
From:         Shannon Kendall, Clerk/Recorder/Registrar of Voters  
Date:         March 7, 2017

Subject:

Appointments in lieu of election to Mono County Special Districts

Discussion:

The following special districts have vacancies that need to be filled and have submitted the following names for appointment/reappointment. These terms will expire 11/30/2020:

Birchim Community Services District

Robin Davis

Wheeler Crest Community Services District

William Dunlap

This situation is governed by Elections Code section §10515 and by Board Resolution R12-64, which provide for the Board of Supervisors to appoint a qualified person to the district board. Per that resolution, if the district board recommends a qualified person for such an appointment, then that recommendation is to be brought to the Board of Supervisors for consideration.

Recommendation:

Make appointments, as recommended above, to fill various special district board vacancies.

Fiscal Impact:

None.



OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Finance, Public Health**

**TIME REQUIRED**

**SUBJECT** Change to Allocation List for Public Health Department

**PERSONS APPEARING BEFORE THE BOARD**

---

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Proposed resolution amending the allocation list to reflect an increase to the full time equivalent (FTE) of the Director of Nursing from 0.8 FTE to 0.9 FTE in the Public Health Department.

---

### RECOMMENDED ACTION:

Adopt proposed resolution #R17-\_\_\_, amending the Allocation List to reflect an increase to the full time equivalent (FTE) of the Director of Nursing from 0.8 FTE to 0.9 FTE in the Public Health Department.

---

### FISCAL IMPACT:

The additional cost of this FTE increase is \$4,762 (\$2,797 for salary and \$1,965 for benefits) for the remainder of FY 16/17 and this amount was included in the department's mid-year budget request that was approved on February 21, 2017. The annual cost of this FTE increase is \$8,670 (\$4,983 for salary and \$3,687 for benefits).

---

**CONTACT NAME:** Janet Dutcher

**PHONE/EMAIL:** 760-932-5494 / jdutcher@mono.ca.gov

---

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

**SEND COPIES TO:**  
Public Health, Payroll, Human Resources

---

### MINUTE ORDER REQUESTED:

YES  NO

---

### ATTACHMENTS:

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[Staff report](#)

[Resolution](#)

**History****Time**

3/1/2017 5:07 AM

2/28/2017 4:33 PM

3/1/2017 5:29 PM

**Who**

County Administrative Office

County Counsel

Finance

**Approval**

Yes

Yes

Yes



# DEPARTMENT OF FINANCE AUDITOR-CONTROLLER COUNTY OF MONO

---

*Stephanie M. Butters*  
Assistant Finance Director  
Auditor-Controller

*Janet Dutcher, CPA, CGFM*  
Director of Finance

*P.O. Box 556*  
*Bridgeport, California 93517*  
*(760) 932-5490*  
*Fax (760) 932-5491*

To: Honorable Board of Supervisors

From: Janet Dutcher, Finance Director

Date: March 7, 2017

## **RECOMMENDATION:**

Adopt proposed resolution #R17-\_\_, amending the Allocation List to reflect an increase to the full time equivalent (FTE) of the Director of Nursing from 0.8 FTE to 0.9 FTE, in the Public Health Department.

## **FISCAL IMPACT:**

The additional cost of this FTE increase is \$4,762 (\$2,797 for salary and \$1,965 for benefits) for the remainder of FY 16/17 and this amount was included in the department's mid-year budget request that was approved on February 21, 2017. The annual cost of this FTE increase is \$8,670 (\$4,983 for salary and \$3,687 for benefits).

## **DISCUSSION:**

As part of the mid-year budget process, the Director of Public Health requested an increase in the full time equivalent (FTE) of the department's Director of Nursing from 0.8 FTE to 0.9 FTE. Your Board approved the mid-year budget increase for this at your meeting on February 21, 2017. Finance inadvertently omitted the request to change the Position Allocation List from that agenda item. This item is to approve the Position Allocation List change from 0.8 FTE to 0.9 FTE.



**RESOLUTION NO. R17-**

**A RESOLUTION OF THE MONO COUNTY BOARD OF SUPERVISORS  
AUTHORIZING THE COUNTY ADMINISTRATIVE OFFICER TO AMEND THE COUNTY  
OF MONO LIST OF ALLOCATED POSITIONS TO REFLECT THE INCREASE IN FULL  
TIME EQUIVALENT (FTE) OF THE DIRECTOR OF NURSING FROM 0.8 FTE TO 0.9 FTE  
IN THE PUBLIC HEALTH DEPARTMENT**

**WHEREAS**, the County of Mono maintains a list, of County job classifications, the pay ranges or rates for those job classifications, and the number of positions allocated by the Board of Supervisors for each of those job classifications on its List of Allocated Positions (or "Allocation List"); and

**WHEREAS**, the Allocation List identifies approved vacancies for recruitment and selection by Human Resources and implements collective bargaining agreements related to job classifications and pay rates; and

**WHEREAS**, the County seeks to provide public services in the most efficient and economical manner possible, which at times requires the modification of job classifications and full time equivalents on the Allocation List; and

**WHEREAS**, it is currently necessary to amend the Allocation List as part of maintaining proper accountability for hiring employees to perform public services;

**NOW, THEREFORE, THE BOARD OF SUPERVISORS OF THE COUNTY OF MONO RESOLVES** as follows:

The County Administrative Officer is authorized to amend the County of Mono List of Allocated Positions to reflect the following change:

Increase the full time equivalent allocation of the Director of Nursing in the Public Health Department from 0.8 FTE to 0.9 FTE (salary \$7,036-\$8,552).

//

1 PASSED AND ADOPTED this 7th day of March 2017, by the following

2 Vote:

3 AYES :  
4 NOES :  
5 ABSTAIN :  
6 ABSENT :

7 ATTEST: \_\_\_\_\_  
8 Clerk of the Board

\_\_\_\_\_ Stacey Corless, Chair  
Board of Supervisors

9  
10 APPROVED AS TO FORM:

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12 \_\_\_\_\_  
13 COUNTY COUNSEL

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**OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS**

**REGULAR AGENDA REQUEST**

Print

**MEETING DATE** March 7, 2017

**Departments: Clerk of the Board**

**TIME REQUIRED**

**SUBJECT** Letter from Terry Lee re Immigration

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

**AGENDA DESCRIPTION:**

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Letter from Terry Lee of Swall Meadows regarding concerns over immigration enforcement.

**RECOMMENDED ACTION:**

**FISCAL IMPACT:**

**CONTACT NAME:** Helen Nunn

**PHONE/EMAIL:** x5534 / hnunn@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

**SEND COPIES TO:**

**MINUTE ORDER REQUESTED:**

YES  NO

**ATTACHMENTS:**

<p>Click to download</p> <p> <a href="#">Letter from Terry Lee</a></p>
--

**History**

Time	Who	Approval
3/1/2017 4:50 AM	County Administrative Office	Yes
2/28/2017 4:45 PM	County Counsel	Yes
3/1/2017 5:29 PM	Finance	Yes

## Helen Nunn

---

**From:** Helen Nunn  
**Sent:** Wednesday, February 22, 2017 1:37 PM  
**To:** Helen Nunn  
**Subject:** FW: So it begins. .

**From:** Terry Lee [<mailto:terrylee@gnet.com>]  
**Sent:** Wednesday, February 22, 2017 8:21 AM  
**To:** Leslie Chapman <[lchapman@mono.ca.gov](mailto:lchapman@mono.ca.gov)>  
**Subject:** So it begins. . . <https://www.nytimes.com/2017/02/21/opinion/mr-trumps-deportation-force-prepares-an-assault-on-american-values.html?action=click&pgtype=Homepage&clickSource=story-heading&module=opinion-c-col-left-region&region=opinion-c-col-left-regio...>

Hi Leslie,

I have been watching the immigration situation very closely. Regardless of what assurances are given by our local community, I suspect that there will be a significant and immediate negative impact. I strongly believe that our Board of Supervisors, Sheriff and schools, among others, support our community. We must not give in to fear.

There are specific actions we can take. For example, the schools can ask for plans of actions including emergency contacts should children be in school when parents are taken into custody. The schools and library can be ready to refuse entry to ICE without warrants for specific people. The Sheriff can outline the actions to be taken to inform a person in custody and his/her emergency contacts that an ICE hold has been placed. We can and must keep our community informed even if trust in that information is severely compromised.

I stand ready to assist in whatever way you need.

Thank you.

Terry

Terry Lee  
1312 Swall Meadows Road  
Swall Meadows, CA 93514  
760.387.0045  
[terrylee@gnet.com](mailto:terrylee@gnet.com)



OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Clerk of the Board**

**TIME REQUIRED**

**SUBJECT** Letter from Craig Schragger re Sierra  
Center Mall

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

---

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Letter from Craig Schragger DDS to the Board of Supervisors regarding his experience as a tenant at Sierra Center Mall.

---

### RECOMMENDED ACTION:

---

### FISCAL IMPACT:

---

**CONTACT NAME:** Helen Nunn

**PHONE/EMAIL:** x5534 / hnunn@mono.ca.gov

---

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YES  NO

---

### ATTACHMENTS:

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[Letter from Craig Schragger](#)

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### History

Time	Who	Approval
3/1/2017 4:54 AM	County Administrative Office	Yes
3/1/2017 4:28 PM	County Counsel	Yes
3/1/2017 5:30 PM	Finance	Yes

## Helen Nunn

---

**From:** Helen Nunn  
**Sent:** Thursday, February 23, 2017 12:01 PM  
**To:** Helen Nunn  
**Subject:** FW: from schrager of mono county

**From:** Craig Schrager [mmthdental@qnet.com]  
**Sent:** Monday, February 20, 2017 10:56 PM  
**To:** Fred Stump  
**Subject:** from schrager of mono county

Hi Fred,

I read your quotes re the Sierra Center mall and I felt the need to fill you in on my life in the mall. I built my dental office in the mall in 1989 when it was owned by some investors in LA. The mall was empty, similar to now. They just about gave me free rent to get me in there; 1/4 the going rate and \$35000 to help me build the improvements. They figured if I would spend \$200000 in improvements ( 1989 dollars) I would never leave.

The ten years there were full of leaky roofs ( it would leak from the roof down 3 levels to my office), shoddy appearance and continual heating outages. We had to run portable heaters which would cause my x rays to blow fuses. They always promised to fix everything. Never did. After putting up with it for a few years, a local attorney informed me I could take them to small claims if I could show damages. I took the owners to small claims five times ( DAVE Buckman the manager would show to represent them); and won each time showing a loss due to rooms I could not use from the leaks, excessive electric bills since I had to heat the place myself, and basically loss of work time. Whenever a restaurant would go in above my unit ( I was on the first floor south) and the floor was mopped, we would get drippings thru the ceiling. The mall changed hands a few times and nothing changed with the facility. It seemed, owners wanted to put lipstick on it, get it rented and sell it to the next owner.

When Paul ( who I have known for 33 years) took over, nothing changed. But, when my 2nd of 3 options was nearing its end, I made him an offer to stay for 25 more years in 1998. I did not want to build another office and waste all those improvements and I thought I had power to get a good deal since the mall was still empty. He said make me another offer...no counter. I made him a fair offer. I do teeth and not business negotiations. I was not going to negotiate with an attorney.

I had been a partner in the lot next to the STove and decided to buy my partners out, roll some serious debt dice and build the building that is there now. Best thing I ever did. After Paul heard I was in escrow, he called to get me to reconsider. At one time he wanted me to buy my unit in the mall as a condo office partnership. Thank God I did not do that. I said no thanks, I am leaving the mall.

If Paul was a supervisor, I wonder how he would handle the rent negotiations with the mall? I believe he would make a low take it or leave it offer. He is a sharp attorney and businessman.

To the buy the mall is to open the never ending can of worms. I don't think the place can ever be fixed....but if the rent is ridiculously low, then it maybe better than the county building its own place.

I am of the opinion that I see our local govts building ice rink, redoing main street, airports, etc and feel the first thing should be town hall and stop renting.

Thanks for reading.

Craig Schrager  
Mammoth Lakes

call or e mail me if you want any more info.

cell 7607938231 though I usually don't have it on me during work hours but can call you back



OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Probation and Behavioral Health**

**TIME REQUIRED** 20 minutes (15 minute presentation;  
5 minute discussion)

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

Karin Humiston, Robin Roberts, Stacie  
Casabian, Jazmin Puga-Sosa, Sal  
Montenez, Sofia Flores

**SUBJECT** Update on Racial & Ethnic Disparity  
Grant

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Presentation by Karin Humiston and Robin Roberts regarding update of the Racial and Ethnic Disparity Grant and review of future changes.

### RECOMMENDED ACTION:

None (informational only). Provide any desired direction to staff.

### FISCAL IMPACT:

None

**CONTACT NAME:** Karin Humiston

**PHONE/EMAIL:** 760-932-5570 / khumiston@mono.ca.gov

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### SEND COPIES TO:

### MINUTE ORDER REQUESTED:

YES  NO

### ATTACHMENTS:

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[Staff Report](#)

### History

**Time**

3/1/2017 4:54 AM

**Who**

County Administrative Office

**Approval**

Yes

2/28/2017 6:04 PM

County Counsel

Yes

3/1/2017 5:28 PM

Finance

Yes



# MONO COUNTY PROBATION DEPARTMENT

---

MAILING : P O . BOX 596, BRIDGEPORT, CALIFORNIA 93517

BRIDGEPORT OFFICE (760) 932-5570 • FAX (760) 932-5571

MAMMOTH OFFICE (760) 924-1730 • FAX (760) 924-1731  
probation@mono.ca.gov

Mark Magit  
Presiding Judge, Superior Court

Dr. Karin Humiston  
Chief Probation Officer

To: Honorable Board of Supervisors

From: Karin Humiston, Chief of Probation

Date: January 31, 2017

## **SUBJECT**

Presentation by Karin Humiston and Robin Roberts regarding update of the Racial and Ethnic Disparity Grant and review of future changes.

## **RECOMMENDATION**

None (information only). Provide any desired direction to staff.

## **DISCUSSION**

The staff wishes to report on goals and accomplishments of the Racial and Ethnic Disparity Grant awarded to Mono County Probation Services two years ago. The third year of the grant is expected to be an important addition of services for youth in our community. Staff will review the plan and expected services to the Board of Supervisors.

## **FISCAL IMPACT**

The Racial and Ethnic Disparity Grant (R.E.D. Grant) is a reimbursable grant and would increase Juvenile Probation revenues in the amount of \$150,000 and increase Juvenile Probation expenditures in the amount of \$150,000 in fiscal year 16/17.





OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**TIME REQUIRED** 10 minutes (5 minute presentation; 5 minute discussion) **PERSONS APPEARING BEFORE THE BOARD** Leslie Chapman, Ingrid Braun

**SUBJECT** Review of Need for Continuation of Local Emergency

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

On January 31, 2017 the Mono County Sheriff declared a state of local emergency as a result of extreme winter weather.

The Board of Supervisors ratified this declaration on February 7, 2017, and further declared a continuing state of emergency. Mono County Code Section 2.60.080 requires that the Board of Supervisors review the need for continuing the local emergency every 14 days, and Government Code section 8630 requires that the Board review the need at least every 30 days until it is terminated. This item is provided for that purpose.

### RECOMMENDED ACTION:

Review need for continuing the local emergency. If Board determines that need no longer exists, direct staff to prepare a declaration terminating local emergency.

### FISCAL IMPACT:

None

**CONTACT NAME:** Ingrid Braun

**PHONE/EMAIL:** 760-932-5414 / lchapman@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

### SEND COPIES TO:

### MINUTE ORDER REQUESTED:

YES  NO

### ATTACHMENTS:

Click to download

[Staff Report](#)

**History**

<b>Time</b>	<b>Who</b>	<b>Approval</b>
3/2/2017 7:18 AM	County Administrative Office	Yes
3/1/2017 4:30 PM	County Counsel	Yes
3/1/2017 5:33 PM	Finance	Yes

**MONO COUNTY**  
**SHERIFF**  
*A Commitment to Community Safety and Service*



**Ingrid Braun**  
Sheriff-Coroner

**MONO COUNTY SHERIFF'S OFFICE**

**Michael Moriarty**  
Undersheriff

DATE: March 7, 2017  
TO: The Honorable Board of Supervisors  
FROM: Ingrid Braun, Sheriff-Coroner  
SUBJECT: Continuation of Proclamation of Local Emergency

**BACKGROUND:**

On January 31, 2017, Sheriff Ingrid Braun, acting in her role as Director of Emergency Services, declared an emergency due to severe winter storms which began on January 21, 2017. The Mono County Board of Supervisors ratified the Disaster Proclamation on February 7, 2017, and continued the emergency on February 21, 2017.

**DISCUSSION:**

Beginning on January 21, 2017, and continuing throughout the month of February, 2017, Mono County suffered a series of winter storms which severely impacted the region and resulted to damage to both structures and infrastructures in Mono County, the Town of Mammoth Lakes and Special Districts. These conditions are beyond the control of the services, personnel, equipment and facilities of Mono County. We will not know the extent of the damage of the storms for many months until the snow melts. Additionally, the potential impact of the run-off from the melt could cause more damage or exacerbate existing damage.

**RECOMMENDATION:**

Request that the Board of Supervisors continue the emergency until such time the County has determined the extent of the damage caused by the winter storms.

**FINANCIAL IMPACT:**

The fiscal impact, if any, is not yet known.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'IB' with a flourish.

Ingrid Braun  
Sheriff-Coroner



OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: CDD**

**TIME REQUIRED** PUBIC HEARING: 10:00 A.M.

**PERSONS** Gerry Le Francois and Nick Criss

**SUBJECT** General Plan Amendments

**APPEARING  
BEFORE THE  
BOARD**

---

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Conduct a public hearing on General Plan Amendment 17-01, Part A and Part B (originally identified as 16-00020).

Following the public hearing and discussion, adopt Resolution 17-\_\_ approving addenda to the 2015 General Plan Final Environmental Impact Report and adopting General Plan Amendment 17-01 Part A, Annual Update and Part B, Land Use Element Chapter 25 Revisions Regarding Transient Rentals (originally identified as 16-00020).

The 2015 General Plan Final Environmental Impact Report is too large to attach and can be accessed at the following link:

<https://monocounty.ca.gov/planning/page/general-plan-eir>

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### RECOMMENDED ACTION:

**GENERAL PLAN AMENDMENT 16-00020(a):** 1. Change Land Use Designation (LUD) of former Mountain Gate property from Rural Residential (RR) 5 & 10 to Open Space (OS) (affected APNs 002-140-033, 002-490-002, -007, -008 & -011 are owned by Mono County); 2. Change LUD for Walker Behavioral Health property from Mixed Use 1-acre minimum to Public Facility (PF) (APN is 002-361-012 and is owned by Mono County); 3. Change LUD for Public Works property at West Walker River/North River Lane from Estate Residential (ER) to Public Facility (PF) (APN is 002-310-056); 4. Change LUD of Walker tennis courts from Estate Residential to Public Facility (APNs are 002-362-008 & -009); 5. Change LUD on various FEMA properties along North River Lane and Meadow Drive from Estate Residential (ER) to Open Space (OS) (APNs are 002-290-005, 006, 007, 002-300-002, 002-310-001, -009, -038, -037, -035, and 002-343-005); 6. Change LUD on APN 002-450-014 Antelope Valley Fire Station from Agricultural 10 (AG10) to Public Facilities (PF); 7. Add policy to Land Use Element, Antelope Valley Plan as follows: The RPAC endorses the use of FEMA/County properties on N. River Road and Meadow Lane as open space, without development for public improvements and facilities until 2041; 8. Change setback in Mixed Use district for residential uses from 0 feet to 10 feet; 9. Specify that a General Plan Amendment initiated by a private landowner must go before the Board of Supervisors for approval if the GPA is a major policy change with potential significant impacts countywide; and 10. Amend Chapter 16, Accessory Dwelling Units, to comply with AB2200 and SB1069. **GENERAL PLAN AMENDMENT 16-00020(b):** Revise General Plan Land Use Element Chapter 25 concerning transient rentals. Highlights of the recommended changes include: establish a process to permit transient rentals in residential areas if specific proposals are compatible with applicable area plans, extend noticing requirements for public hearings to 30 days, define Type I rentals as owner-occupied properties and set Use Permit Process for approval, define Type II rentals as vacant properties with off-site management and set a General Plan Amendment process for approval, require Vacation Home Rental Permits (Ch. 26) for both Type I and Type II rentals, eliminate solicitation of multi-parcel applications or setup of districts, focus on standard for approval as lack of reasonable opposition by neighbors directly affected rather than neighborhood support, and clarify "neighbor."

---

### FISCAL IMPACT:

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**CONTACT NAME:** Same

**PHONE/EMAIL:** 760.924.1810 / glefrancois@mono.ca.gov

---

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

**SEND COPIES TO:**

---

**MINUTE ORDER REQUESTED:**

YES  NO

---

**ATTACHMENTS:**

Click to download
<input type="checkbox"/> <a href="#">Staff Report</a>
<input type="checkbox"/> <a href="#">BOS Resolution R17-</a>
<input type="checkbox"/> <a href="#">Exhibit A to Resolution, Map Amendment Summary</a>
<input type="checkbox"/> <a href="#">Exhibit B to Resolution, Ch 25 - Land Use Amendment, Transient Rentals</a>
<input type="checkbox"/> <a href="#">PC Resolution 16-01</a>
<input type="checkbox"/> <a href="#">Part A Redline</a>
<input type="checkbox"/> <a href="#">Part A Addendum</a>
<input type="checkbox"/> <a href="#">PC Resolution 16-02</a>
<input type="checkbox"/> <a href="#">Ch 25 with Redline</a>
<input type="checkbox"/> <a href="#">Part B Addendum</a>
<input type="checkbox"/> <a href="#">Transient Resource Materials</a>
<input type="checkbox"/> <a href="#">JL Rental Work Program</a>
<input type="checkbox"/> <a href="#">PC Adopted Mins</a>
<input type="checkbox"/> <a href="#">Notice of Hearing Times</a>
<input type="checkbox"/> <a href="#">Notice of Hearing Sheet</a>

---

**History**

Time	Who	Approval
3/2/2017 7:27 AM	County Administrative Office	Yes
3/1/2017 4:07 PM	County Counsel	Yes
3/2/2017 8:14 AM	Finance	Yes

# Mono County Community Development Department

---

PO Box 347  
Mammoth Lakes, CA 93546  
760.924.1800, fax 924.1801  
commdev@mono.ca.gov

PO Box 8  
Bridgeport, CA 93517  
760.932.5420, fax 932.5431  
[www.monocounty.ca.gov](http://www.monocounty.ca.gov)

March 7, 2017

**To:** Board of Supervisors

**From:** Gerry Le Francois, Principal Planner  
Nick Criss, Code Compliance Officer

**Subject:** Public Hearing on General Plan Amendment 17-01, Part A: Annual General Plan Update, and Part B: General Plan Land Use Element Chapter 25 Revisions Regarding Transient Rentals. Please note that this General Plan Amendment 17-01, Part A and Part B, was originally identified as GPA 16-02.

## RECOMMENDED ACTION

1. Conduct a public hearing on General Plan Amendment 17-01 Part A: Annual Update, and Part B: General Plan Land Use Element Chapter 25 Revisions Regarding Transient Rentals (originally identified as GPA 16-02).
2. Following the public hearing and Board discussion, adopt Resolution R17-\_\_ Approving Addenda to the 2015 General Plan EIR and Approving General Plan Amendment Part A, Annual Update, and Part B, Land Use Element Chapter 25 Revisions Regarding Transient Rentals.

## FISCAL IMPACT

Other than an undefined potential increase in Transient Occupancy Tax (TOT) revenue, no impact to General Fund.

## GPA 16-02, PART A

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### DISCUSSION

The Planning Commission has recommended several annual general plan clarifications and/or changes for the Board of Supervisors consideration as part of the annual General Plan amendment. These items generally clarify oversights, reflect recent changes in State law, or in the case of the Antelope Valley RPAC (Regional Planning Advisory Committee), provide additional direction on the use of County-owned open space parcels. The summary below identifies the proposed changes, and maps of the proposed parcels and text changes in legislative format are contained in Attachment 2:

1. Change the Land Use Designation (LUD) of the former Mountain Gate property from Rural Residential (RR) 5 & 10 to Open Space (OS). The affected APNs 002-140-033, 002-490-002, -007, -008, -010 & -011 are owned by Mono County.
2. Change the LUD for Walker Behavioral Health property from Mixed Use 1-acre minimum to Public Facility (PF). The APN is 002-361-012 and is owned by Mono County.
3. Change the LUD for Mono County Public Works property at the West Walker River and North River Lane from Estate Residential (ER) to Public Facility (PF). The APN is 002-310-056.
4. Change the LUD of the County-owned Walker tennis courts from Estate Residential to Public Facility. The APNs are 002-362-008 & -009.
5. Change LUD on the various County-owned properties obtained with FEMA (Federal Emergency Management Agency) funds along North River Lane and Meadow Drive from Estate Residential (ER) to

Open Space (OS). The APNs are 002-290-005, -006, -007, 002-300-002, 002-310-001, -009, -038, -037, -035, and 002-343-005.

6. Change the LUD on APN 002-450-014 Antelope Valley Fire Station from Agricultural 10 (AG10) to Public Facilities (PF).
7. Add a policy to the Land Use Element, Antelope Valley area policies, documenting that the Antelope Valley RPAC endorses the use of FEMA/County properties on N. River Road and Meadow Lane as open space, without development of public improvements and facilities until 2041.
8. Amend “Chapter 48 Amendments” regarding the Initiation of a General Plan Amendment to clarify that policy changes that are countywide and/or not associated with individual parcels may only be initiated by the Planning Commission or Board of Supervisors.
9. Change the side yard setback in the Mixed Use Land Use Designation and Table 04.120 for residential uses from 0 feet to 10 feet.
10. Amend Chapter 16 Accessory Units to be consistent with changes to state law, including changes to ministerial reviews and permitted uses, parking requirements, fire sprinkler requirements, and requirements for connections, garage conversions, and units above garages.

## **GPA 16-02, PART B**

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### **DISCUSSION**

Following the Board’s February 11, 2016, joint workshop with the Planning Commission and subsequent Board enactment of a moratorium on transient (short-term) rentals in single-family areas (expires March 2, 2017), three additional workshops on possible revisions to the development standards of Chapter 25, Transient Rental Overlay District were conducted by the Planning Commission. Extensive discussion focused on owner-occupied vs. non-owner-occupied; neighborhood vs. neighbor; minimizing conflicts; adequate access; parking; impact on workforce housing; and path to legitimacy. Highlights of the recommended changes proposed by the Planning Commission include:

- Defines Type I rentals as owner-occupied properties and sets Use Permit Process for approval;
- Defines Type II rentals as vacant properties with off-site management and sets a General Plan Amendment process for approval;
- Requires Vacation Home Rental Permits (Ch. 26) for both Type I and Type II rentals;
- Eliminates encouraging multi-parcel applications or the setup of districts;
- Focuses on lack of reasonable opposition by neighbors directly affected rather than neighborhood support;
- Sets standard noticing requirement.

At the July 12, 2016, Board of Supervisors meeting, a revised Chapter 25 was presented and discussed based on recommendations from three Planning Commission workshops held in spring of 2016. After reviewing the revised chapter, the Board of Supervisors recommended that the noticing period be increased to 30 days prior to public hearings and that appeal fees be waived for Type I rentals. The Board directed staff to present the revised Chapter 25 to the June Lake CAC (Citizens Advisory Committee) as well as the RPACs to gather community feedback and suggestions.

Community Development staff presented the revised chapter at the Bridgeport, Mono Basin, Antelope Valley, and Long Valley RPACs, all of which supported moving forward without any additional changes. The June Lake CAC raised various concerns and recommended that language of Chapter 25 be revised to allow short-term rentals only in areas that are consistent with the June Lake Area Plan and other applicable area plans. This would allow June Lake, along with any other communities, to initiate a process to amend local area plans

that would determine where short-term rentals would and would not be allowed within that specific community.

At the October 4, 2016, Board of Supervisors meeting, Supervisor Johnston presented an alternative proposal on transient rentals specific for June Lake. His proposal requires a process that identifies and maps neighborhoods that may be appropriate for short-term rentals. A vote would be taken in areas that are recognized as appropriate, and if 80% of the property owners in that area agree, then a general plan amendment would re-designate the land use in that area to allow for short-term rentals as a permitted use. The Board recommended that staff attempt to incorporate Supervisor Johnston's proposal into the current Chapter 25 revision process. Subsequently, Supervisor Johnston's proposal was presented to the June Lake CAC and various elements are being considered as part of the June Lake Area Plan update (see Attachment 5) as coordinated by Wendy Sugimura.

On December 15, 2016, Community Development Department staff presented the revised Chapter 25 (see Attachment 6) including the June Lake CAC's suggestions and, following substantial discussion (see Attachment 7), the Planning Commission voted 3-2 recommending that the Board of Supervisors adopt Resolution R16-02 revising Chapter 25 in the Mono County General Plan Land Use Element, with a number of changes, including renaming Transient Rentals to Short-Term Rentals. Although this would apply countywide, the chapter excludes June Lake until its Area Plan has been amended to address community concerns.

In accordance with the California Environmental Quality Act, an addendum to the existing General Plan EIR is being utilized (see Attachment 4 for Part A and Attachment 8 for Part B). In addition, resource materials and public comments received on this matter since 2013 are included in Attachment 9.

Please contact Gerry Le Francois for Part A questions and Nick Criss at 760-924-1826 questions regarding Part B. This staff report has been reviewed and approved by Community Development Director Scott Burns.

In accordance with the California Environmental Quality Act, an addendum to the existing General Plan EIR is being utilized (see Attachments 4 and 8).

#### **ATTACHMENTS**

1. BOS Resolution R17-\_\_\_, including Exhibit A (clean GPA) and Exhibit B (clean Ch. 25)
2. Planning Commission Resolution R16-01, Part A
3. GPA 16-02, Part A: Clean maps, text
4. GPA 16-02, Part A redline text edits
5. Addendum for Part A
6. Planning Commission Resolution R16-02, Part B
7. Planning Commission draft Ch. 25 – Short-Term Rentals
8. June Lake rental work program
9. Addendum for Part B
10. Summary of transient rental resource materials, meetings, and comments
11. Planning Commission minutes 12.15.16





RESOLUTION R17-\_\_

**A RESOLUTION OF THE MONO COUNTY BOARD OF SUPERVISORS APPROVING  
ADDENDA TO THE 2015 GENERAL PLAN EIR AND APPROVING GENERAL PLAN  
AMENDMENT 17-01 PART A, ANNUAL UPDATE, AND PART B, LAND USE  
ELEMENT CHAPTER 25 REVISIONS REGARDING TRANSIENT RENTALS**

**WHEREAS**, the Community Development Department conducted public outreach via the RPACs (Regional Planning Advisory Committees), the June Lake CAC (Citizens Advisory Committee), and others for the purpose of identifying potential changes to transient rental regulations and other issues within the Mono County General Plan in need of update or revision; and

**WHEREAS**, on November 17 and December 15, 2016, the Planning Commission held duly-noticed public hearings regarding the 2016 General Plan Updates (Part A) and related Changes to Chapter 25 on Transient Rentals (Part B) (hereinafter referred to as GPA 17-01, Part A and Part B), and approved Resolutions R16-01 & R16-02 recommending that the Board approve the General Plan Amendment; and

**WHEREAS**, in accordance with the requirements of the CEQA (California Environmental Quality Act), addenda to the 2015 General Plan EIR (Environmental Impact Report) have been prepared and are recommended for approval by the Planning Commission; and

**WHEREAS**, having reviewed and considered all the information and evidence presented to it, including the recommendation of the Planning Commission, public testimony, written comments, the addenda to the Final EIR, and staff reports and presentations, the Board of Supervisors now wishes to make required findings, approving the addenda to the 2015 FEIR (Final Environmental Impact Report) and adopting General Plan Amendment 17-01, Part A and Part B (originally identified as GPA 16-02), which is attached as an exhibit and incorporated by this reference.

**NOW, THEREFORE, THE MONO COUNTY BOARD OF SUPERVISORS HEREBY FINDS AND RESOLVES AS FOLLOWS:**

**SECTION ONE:** Addenda to the Final Environmental Impact Report is the appropriate level of environmental review of the proposed General Plan Amendment under CEQA. CEQA Guidelines Section 15164 (a) provides that “the lead agency or responsible agency shall prepare an addendum to a previously certified EIR if some changes or additions are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent EIR have occurred” and the Board of Supervisors finds that these General Plan changes do not trigger further analysis under CEQA Guidelines Section 15162 (as more fully described in the addenda); the addenda to the Final EIR have been prepared for the proposed General Plan Amendment in compliance with CEQA; and that this approval reflects the County’s independent judgment and analysis.

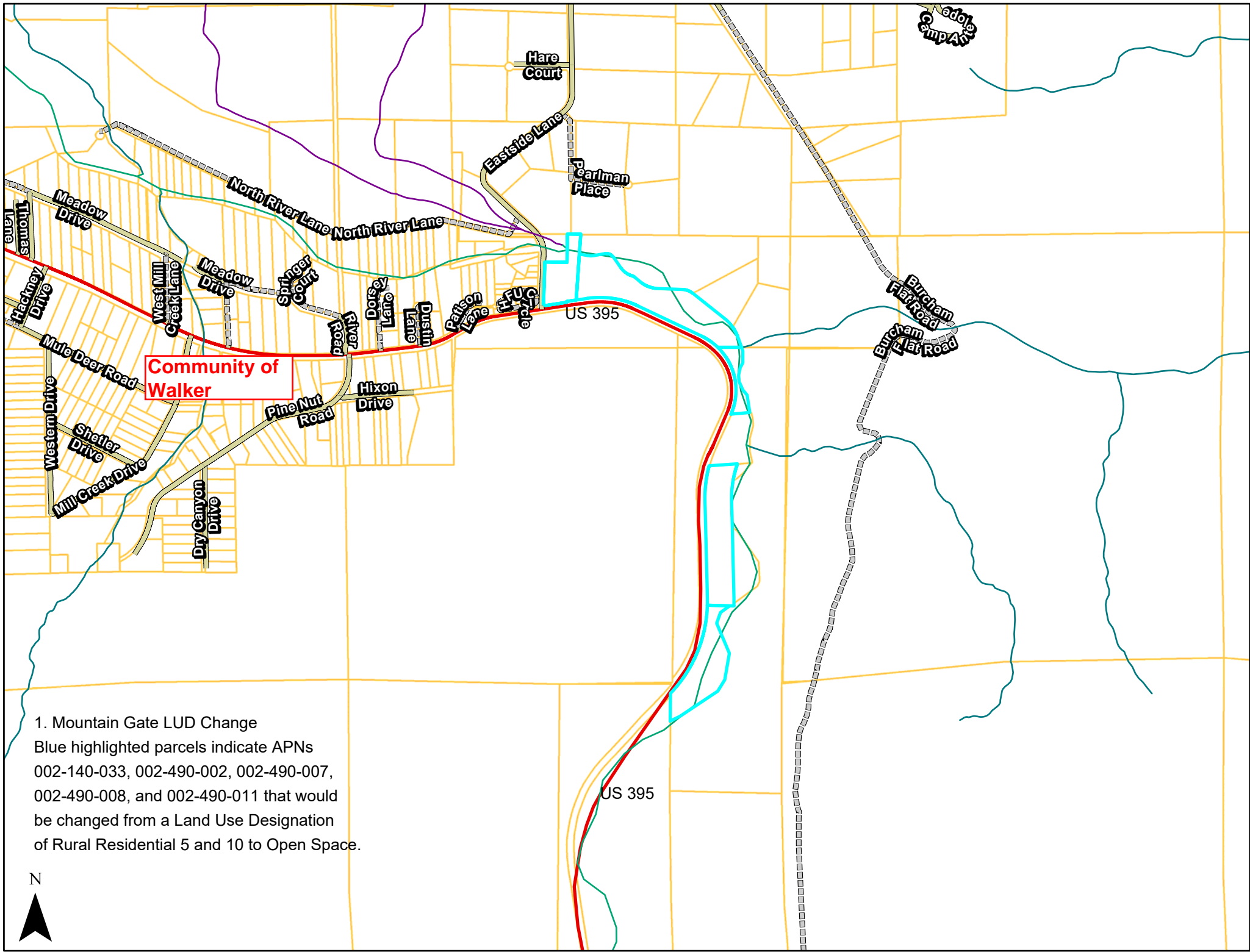
**SECTION TWO:** The Board hereby approves the addenda to the 2015 General Plan EIR.



## Exhibit A

### Map Amendment Summary

1. Change the Land Use Designation (LUD) of the former Mountain Gate property from Rural Residential (RR) 5 & 10 to Open Space (OS). The affected APNs 002-140-033, 002-490-002, -007, -008, -010 & -011 are owned by Mono County.
2. Change the LUD for Walker Behavioral Health property from Mixed Use 1-acre minimum to Public Facility (PF). The APN is 002-361-012 and is owned by Mono County.
3. Change the LUD for Public Works property at the West Walker River and North River Lane from Estate Residential (ER) to Public Facility (PF). The APN is 002-310-056.
4. Change the LUD of the Walker tennis courts from Estate Residential to Public Facility. The APNs are 002-362-008 & -009.
5. Change LUD on the various FEMA properties along North River Lane and Meadow Drive from Estate Residential (ER) to Open Space (OS). The APNs are 002-290-005, -006, -007, 002-300-002, 002-310-001, -009, -038, -037, -035, and 002-343-005.
6. Change the LUD on APN 002-450-014 Antelope Valley Fire Station from Agricultural 10 (AG10) to Public Facilities (PF).



1. Mountain Gate LUD Change  
 Blue highlighted parcels indicate APNs  
 002-140-033, 002-490-002, 002-490-007,  
 002-490-008, and 002-490-011 that would  
 be changed from a Land Use Designation  
 of Rural Residential 5 and 10 to Open Space.

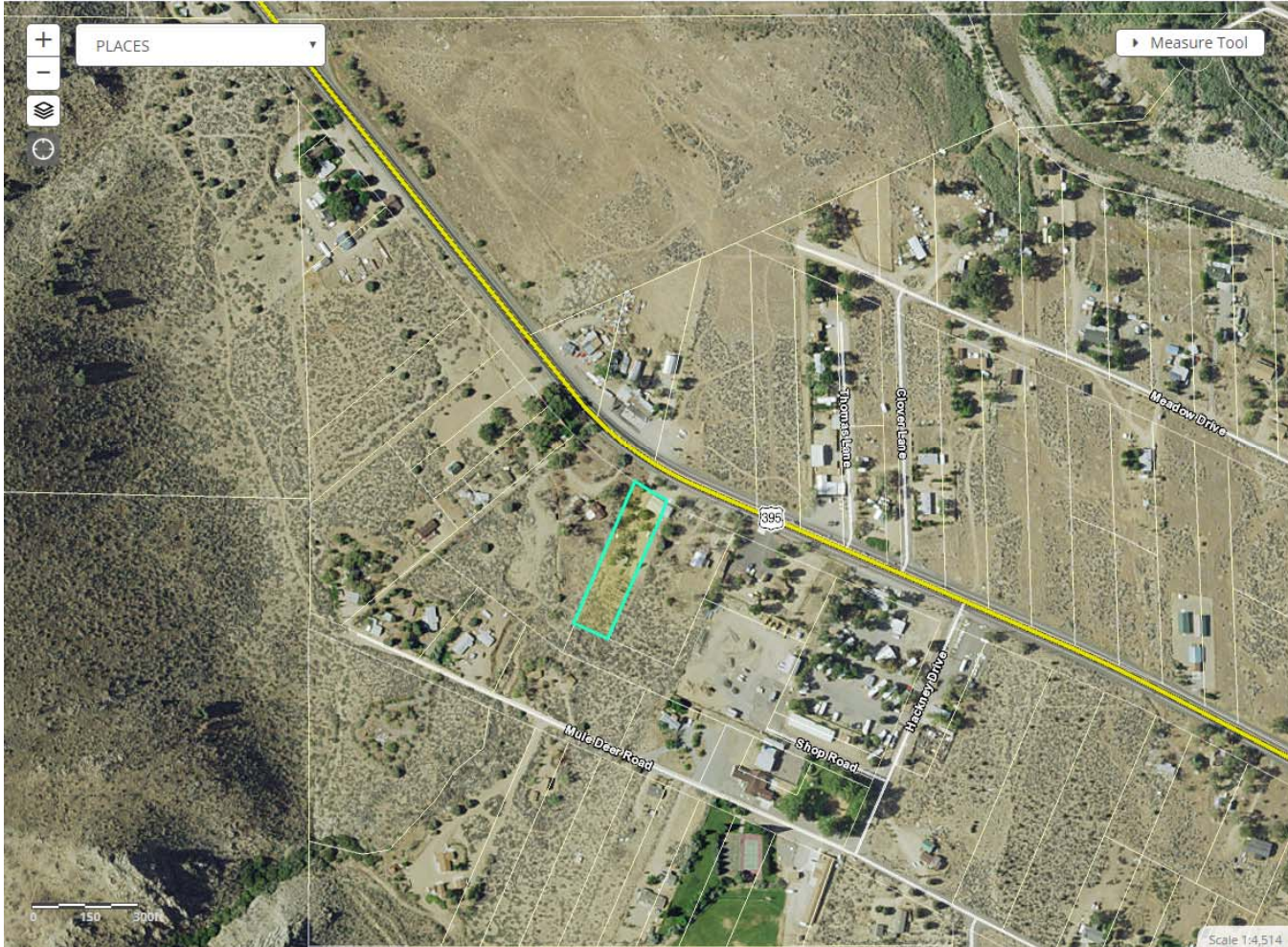
N



## 2. Walker Behavioral Health Property LUD Change

Blue highlighted parcel would change the Land Use Designation for the Walker Behavior Health property from Mixed Use 1-acre minimum to Public Facility.

**PARCEL VIEWER 4.0** | Map | Search | Results 1 | Parcel | Quick Search | wsugimura | Logout



**107655 HWY 395**  
002-361-012-000

[View or Print Value Notice](#)

<b>Address</b>	107655 HWY 395
<b>Community</b>	Walker
<b>Complex</b>	Walker Mental Health
<b>Assessee Name</b>	COUNTY OF MONO
<b>Owner(s)</b>	COUNTY OF MONO P.O. BOX 495 BRIDGEPORT, CA 93517
<b>Legal Description</b>	29 8N 23E, 37
<b>Improvement Value</b>	\$0
<b>Land Value</b>	\$0
<b>Land Use Designation</b>	MU 1
<b>Division Type</b>	Lot
<b>Parcel Type</b>	Land Parcel
<b>Stated Area</b>	1
<b>Calculated Acres</b>	1.02
<b>Tax Rate Area</b>	051001
<b>Previous Assessment #</b>	000236112000000



### 3. Public Works Property LUD Change

Blue highlighted parcel would change the Land Use Designation for the Mono County Public Works Facility at West Walker River/North River Lane from Estate Residential to Public Facility.

The screenshot displays the Parcel Viewer 4.0 web application. The interface includes a top navigation bar with the title 'PARCEL VIEWER 4.0', a search bar, and a 'Parcel' dropdown menu. The main map area shows an aerial view of a rural area with several roads and parcels. A small parcel is highlighted in blue, indicating the subject of the LUD change. The map includes various controls such as a 'Measure Tool' and a 'PLACES' dropdown. The right-hand side of the screen features a metadata panel for the selected parcel, 135 Eastside Lane. This panel provides detailed information including the address, community, owner(s), legal description, and current land use designation, which is 'Estate Residential (ER)'. The map scale is indicated as 1:4,514.

Field	Value
Address	135 Eastside Lane
Community	Walker
Complex	
Assessee Name	COUNTY OF MONO-ROAD DEPT. R-W
Owner(s)	EASTSIDE BRIDGE, R-W - REF. COUNTY OF MONO-ROAD DEPT. R-W @ EASTSIDE BRIDGE
Legal Description	RIGHT OF WAY AT EASTSIDE BRIDGE
Improvement Value	
Land Value	
Land Use Designation	Estate Residential (ER)
Division Type	Lot
Parcel Type	Land Parcel
Stated Area	Unknown
Calculated Acres	0.66
Tax Rate Area	051003
Previous Assessment #	000231056000000



## 4. Walker Tennis Courts LUD Changes

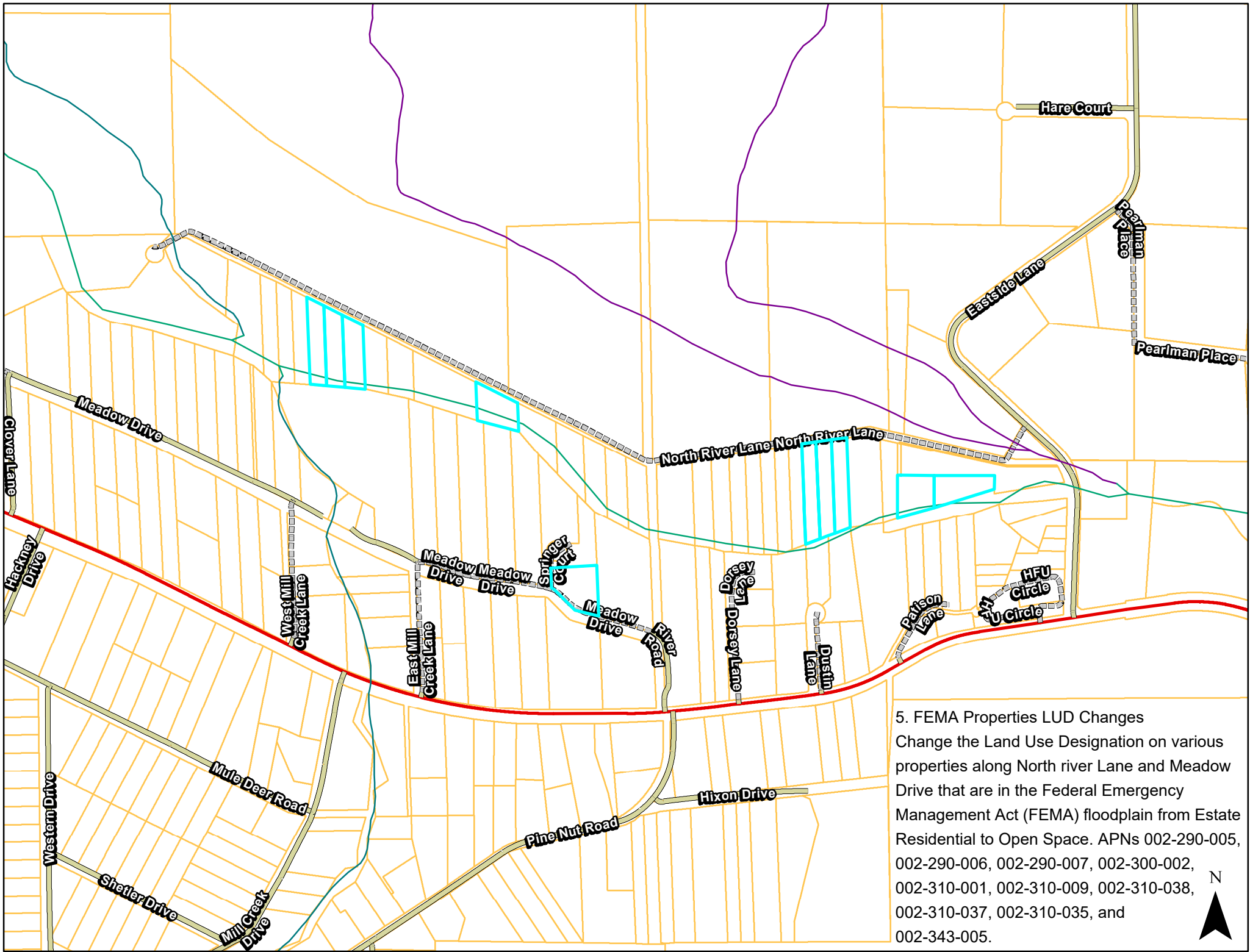
Blue highlighted parcel would change the Land Use Designation for the Walker tennis courts from Estate Residential to Public Facility.

**PARCEL VIEWER 4.0** | Map | Search | Results 2 | Parcel | Quick Search | wsugimura | Logout

**Walker**  
002-362-009-000  
and 002-362-008-000

[View or Print Value Notice](#)

<b>Address</b>	Walker
<b>Community</b>	Walker
<b>Complex</b>	
<b>Assessee Name</b>	COUNTY OF MONO ANT. VLY REC. CTR
<b>Owner(s)</b>	COUNTY OF MONO ANT. VLY REC. CTR MONO COUNTY DEPARTMENT OF PUBLIC WORKS PO BOX 457 BRIDGEPORT, CA 93517
<b>Legal Description</b>	MILL CREEK RANCH Y-9, ANTELOPE VALLEY RECREATION CENTER RS 31 52 RSBK4 PG65
<b>Improvement Value</b>	
<b>Land Value</b>	
<b>Land Use Designation</b>	Estate Residential (ER) ⓘ
<b>Division Type</b>	Lot
<b>Parcel Type</b>	Land Parcel
<b>Stated Area</b>	1.02
<b>Calculated Acres</b>	1.04
<b>Tax Rate Area</b>	051001
<b>Previous Assessment #</b>	000236209000000

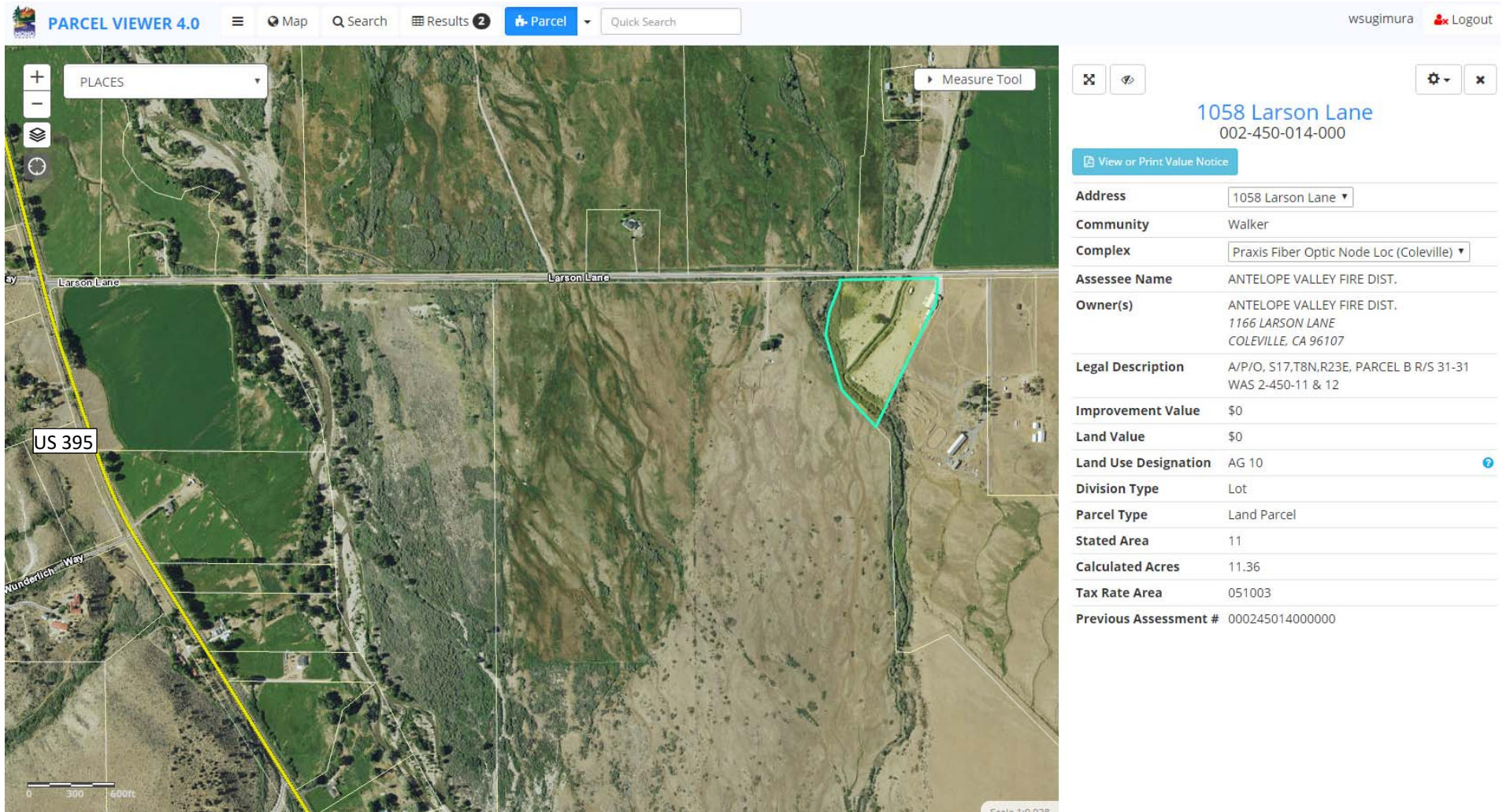


5. FEMA Properties LUD Changes  
 Change the Land Use Designation on various properties along North river Lane and Meadow Drive that are in the Federal Emergency Management Act (FEMA) floodplain from Estate Residential to Open Space. APNs 002-290-005, 002-290-006, 002-290-007, 002-300-002, 002-310-001, 002-310-009, 002-310-038, 002-310-037, 002-310-035, and 002-343-005.



## 6. Antelope Valley Fire State LUD Change

Blue highlighted parcel would change the Land Use Designation for the Antelope Valley Fire Station parcel from Agricultural 10 to Public Facilities.



**PARCEL VIEWER 4.0** | Map | Search | Results 2 | Parcel | Quick Search

wsugimura | Logout

PLACES | Measure Tool

1058 Larson Lane  
002-450-014-000

[View or Print Value Notice](#)

Address	1058 Larson Lane
Community	Walker
Complex	Praxis Fiber Optic Node Loc (Coleville)
Assessee Name	ANTELOPE VALLEY FIRE DIST.
Owner(s)	ANTELOPE VALLEY FIRE DIST. 1166 LARSON LANE COLEVILLE, CA 96107
Legal Description	A/P/O, S17,T8N,R23E, PARCEL B R/S 31-31 WAS 2-450-11 & 12
Improvement Value	\$0
Land Value	\$0
Land Use Designation	AG 10
Division Type	Lot
Parcel Type	Land Parcel
Stated Area	11
Calculated Acres	11.36
Tax Rate Area	051003
Previous Assessment #	000245014000000

## 7. Antelope Valley Area Policy Addition

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**Policy 4.B.2.** Preserve the agricultural lands and natural resource lands in the Antelope Valley.

**Action 4.B.2.a.** In accordance with the California Environmental Quality Act (CEQA), require the preparation of an Environmental Impact Report (EIR) for projects that may convert agricultural lands to other uses.

**Action 4.B.2.b.** Encourage agricultural land owners to utilize the property tax incentives for agricultural land provided for in the county Williamson Act program.

**Action 4.B.2.c.** Inform owners of critical wildlife habitat areas of the potential for open-space easements to **protect such areas and of the potential for property tax adjustments.**

**Action 4.B.2.c.** The RPAC endorses the use of FEMA/County properties on N. River Road and Meadow Lane as open space, without development of public improvements and facilities until 2041.

## 8. Amendment to “Chapter 48: Amendments”

---

### I. GENERAL PLAN MAP/LAND USE DESIGNATION AMENDMENTS

#### 48.010 Initiation.

The provisions of this section, or portion thereof, to the extent that the same may be referred to in any specific procedure, shall govern in the initiation of proceedings. Initiation may be by:

- A. The adoption of a resolution of initiation by the Board of Supervisors;
- B. The adoption of a resolution of initiation by the Commission; or
- C. Filing with the Director an application signed by one or more of the record owners of the parcel of property that is the subject of the application or by an agent of the owner, authorized in writing, or by a public utility company or other agency with the powers of eminent domain. In the event that more than one parcel is submitted for district amendment, owners of parcels representing at least 60% of the area involved must sign the application. The names of all record owners of all land involved must be stated. A petition for amendment shall be on a form designated by the Commission, and shall be accompanied by the required application, environmental forms, and fee. In addition, the applicant shall also be assured that the proposed district amendment is consistent with this General Plan before his application is deemed accepted.
- D. General plan amendments addressing matters applicable throughout the county and/or not directly associated with specific parcels of land may only be initiated by the Planning Commission or Board of Supervisors.

## 9. Change side-yard setback in Mixed Use LUD

---

**TABLE 04.120: MINIMUM YARDS**

LUD	Front	Rear	Side
SFR <1 acre	20'	10'	10'
SFR >1 acre	30'	30'	30'
ER <1 acre	50'	10'	10'

ER >1 acre	50'	30'	30'
RR	50'	30'	30'
RU	30'	30'	30'
RMH <1 acre	20'	10'	10'
RMH >1 acre	30'	30'	30'
MFR <1 acre	20'	10'	10'
MFR >1 acre	30'	30'	30'
MU <1 acre	10'	5'	0' 10'
MU >1 acre	30'	30'	30'
CL	10'	5'	0'
C	10'	5'	0'
SC	10'	5'	0'
IP	20'	10'	10'
RM	50'	30'	30'
AG	50'	50'	50'
NHP	30'	30'	30'
OS	50'	30'	30'

## 10. Amendment to Chapter 16: Accessory Dwelling Units

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### Sections:

#### 16.010 Intent.

#### 16.020 Definition.

#### 16.030 Applicable Land Use Designations.

#### 16.040 General Provisions.

#### 16.050 Standards for Accessory Dwelling Units.

**16.010 Intent.** The intent of this chapter is to allow for Accessory Dwelling Units in accordance with State law in order to provide additional affordable housing opportunities, including housing for the elderly in Mono County.

#### 16.020 Definition.

"Accessory Dwelling Unit" (also referred to as "dependent," "Secondary Housing," or "granny unit") means residential occupancy of a living unit located on the same parcel as the primary residential unit. It provides complete, independent living facilities for one or more persons including permanent provisions for living, sleeping, eating, cooking, and sanitation on the same parcel as the primary unit is situated. An Accessory Dwelling Unit shall meet the minimum regulations for an efficiency dwelling unit in the California Building Code.

The Accessory Dwelling Unit can be either attached to or detached from the primary residential unit but in either case shall have similar architectural elements as the primary unit (i.e., materials, textures, colors, etc.; see 16.050 G below). The Accessory Dwelling Unit shall be clearly subordinate to the primary unit.

Utilities that are installed for future expansion, such as stub outs that would allow a kitchen to be installed at a later date, shall be considered as complete cooking facilities in accessory dwelling units. In units required by deed restriction, complete cooking facilities shall be installed resulting

in a usable kitchen at final permit issuance, and interior access between attached units shall be no more than a single personnel door.

#### **16.030 Applicable Land Use Designations.**

An Accessory Dwelling Unit may be permitted in any land use designation that allows single-family residences as a permitted use or as allowed in Specific Plan (SP) areas subject to the General Provisions below.

#### **16.040 General Provisions.**

- A. On parcels less than 7,500 sq. ft. in net area, an attached Accessory Dwelling Unit not exceeding 500 sq. ft. in size may be permitted with a building permit by application for a Director Review.
- B. On parcels of 7,500 sq. ft. up to 10,000 sq. ft. in net area, an attached Accessory Dwelling Unit not exceeding 640 sq. ft. in size is allowed with a building permit. A detached Accessory Dwelling Unit not exceeding 640 sq. ft. may be permitted by application for a Director Review.
- C. On parcels of 10,000 sq. ft. up to one acre in net area, an Accessory Dwelling Unit not exceeding 640 sq. ft. in size (attached or detached) is allowed with a building permit.
- D. On parcels one acre or greater, an Accessory Dwelling Unit not exceeding 640 sq. ft. in size (attached or detached) is allowed with a building permit. In this same parcel size range, an Accessory Dwelling Unit exceeding 640 sq. ft. but not exceeding 1,400 sq. ft. in size (attached or detached) may be permitted by application for a Director Review. In this same parcel size range, an Accessory Dwelling Unit exceeding 1,400 sq. ft. may be permitted by application for a use permit.
- E. Square footage of Accessory Dwelling Units shall be calculated based on the exterior dimensions of the unit. All interior living space shall count toward the total square footage of the unit.
- F. Consistent with Government Code §65852.2, ministerial reviews shall occur within 120 days after receiving an accessory dwelling unit application.

#### **16.050 Standards for New Accessory Dwelling Units.**

- A. All construction shall conform to the height, setback, lot coverage, fees (including school impact fees and fire district fees), snow storage, and other development requirements applicable to residential construction in the land use designation in which the property is located.
- B. If a well and/or septic system is/are to be utilized, a clearance letter shall be obtained from the Environmental Health director and shall accompany the building permit application (or if applicable, the Director Review or Use Permit application). For Accessory Dwelling Units that are served by a public water and/or sewer system, a letter from the serving entity that indicates adequate service shall be submitted as part of the application.
- C. One of the units on the parcel (either the primary unit or the Accessory Dwelling Unit) must be owner occupied.

D. If the Accessory Dwelling Unit is 640 sq. ft. or less in size, one off-street parking space must be provided for the Accessory Dwelling Unit in addition to parking required for the primary unit. If the Accessory Dwelling Unit is larger than 640 square feet, two parking spaces must be provided for the Accessory Dwelling Unit in addition to parking required for the primary unit, if it contains two or more bedrooms. Parking shall be in accordance with Chapter 06 of the Mono County Land Use Element, except that June Lake provisions of three parking spaces per unit shall apply only to the primary unit and not the Accessory Dwelling Unit unless the following instances exist, in which case, no parking standards shall be imposed:

- 1) The accessory dwelling unit is located within one-half mile of public transit.
- 2) The accessory dwelling unit is located within an architecturally and historically significant district.
- 3) The accessory dwelling unit is part of the existing primary residence or an existing accessory structure.
- 4) When on-street parking permits are required but not offered to the occupant of the accessory dwelling unit.
- 5) When there is a car-share vehicle located within one block of the accessory dwelling unit.

E. Whether attached or detached, the Accessory Dwelling Unit shall be architecturally compatible with the primary residence. The Community Development Department shall determine the architectural compatibility of the structures and shall consider roofing, siding, trim, door and window frame colors; roofing, siding, trim, door, and window materials; roof slope and pitch; and wall articulation, roof line articulation, eaves, railings, chimneys, porches, and similar features; landscaping should also be considered in helping to make the units compatible. In addition, the Accessory Dwelling Unit shall be clearly subordinate to the primary unit in terms of size and placement on the property. If attached, the two units shall have the appearance of a single-family residence; the Accessory Dwelling Unit entrance shall be located on the side or rear of the building.

F. Accessory dwelling units shall not be required to provide fire sprinklers if they are not required for the primary residence. Accessory dwelling unit utility connections and related fees shall comply with Government Code §65852.2.

G. No passageway shall be required in conjunction with the construction of an accessory dwelling unit. No setback shall be required for an existing garage that is converted to an accessory dwelling unit, and a setback of no more than five (5) feet from the side and rear lot lines shall be required for an accessory dwelling unit that is constructed above a garage.

# EXHIBIT B

## DEVELOPMENT STANDARDS

### CHAPTER 25 – SHORT-TERM RENTAL

#### Sections:

<b>25.010</b>	<b>Intent.</b>
<b>25.020</b>	<b>Establishment of Type I Short-Term Rental: Owner-Occupied.</b>
<b>25.030</b>	<b>Establishment of Type II Short-Term Rental: Not Owner-Occupied.</b>
<b>25.040</b>	<b>Notice requirements.</b>
<b>25.050</b>	<b>Uses permitted.</b>
<b>25.060</b>	<b>Uses permitted subject to director review</b>
<b>25.070</b>	<b>Uses permitted subject to use permit</b>
<b>25.080</b>	<b>Additional requirements</b>

#### **25.010 Intent.**

In recognition of the demand by visitors for diverse lodging options, this chapter is intended to establish a process to permit short-term rentals within residential areas that do not exhibit reasonable opposition by neighbors who may be directly affected, and when consistent with applicable Area Plan policies.<sup>1</sup>

#### **25.020 Establishment of Type I Short-Term Rental: Owner-Occupied**

Type I short-term rentals are owner-occupied or associated with an owner-occupied principal residence. This rental includes an entire dwelling unit or, if only part of the unit, includes at a minimum a sleeping room (with shared full bathroom). Rental is limited to a single party of individuals, and the owner is required to be present during the rental. The short-term rental use may be permitted on any residential parcel having land use designation(s) of SFR, ER, RR, MFR-L or RMH subject to use permit, if consistent with applicable Area Plan policies.<sup>1</sup> Fees for appeal of Type I use permit decisions shall be waived.

#### **25.030 Establishment of Type II Short-Term Rental: Not Owner-Occupied**

Type II short-term rentals include rental of an entire dwelling unit that is not concurrently occupied by the owner or on the same parcel as a principal residence concurrently occupied by the owner. The short-term rental use may be established on any residential parcel, or group of parcels, meeting the requirements of 25.060 and having land use designation(s) of SFR, ER, RR, MFR-L or RMH. The short-term rental must be consistent with applicable Area Plan policies,<sup>1</sup> must exhibit no reasonable opposition from neighbors within 500 feet of the subject parcel, and must have adequate year-round access.

In addition to the requirements of this chapter, initiation and application for a Type II short-term rental shall be processed in the same manner as any land use redesignation (see Ch. 48, Amendments I. General Plan Map/Land Use Designation Amendments). The land use

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<sup>1</sup> The June Lake Area Plan will be revised shortly after the adoption of this chapter to identify appropriate areas for short-term rentals. Until the Area Plan revision is complete, no short-term rental applications shall be processed for June Lake. After Area Plan revision, applications can be accepted and evaluated for consistency with June Lake Area Plan policies per 25.010, 25.020, and 25.030.



designation followed by the letters STR (e.g., SFR-STR) would indicate a Type II short-term rental is permitted.

**25.040 Notice requirements.**

- A. Notice shall be given to owners of surrounding properties and published in a newspaper of general circulation 30 days in advance of a public hearing.
- B. "Surrounding property," for the purposes of this planning permit, shall be defined as those properties that fall within a 500-foot radius drawn from the nearest limits of the parcel that is subject of the land use application. If a property is located more than 500 feet from the boundary of the parcel, but may be directly affected by any land use application on the subject parcel, then that property owner may also be noticed. Further, any property owners, regardless of their location or proximity to the parcel subject to a land use application, may receive notice as long as they submit their request in writing to the Planning Division more than 10 days in advance of the hearing. Such notice shall be given to those properties at least 20 days in advance of the hearing by mail to all persons whose names and addresses appear on the latest adopted tax roll of the County.

**25.050 Uses permitted.**

The following uses shall be permitted with a short-term rental approval, plus such other uses as the commission finds to be similar and not more obnoxious or detrimental to the public safety, health and welfare:

- A. All uses permitted in the underlying land use designation.
- B. Where the principal use of the subject parcel(s) is single-family or multi-family residential, the residence or any accessory dwelling unit on the parcel(s) may be rented on a short-term basis subject to the requirements of 25.070.

**25.060 Uses permitted subject to director review.**

All uses permitted subject to director review in the underlying land use designation with which the short-term rental is combined shall be permitted, subject to director review approval.

**25.070 Uses permitted subject to use permit.**

All uses permitted subject to use permit in the underlying land use designation with which the short-term rental is combined shall be permitted, subject to use permit approval.

**25.080 Additional requirements.**

Any person or entity that leases, rents, or otherwise makes available for compensation, a single-family or multi-family residence located within an approved short-term rental established by this chapter, for a period of less than 30 days, must first obtain a vacation home rental permit and comply with all applicable requirements of that permit, as set forth in Chapter 26, Transient Rental Standards and Enforcement.

Parcels located within conditional development zones (avalanche) shall not be allowed short-term rentals during the avalanche season, November 1 through April 15.



1  
2  
3                                   **RESOLUTION R16-01**  
4                   **A RESOLUTION OF THE MONO COUNTY PLANNING COMMISSION**  
5                   **INITIATING AND RECOMMENDING THAT THE BOARD OF SUPERVISORS**  
6                   **CERTIFY AN ADDENDUM TO FINAL EIR FOR THE MONO COUNTY**  
7                   **GENERAL PLAN AND ADOPT THE PROPOSED 2016 MINOR**  
8                   **UPDATE TO THE LAND USE ELEMENT, GPA 16-00020**

9           **WHEREAS**, as an outcome of the annual General Plan review, several adjustments to the Land Use Element of the General Plan are proposed to correct oversights and respond to changes in State law, including designation changes recommended by the Antelope Valley Regional Planning Advisory Committee; and

10           **WHEREAS**, the proposed amendments in the Antelope Valley Planning Area have been reviewed and are recommended by the Antelope Valley Regional Planning Advisory Committee; and

11  
12           **WHEREAS**, on October 20, 2016, the Planning Commission held a workshop to receive public input and provide direction on the proposed adjustments; and

13  
14           **WHEREAS**, on November 17, 2016, the Planning Commission held a duly-noticed public hearing regarding the 2016 Updates and related Addendum to the Final EIR; and

15           **WHEREAS**, the Planning Commission has considered the Addendum for the 2016 Minor Update (General Plan Amendment [GPA] 16-00020) with the 2015 Regional Transportation Plan/General Plan Updates (2015 RTP/GU) Final EIR prior to making a decision on the project; and

16  
17  
18           **WHEREAS**, having reviewed and considered all the information and evidence presented to it, including public testimony, staff reports and presentations, the Planning Commission recommends that the Board of Supervisors make required findings and adopt the 2016 Update.

19  
20           **NOW, THEREFORE, THE MONO COUNTY PLANNING COMMISSION HEREBY**  
21           **FINDS, RESOLVES, AND RECOMMENDS AS FOLLOWS:**

22           **SECTION ONE:** The Planning Commission finds that an Addendum to the 2015 RTP/GPU Final EIR has been prepared in compliance with CEQA and that the Addendum reflects the County's independent judgement and analysis. The Planning Commission further finds that the Addendum and Final EIR are adequate and complete for consideration by the Board of Supervisors in making a decision on the merits of the 2016 Update, and makes the following findings to recommend approval of changes in district designation classification as required by the General Plan (Chapter 48):

- 23  
24  
25  
26           A. *The proposed change in land use designation is consistent with the text and maps of this General Plan:* The proposed changes in land use designations provide a higher degree of consistency with the existing uses on the parcels, or recognize environmental or hazard constraints limiting land uses, and recognize that these parcels are currently not appropriate for residential use. Open Space and Public Facilities are more appropriate Land Use Designations.



- B. *The proposed change in land use designation is consistent with the goals and policies contained within any applicable area plan:* The proposed changes in land use designations are consistent with goals and policies of the Safety Element and the Antelope Valley Area Plan, and the Antelope Valley policies were recommended by the Antelope Valley Regional Planning Advisory Committee (RPAC).
- C. *The site of the proposed change in land use designation is suitable for any of the land uses permitted within that proposed land use designation:* The proposed changes are suitable for Open Space and Public Facilities based on existing uses on the parcels and/or identified hazard constraints, and the land uses identified in the Land Use Designation are appropriate.
- D. *The proposed change in land use designation is reasonable and beneficial at this time:* The proposed changes are reasonable and beneficial to provide public services and reduce potential impacts associated with safety hazards (i.e., flood); and
- E. *The proposed change in land use designation will not have a substantial adverse effect on surrounding properties:* The proposed change will not have a substantial adverse effect because these parcels are currently Open Space or currently being used as Public Facilities.

**SECTION TWO:** The Planning Commission recommends that the Board of Supervisors adopt the 2016 Minor Update (General Plan Amendment [GPA] 16-00020).

**PASSED AND ADOPTED** this 17<sup>TH</sup> day of November 2016, by the following vote:

AYES: Scott Bush, Roberta Lagomarsini, Chris Lizza, Mary Pipersky, Dan Roberts

NOES:

ABSENT:

ABSTAIN:

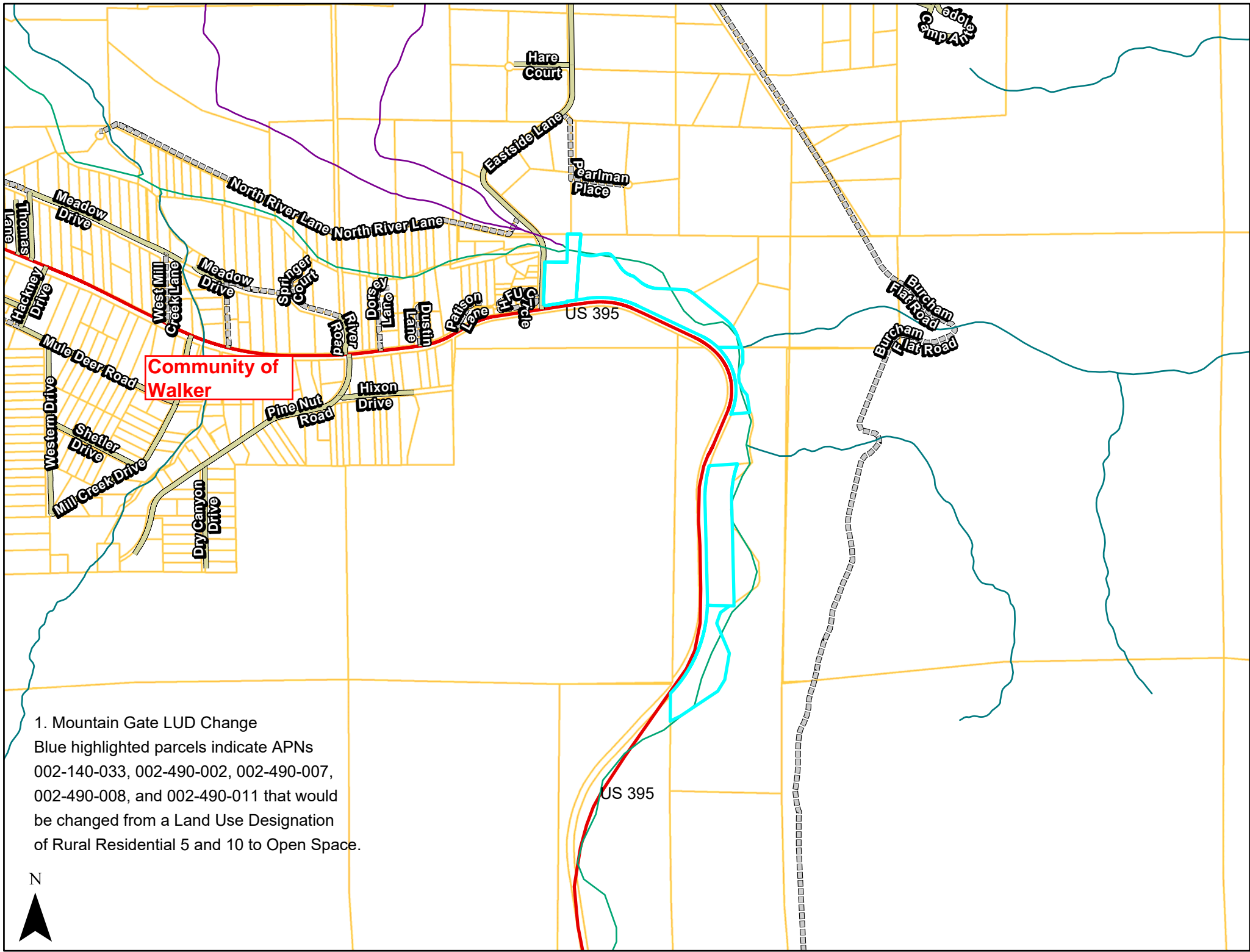
  
 \_\_\_\_\_  
 Chris I. Lizza, Chair

Attest:

  
 \_\_\_\_\_  
 CD Ritter, Commission Secretary

Approved as to form:

  
 \_\_\_\_\_  
 Christy Milovich, Assistant County Counsel



1. Mountain Gate LUD Change  
 Blue highlighted parcels indicate APNs  
 002-140-033, 002-490-002, 002-490-007,  
 002-490-008, and 002-490-011 that would  
 be changed from a Land Use Designation  
 of Rural Residential 5 and 10 to Open Space.

N





## 2. Walker Behavioral Health Property LUD Change

Blue highlighted parcel would change the Land Use Designation for the Walker Behavior Health property from Mixed Use 1-acre minimum to Public Facility.

The screenshot displays the PARCEL VIEWER 4.0 interface. The main map area shows an aerial view of a rural area with several roads and a parcel highlighted in blue. The highlighted parcel is located near Highway 395 and is bounded by Mule Deer Road to the south and Meadow Drive to the east. The data panel on the right provides the following information:

<b>107655 HWY 395</b> 002-361-012-000	
<a href="#">View or Print Value Notice</a>	
<b>Address</b>	107655 HWY 395
<b>Community</b>	Walker
<b>Complex</b>	Walker Mental Health
<b>Assessee Name</b>	COUNTY OF MONO
<b>Owner(s)</b>	COUNTY OF MONO P.O. BOX 495 BRIDGEPORT, CA 93517
<b>Legal Description</b>	29 8N 23E, 37
<b>Improvement Value</b>	\$0
<b>Land Value</b>	\$0
<b>Land Use Designation</b>	MU 1
<b>Division Type</b>	Lot
<b>Parcel Type</b>	Land Parcel
<b>Stated Area</b>	1
<b>Calculated Acres</b>	1.02
<b>Tax Rate Area</b>	051001
<b>Previous Assessment #</b>	000236112000000



### 3. Public Works Property LUD Change

Blue highlighted parcel would change the Land Use Designation for the Mono County Public Works Facility at West Walker River/North River Lane from Estate Residential to Public Facility.

The screenshot displays the Parcel Viewer 4.0 web application. The interface includes a top navigation bar with the title 'PARCEL VIEWER 4.0', a search bar, and a 'Parcel' dropdown menu. The main map area shows an aerial view of a rural area with several roads and parcels. A small parcel is highlighted in blue, indicating the subject of the LUD change. The map includes various controls like a 'Measure Tool' and a 'PLACES' dropdown. The right-hand side features a metadata panel for the selected parcel, providing detailed information about its location, ownership, and current land use designation.

135 Eastside Lane 002-310-056-000	
<a href="#">View or Print Value Notice</a>	
<b>Address</b>	135 Eastside Lane
<b>Community</b>	Walker
<b>Complex</b>	
<b>Assessee Name</b>	COUNTY OF MONO-ROAD DEPT. R-W
<b>Owner(s)</b>	EASTSIDE BRIDGE, R-W - REF. COUNTY OF MONO-ROAD DEPT. R-W @ EASTSIDE BRIDGE
<b>Legal Description</b>	RIGHT OF WAY AT EASTSIDE BRIDGE
<b>Improvement Value</b>	
<b>Land Value</b>	
<b>Land Use Designation</b>	Estate Residential (ER) <span style="color: blue;">?</span>
<b>Division Type</b>	Lot
<b>Parcel Type</b>	Land Parcel
<b>Stated Area</b>	Unknown
<b>Calculated Acres</b>	0.66
<b>Tax Rate Area</b>	051003
<b>Previous Assessment #</b>	000231056000000



## 4. Walker Tennis Courts LUD Changes

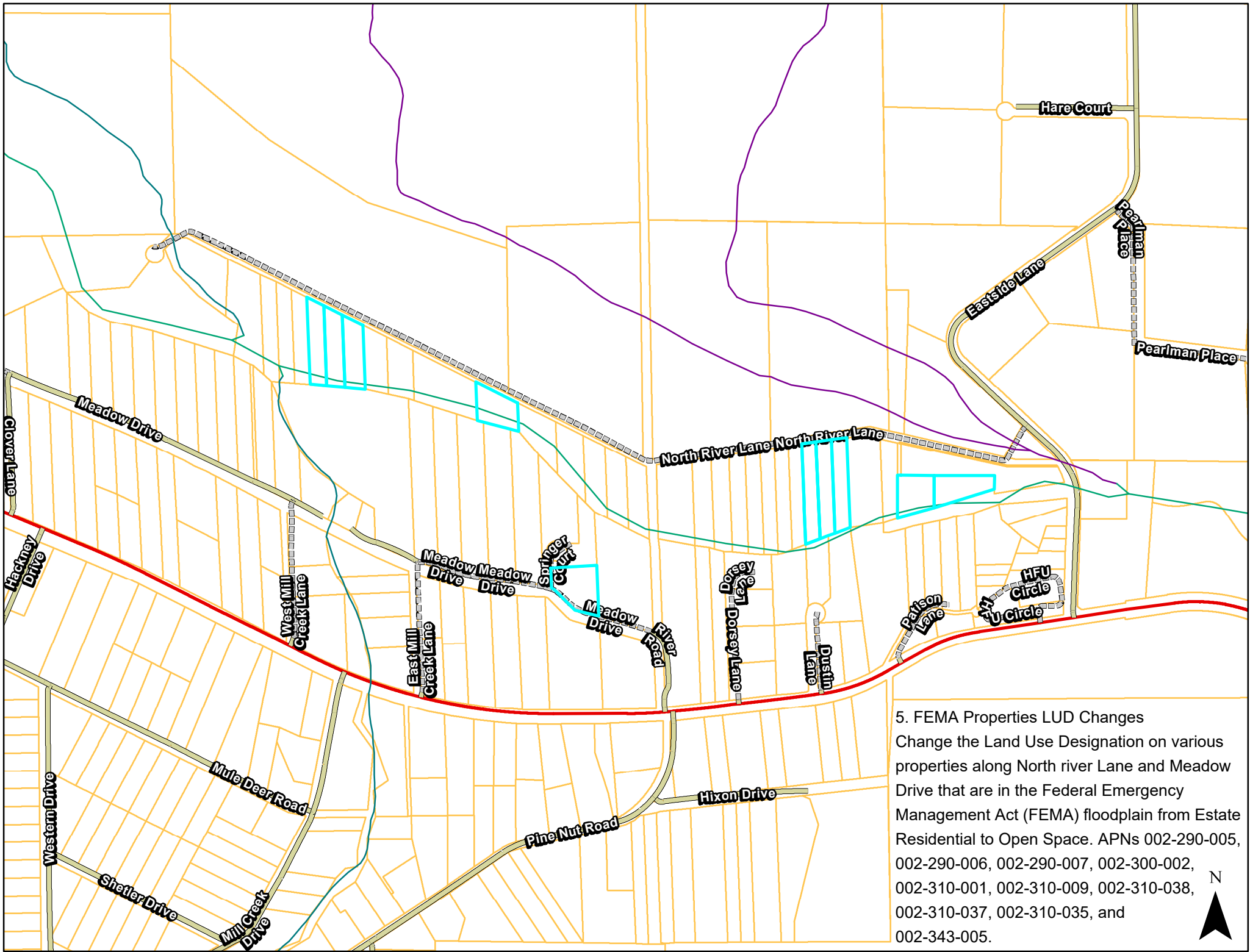
Blue highlighted parcel would change the Land Use Designation for the Walker tennis courts from Estate Residential to Public Facility.

**PARCEL VIEWER 4.0** | Map | Search | Results 2 | Parcel | Quick Search | wsugimura | Logout

**Walker**  
002-362-009-000  
and 002-362-008-000

[View or Print Value Notice](#)

<b>Address</b>	Walker
<b>Community</b>	Walker
<b>Complex</b>	
<b>Assessee Name</b>	COUNTY OF MONO ANT. VLY REC. CTR
<b>Owner(s)</b>	COUNTY OF MONO ANT. VLY REC. CTR MONO COUNTY DEPARTMENT OF PUBLIC WORKS PO BOX 457 BRIDGEPORT, CA 93517
<b>Legal Description</b>	MILL CREEK RANCH Y-9, ANTELOPE VALLEY RECREATION CENTER RS 31 52 RSBK4 PG65
<b>Improvement Value</b>	
<b>Land Value</b>	
<b>Land Use Designation</b>	Estate Residential (ER) ⓘ
<b>Division Type</b>	Lot
<b>Parcel Type</b>	Land Parcel
<b>Stated Area</b>	1.02
<b>Calculated Acres</b>	1.04
<b>Tax Rate Area</b>	051001
<b>Previous Assessment #</b>	000236209000000





## 6. Antelope Valley Fire State LUD Change

Blue highlighted parcel would change the Land Use Designation for the Antelope Valley Fire Station parcel from Agricultural 10 to Public Facilities.

**PARCEL VIEWER 4.0** | Map | Search | Results 2 | Parcel | Quick Search

wsugimura | Logout

PLACES | Measure Tool

1058 Larson Lane  
002-450-014-000

[View or Print Value Notice](#)

Address	1058 Larson Lane
Community	Walker
Complex	Praxis Fiber Optic Node Loc (Coleville)
Assessee Name	ANTELOPE VALLEY FIRE DIST.
Owner(s)	ANTELOPE VALLEY FIRE DIST. 1166 LARSON LANE COLEVILLE, CA 96107
Legal Description	A/P/O, S17,T8N,R23E, PARCEL B R/S 31-31 WAS 2-450-11 & 12
Improvement Value	\$0
Land Value	\$0
Land Use Designation	AG 10
Division Type	Lot
Parcel Type	Land Parcel
Stated Area	11
Calculated Acres	11.36
Tax Rate Area	051003
Previous Assessment #	000245014000000

## 7. Antelope Valley Area Policy Addition

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**Policy 4.B.2.** Preserve the agricultural lands and natural resource lands in the Antelope Valley.

**Action 4.B.2.a.** In accordance with the California Environmental Quality Act (CEQA), require the preparation of an Environmental Impact Report (EIR) for projects that may convert agricultural lands to other uses.

**Action 4.B.2.b.** Encourage agricultural land owners to utilize the property tax incentives for agricultural land provided for in the county Williamson Act program.

**Action 4.B.2.c.** Inform owners of critical wildlife habitat areas of the potential for open-space easements to protect such areas and of the potential for property tax adjustments.

**Action 4.B.2.c.** The RPAC endorses the use of FEMA/County properties on N. River Road and Meadow Lane as open space, without development of public improvements and facilities until 2041.

## 8. Amendment to “Chapter 48: Amendments”

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- B. The adoption of a resolution of initiation by the Commission; or
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## 9. Change side yard setback in Mixed Use LUD

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**Table 04.120: Minimum Yards**

LUD	Front	Rear	Side
SFR <1 acre	20'	10'	10'
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ER <1 acre	50'	10'	10'
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C	10'	5'	0'
SC	10'	5'	0'
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## 10. Amendment to Chapter 16: Accessory Dwelling Units

---

### Development Standards Chapter 16 – Accessory Dwelling Units

**Sections:**

**16.010 Intent.**

**16.020 Definition.**

**16.030 Applicable Land Use Designations.**

**16.040 General Provisions.**

**16.050 Standards for Accessory Dwelling Units.**

**16.010 Intent.**

The intent of this chapter is to allow for Accessory Dwelling Units in accordance with State law in order to provide additional affordable housing opportunities, including housing for the elderly in Mono County.

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Utilities that are installed for future expansion, such as stub outs that would allow a kitchen to be installed at a later date shall be considered as complete cooking facilities in accessory dwelling units. In units required by deed restriction, complete cooking facilities shall be installed resulting in a usable kitchen at final permit issuance, and interior access between attached units shall be no more than a single personnel door.

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- A. On parcels less than 7,500 sq. ft. in net area, an attached Accessory Dwelling Unit not exceeding 500 sq. ft. in size may be permitted with a building permit by application for a Director Review.
- B. On parcels of 7,500 sq. ft. up to 10,000 sq. ft. in net area, an attached Accessory Dwelling Unit not exceeding 640 sq. ft. in size is allowed with a building permit. A detached Accessory Dwelling Unit not exceeding 640 sq. ft. may be permitted by application for a Director Review.
- C. On parcels of 10,000 sq. ft. up to one acre in net area, an Accessory Dwelling Unit not exceeding 640 sq. ft. in size (attached or detached) is allowed with a building permit.
- D. On parcels one acre or greater, an Accessory Dwelling Unit not exceeding 640 sq. ft. in size (attached or detached) is allowed with a building permit. In this same parcel size range, an Accessory Dwelling Unit exceeding 640 sq. ft. but not exceeding 1,400 sq. ft. in size (attached or detached) may be permitted by application for a Director Review. In this same parcel size range, an Accessory Dwelling Unit exceeding 1,400 sq. ft. may be permitted by application for a use permit.
- E. Square footage of Accessory Dwelling Units shall be calculated based on the exterior dimensions of the unit. All interior living space shall count toward the total square footage of the unit.
- F. Consistent with Government Code §65852.2, ministerial reviews shall occur within 120 days after receiving an accessory dwelling unit application.

#### 16.050 Standards for New Accessory Dwelling Units.

- A. All construction shall conform to the height, setback, lot coverage, fees (including school impact fees and fire district fees), snow storage, and other development requirements applicable to residential construction in the land use designation in which the property is located.
- B. If a well and/or septic system is/are to be utilized, a clearance letter shall be obtained from the Environmental Health director and shall accompany the building permit application (or if applicable, the Director Review or Use Permit application). For Accessory Dwelling Units that are served by a public water and/or sewer system, a letter from the serving entity that indicates adequate service shall be submitted as part of the application.
- C. One of the units on the parcel (either the primary unit or the Accessory Dwelling Unit) must be owner occupied.
- D. If the Accessory Dwelling Unit is 640 sq. ft. or less in size, one off-street parking space must be provided for the Accessory Dwelling Unit in addition to parking required for the primary unit. If the Accessory Dwelling Unit is larger than 640 square feet, two parking spaces must be provided for the Accessory Dwelling Unit in addition to parking required for the primary unit, if it contains two or more bedrooms. Parking shall be in accordance with Chapter 06 of the Mono County Land Use Element, except that June Lake provisions of three parking spaces per unit shall apply only to the primary unit and not the Accessory Dwelling Unit unless the following instances exist, in which case, no parking standards shall be imposed:-
  - 1) The accessory dwelling unit is located within one-half mile of public transit.
  - 2) The accessory dwelling unit is located within an architecturally and historically significant district.
  - 3) The accessory dwelling unit is part of the existing primary residence or an existing accessory structure.
  - 4) When on-street parking permits are required but not offered to the occupant of the accessory dwelling unit.
  - 5) When there is a car-share vehicle located within one block of the accessory dwelling unit.
- E. Whether attached or detached, the Accessory Dwelling Unit shall be architecturally compatible with the primary residence. The Community Development Department shall determine the architectural compatibility of the structures and shall consider roofing, siding, trim, door and window frame colors; roofing, siding, trim, door, and window materials; roof slope and pitch; and wall articulation, roof line articulation, eaves, railings, chimneys, porches, and similar features; landscaping should also be considered in helping to make the units compatible. In addition, the Accessory Dwelling Unit shall be clearly subordinate to the primary unit in terms of size and placement on the property. If attached, the two units shall have the appearance of a single-family residence; the Accessory Dwelling Unit entrance shall be located on the side or rear of the building.
- F. Accessory dwelling units shall not be required to provide fire sprinklers if they are not required for the primary residence. Accessory dwelling unit utility connections and related fees shall comply with Government Code §65852.2.

G. No passageway shall be required in conjunction with the construction of an accessory dwelling unit. No setback shall be required for an existing garage that is converted to an accessory dwelling unit, and a setback of no more than five (5) feet from the side and rear lot lines shall be required for an accessory dwelling unit that is constructed above a garage.

**MONO COUNTY GENERAL PLAN LAND USE AMENDMENT**

**GENERAL PLAN EIR ADDENDUM #16-02 Part A**

**November 2016**

**Addendum to the  
Mono County General Plan  
Final Environmental Impact Report (FEIR)**

**SCH #2014061029**

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## **Executive Summary**

The County of Mono, as Lead Agency, determined that the 2015 *RTP/General Plan Update* is a ‘project’ as defined in the CEQA Guidelines, and requires the preparation of an EIR. In compliance with CEQA, this EIR has been prepared to analyze the potential environmental effects associated with implementation of the project. The EIR has been prepared to fully inform decision-makers in the county, responsible and trustee agencies, interested organizations and the general public of the potential environmental consequences associated with approval and implementation of the *2015 RTP/General Plan Update*. A detailed description of the proposed project, including the project setting, project components and characteristics, project objectives, discretionary actions, and how the EIR will be used, is provided in EIR §3.0 (Project Description).

The 2015 Update and repeal of the Conway Ranch Specific covered by the FEIR included a comprehensive update of the Mono County General Plan including appendices and Land Use redesignation for Conway Ranch; the Regional Transportation Plan (RTP) which also included the Regional Blueprint, Bicycle Transportation Plan, and Trails Plan as appendices; three elements of the Countywide Integrated Waste Management Plan (CIWMP); Noise Ordinance update; and repeal of the Conway Ranch Specific Plan. All project components cover the unincorporated areas, and the RTP and CIWMP also apply to the town of Mammoth Lakes to varying degrees. The RTP was updated through community-based efforts with Regional Planning Advisory Committees (RPACs) for the unincorporated area and language provided directly by the Town, and the CIWMP was vetted through the Solid Waste Task Force which includes town representatives. The General Plan and RTP update continue to focus growth in and adjacent to existing communities to avoid growth in environmentally sensitive areas and agricultural lands, and support sustainable, healthy, and livable communities.

The proposed 2016 update contained in the attached staff report covers minor changes to the General Plan as proposed by staff, the Antelope Valley Regional Planning Advisory Committee, and/or to comply with changes to state law.

This DEIR was provided to the Planning Commission last year prior to its adoption. If you need a copy or have questions, please contact Gerry Le Francois at [gfrancois@mono.ca.gov](mailto:gfrancois@mono.ca.gov) or 760.924.1810.

## **Addendum Determination**

Mono County has determined that an Addendum to the Final Environmental Impact Report is the appropriate level of environmental review under CEQA. An Addendum is appropriate because the analysis in Table 1 below demonstrates that none of the conditions described in CEQA Guideline Section 15162 have occurred.

CEQA Section 15164 (a) provides that “the lead agency or responsible agency shall prepare an addendum to a previously certified EIR if some changes or additions are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent EIR have occurred.” None of the conditions described in section 15162 have occurred.

Section 15162 provides for the preparation of a subsequent EIR where:

- (1) Substantial changes are proposed in the project, which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;
- (2) Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified effects;
- (3) New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete or the negative declaration was adopted, shows any of the following:
  - a. The project will have one or more significant effects not discussed in the previous EIR or negative declaration;
  - b. Significant effects previously examined will be substantially more severe than shown in the previous EIR;
  - c. Mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the measure or alternative; or
  - d. Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment but the project proponent declines to adopt the mitigation measure or alternative.

**Table 1: Review of findings under CEQA Guidelines Section 15162**

<p><b>Summary and Location of the Proposed Specific Plan Change</b></p>	<p><b>CEQA guidelines section 15162 Analysis</b></p>
<p>Item 1: Change the Land Use Designation (LUD) of the former Mountain Gate property from Rural Residential (RR) 5 &amp; 10 to Open Space (OS). The affected APNs 002-140-033, 002-490-002, -007, -008, -010 &amp; -011 are owned by Mono County.</p>	<p>These parcels have been acquired by Mono County either through purchase or from the Federal Emergency Management Agency (FEMA). These parcels are within the Walker River floodplain, have deed restrictions related to future development, and/or residential uses are no longer appropriate for these properties.</p> <p>These changes are not substantive under CEQA section 15162 analysis.</p>
<p>Item 2: Change the LUD for Walker Behavioral Health property from Mixed Use 1-acre minimum to Public Facility (PF). The APN is 002-361-012 and is owned by Mono County.</p>	<p>This parcel is being used as a public building for government purposes. A Public Facility land use designation is the appropriate land use.</p> <p>These changes are not substantive under CEQA section 15162 analysis.</p>
<p>Item 3: Change the LUD for Public Works property at the West Walker River and North River Lane from Estate Residential (ER) to Public Facility (PF). The APN is 002-310-056 and is Owned by Mono County.</p>	<p>This parcel is being used for public purposes (parking area and mailboxes). A Public Facility land use designation is the appropriate land use instead of residential.</p> <p>These changes are not substantive under CEQA section 15162 analysis.</p>
<p>Item 4: Change the LUD of the Walker tennis courts from Estate Residential to Public Facility. The APNs are 002-362-008 &amp; -009.</p>	<p>These parcels are being used for public purposes (parking area and mailboxes). A Public Facility land use designation is the appropriate land use instead of residential.</p> <p>These changes are not substantive under CEQA section 15162 analysis.</p>



<p>Item 5: Change LUD on the various FEMA properties along North River Lane and Meadow Drive from Estate Residential (ER) to Open Space (OS). The APNs are 002-290-005, -006, -007, 002-300-002, 002-310-001, -009, -038, -037, -035, and 002-343-005.</p>	<p>These parcels have been acquired by Mono County either through purchase or from the Federal Emergency Management Agency (FEMA). These parcels are within the Walker River floodplain, have deed restrictions related to future development, and/or residential uses are no longer appropriate for these properties.</p> <p>These changes are not substantive under CEQA section 15162 analysis.</p>
<p>Item 6: Change the LUD on APN 002-450-014 Antelope Valley Fire Station from Agricultural 10 (AG10) to Public Facilities (PF).</p>	<p>This parcel is being used for public purposes (Antelope Valley Fire Station, Digital 395 node, etc.). A Public Facility land use designation is the appropriate land use. A fire station has occupied this site since 2008.</p> <p>These changes are not substantive under CEQA section 15162 analysis.</p>
<p>Item 7: Add a policy to the Land Use Element, Antelope Valley Plan: The RPAC endorses the use of FEMA/County properties on N. River Road and Meadow Lane as open space, without development of public improvements and facilities until 2041.</p>	<p>This policy change is related to various parcels acquired by Mono County either through purchase or from the Federal Emergency Management Agency (FEMA). These parcels are within the Walker River floodplain, have deed restrictions related to future development, and/or residential uses are no longer appropriate for these properties.</p> <p>These changes are not substantive under CEQA section 15162 analysis.</p>
<p>Item 8: Amend Chapter 48 Amendments as it relates to Initiation of a General Plan Amendment:  General Plan amendments addressing matters applicable throughout the county and/or not directly associated with specific parcels of land may</p>	<p>This addition clarifies General Plan amendments that might have countywide impacts must be initiated by the Planning Commission or Board of Supervisors.</p> <p>These changes are not substantive under CEQA section 15162 analysis.</p>

<p>be initiated by the Planning Commission or Board of Supervisors.</p>	
<p>Item 9: Change the side yard setback in the Mixed Use and use designation and Table 04.120 for residential uses from 0 feet to 10 feet.</p>	<p>This addition clarifies and make consistent the 10 foot side yard setback with other residential land use designations.</p> <p>These changes are not substantive under CEQA section 15162 analysis.</p>
<p>Item 10: Amend Chapter 16 Assessorly Units to comply with recent legislation (AB 2200 and SB 1069) effective Jan. 1, 2017.</p>	<p>This amendment to Chapter 16 ensures consistency with AB 2200 and SB 1069.</p> <p>These changes are not substantive under CEQA section 15162 analysis.</p>



**RESOLUTION R16-02**

**A RESOLUTION OF THE MONO COUNTY PLANNING COMMISSION  
INITIATING AND RECOMMENDING THAT THE BOARD OF SUPERVISORS  
CERTIFY AN ADDENDUM TO FINAL EIR FOR MONO COUNTY GENERAL PLAN  
AND ADOPT PROPOSED AMENDMENT TO LAND USE ELEMENT CH. 25 – TRANSIENT  
RENTAL OVERLAY DISTRICT, GENERAL PLAN AMENDMENT (GPA) 16-02**

**WHEREAS**, at public hearings before the Planning Commission and Board of Supervisors held Nov. 12 and Dec. 8, 2015, respectively, various community members expressed concerns related to the creation of Transient Rental Overlay Districts (TRODs) within the county; and

**WHEREAS**, the Board of Supervisors and Planning Commission held a joint workshop on Feb. 11, 2016, and heard additional information and detail regarding community concerns; and

**WHEREAS**, in response to the joint workshop, the Board of Supervisors later enacted an interim moratorium suspending TROD processing until March 2, 2017, to provide time to develop recommendations for possible modification; and

**WHEREAS**, the Planning Commission held three workshops in the spring of 2016, and the resulting revised Chapter 25 was presented to the Board of Supervisors in July 2016, at which time additional feedback was given; and

**WHEREAS**, the revised chapter was reviewed by the Bridgeport, Mono Basin, Antelope Valley, and Long Valley Regional Advisory Committees (RPACs), all of which supported moving forward without any additional changes; and

**WHEREAS**, the June Lake Citizens Advisory Committee (CAC) raised various concerns and recommended that language of Chapter 25 be revised to allow transient rentals only if consistent with applicable area plans, and a separate planning effort, which integrates a proposal by Supervisor Johnston, is under way to revise the June Lake Area Plan in response; and

**WHEREAS**, on Dec. 15, 2016, the Planning Commission has considered the Addendum and held a duly-noticed public hearing regarding GPA 16-02 and the Addendum prior to making a decision on the project; and

**WHEREAS**, having reviewed and considered all the information and evidence presented to it, including public testimony, staff reports and presentations, the Planning Commission recommends that the Board of Supervisors make required findings and adopt GPA 16-02 amending language in the Land Use Element, Chapter 25 – Transient Rental Overlay District.

**NOW, THEREFORE, THE MONO COUNTY PLANNING COMMISSION HEREBY  
FINDS, RESOLVES, AND RECOMMENDS AS FOLLOWS:**

1 **SECTION ONE:** The Planning Commission finds that an Addendum to the 2015 RTP/GPU Final  
2 EIR has been prepared in compliance with CEQA and that the Addendum reflects the County's  
3 independent judgment and analysis. The Planning Commission further finds that the Addendum and  
4 Final EIR are adequate and complete for consideration by the Board of Supervisors in making a  
5 decision on the merits of amendments to the Land Use Element, Chapter 25 – Transient Rental  
6 Overlay District, GPA 16-02 (**Exhibit A**).

7 **SECTION TWO:** The Planning Commission finds the proposed changes to the text are consistent  
8 with this General Plan as well as any applicable area plans.

9 **SECTION THREE:** The Planning Commission recommends that the Board of Supervisors adopt  
10 GPA 16-02.

11 **PASSED AND ADOPTED** this 15<sup>TH</sup> day of December 2016, by the following vote:

12 AYES: Scott Bush, Roberta Lagomarsini, Dan Roberts

13 NOES: Chris Lizza, Mary Pipersky

14 ABSENT:

15 ABSTAIN:

16 \_\_\_\_\_  
Chris Lizza, Chair

17 Attest:

Approved as to form:

18   
19 \_\_\_\_\_  
CD Ritter, Commission Secretary

20 \_\_\_\_\_  
Christy Milovich, Assistant County Counsel

## DEVELOPMENT STANDARDS

### CHAPTER 25 – ~~TRANSIENT~~ SHORT-TERM RENTALS

#### Sections:

25.010	Intent.
25.020	Establishment of Type I <del>Vacation</del> <u>Short-Term</u> Rental: Owner-Occupied.
25.030	Establishment of Type II <del>Vacation</del> <u>Short-Term</u> Rental: Not Owner-Occupied.
25.040	Notice requirements.
25.050	Uses permitted.
25.060	Uses permitted subject to director review
25.070	Uses permitted subject to use permit
25.080	Additional requirements

#### 25.010 Intent.

In recognition of the demand by visitors for diverse lodging options, this chapter is intended to establish a process to permit short-term transient rentals within residential areas that do not exhibit reasonable opposition by neighbors who may be directly affected, and when consistent with applicable Area Plan policies.<sup>1</sup> ~~and that are consistent with the applicable Area Plan\*.~~

#### 25.020 Establishment of Type I ~~Vacation~~ Short-Term Rental: Owner-Occupied

Type I ~~short-term vacation~~ rentals are owner-occupied or associated with an owner-occupied principal residence. This rental includes ~~rental of~~ an entire dwelling unit or, if only part of the unit, includes at a minimum a sleeping room (with shared full bathroom). Rental is limited to a single party of individuals, and the owner is required to be present during the rental. The ~~transient~~short-term rental use may be permitted on any residential parcel ~~and~~ having land use designation(s) of SFR, ER, RR, MFR-L or RMH subject to uUse pPermit, if consistent with applicable Area Plan policies.<sup>1</sup> ~~if not prohibited by the applicable Area Plan.~~ Fees for appeal of Type I uUse pPermit decisions shall be waived.

#### 25.030 Establishment of Type II ~~Short-Term Vacation~~ Short-Term Rental: Not Owner-Occupied

Type II ~~vacation~~short-term rentals include rental of an entire dwelling unit that is not concurrently occupied by the owner or on the same parcel as a principal residence concurrently occupied by the owner. The ~~short-term transient~~ rental use may be overlaid established on any residential parcel, or group of parcels, meeting the requirements of 25.060, and having land use designation(s) of SFR, ER, RR, MFR-L or RMH. ~~The short-term rental must be consistent with applicable Area Plan policies.~~<sup>1</sup> ~~if not prohibited by the applicable~~

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<sup>1</sup> The June Lake Area Plan will be revised shortly after the adoption of this chapter to identify appropriate areas for short-term rentals. Until the Area Plan revision is complete, no short-term rental applications shall be processed for June Lake. After Area Plan revision, applications can be accepted and evaluated for consistency with June Lake Area Plan policies per 25.010, 25.020, and 25.030.\* ~~The June Lake Area Plan is presently under revision to determine areas appropriate for single family neighborhood transient rentals. The June Lake Citizens Advisory Committee (JLCAC) recommends that no transient rental overlay applications be processed for June Lake until the Area Plan revision is concluded.~~

~~Area Plan, where must exhibit~~ no reasonable opposition from neighbors within 500 ~~feet,~~ of the subject parcel ~~can be demonstrated,~~ and ~~that has~~ must have adequate year-round access.

In addition to the requirements of this chapter, initiation and application for a ~~transient Type II short-term~~ rental shall be processed in the same manner as any land use redesignation (see Ch. 48, Amendments I. General Plan Map/Land Use Designation Amendments). The land use designation followed by the letters STR (e.g., SFR-STR) would indicate a ~~transient~~Type II short-term rental is permitted.

#### **25.040 Notice requirements.**

- A. Notice shall be given to owners of surrounding properties and published ~~once~~ in a newspaper of general circulation 30 days in advance of a public hearing.
- B. "Surrounding property," for the purposes of this planning permit, shall be defined as those properties that fall within a 500-foot radius drawn from the nearest limits of the parcel that is subject of the land use application. If a property is located more than 500 feet from the boundary of the parcel, but may be directly affected by any land use application on the subject parcel, then that property owner may also be noticed. Further, any property owners, regardless of their location or proximity to the parcel subject to a land use application, may receive notice as long as they submit their request in writing to the Planning Division more than 10 days in advance of the hearing. Such notice shall be given to those properties at least 20 days in advance of the hearing by mail to all persons whose names and addresses appear on the latest adopted tax roll of the County.

#### **25.050 Uses permitted.**

The following uses shall be permitted with a ~~transient~~short-term rental approval, plus such other uses as the commission finds to be similar and not more obnoxious or detrimental to the public safety, health and welfare:

- A. All uses permitted in the underlying land use designation.
- B. Where the principal use of the subject parcel(s) is single-family or multi-family residential, the residence or any accessory dwelling unit on the parcel(s), may be rented on a ~~transient~~short-term basis subject to the requirements of 25.070.

#### **25.060 Uses permitted subject to director review.**

All uses permitted subject to director review in the underlying land use designation with which the ~~transient~~short-term rental ~~overlay district~~ is combined shall be permitted, subject to director review approval.

#### **25.070 Uses permitted subject to use permit.**

All uses permitted subject to use permit in the underlying land use designation with which the ~~transient~~short-term rental ~~overlay district~~ is combined shall be permitted, subject to ~~securing a~~ use permit approval.

#### **25.080 Additional requirements.**

Any person or entity that leases, rents, or otherwise makes available for compensation, a single-family or multi-family residence located within an approved ~~transient~~short-term rental established by this chapter, for a period of less than ~~thirty~~ (30) days, must first obtain a

vacation home rental permit and comply with all applicable requirements of that permit, as set forth in Chapter 26, Transient Rental Standards and Enforcement.

Parcels located within conditional development zones (avalanche) shall not be allowed ~~transient~~short-term rentals during the avalanche season, November 1 through April 15.

**Mono County General Plan Land Use Amendment  
GENERAL PLAN EIR ADDENDUM#16-02 Part B  
December 15, 2016**

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**INTRODUCTION AND DISCUSSION OF PROPOSED MODIFICATIONS**

Mono County is proposing to amend the Mono County General Plan Land Use Element, Chapter 25, concerning transient rentals in single-family residential areas. The changes include establishing a process to permit transient rentals in residential areas if specific proposals are compatible with applicable area plans, extending noticing requirements for public hearings to 30 days, defining Type I rentals as owner-occupied properties and setting Use Permit Process for approval, defining Type II rentals as vacant properties with off-site management and setting a General Plan Amendment process for approval, requiring Vacation Home Rental Permits (Ch. 26) for both Type I and Type II rentals, eliminating solicitation of multi-parcel applications or setup of districts, focusing on standard for approval as lack of reasonable opposition by neighbors directly affected rather than neighborhood support, and clarifying the term "neighbor."

The process to permit transient or nightly rentals in single-family residential areas continues to require two separate actions by the county: 1) an application to the county for a Use Permit for Type I rentals or a General Plan Amendment for Type II rentals, and 2) compliance with a vacation home rental permit as set forth in Chapter 26, Transient Rental Standards and Enforcement. Approval of these actions would allow the rental of single-family home(s) on a transient or nightly basis, in accordance with the terms of the approvals.

**ENVIRONMENTAL REVIEW AND CEQA PROVISIONS FOR PREPARATION OF AN ADDENDUM TO A FINAL EIR**

In 2015, Mono County certified an Environmental Impact Report (EIR) for the Regional Transportation Plan/General Plan Update (SCH #2014061029). The General Plan EIR analyzed the impacts of designating areas of the County as SFR, ER, RR, or RMH based on a "practical buildout" scenario that is based on a simplified analysis of selected known constraints (hazards, infrastructure and agricultural preservation), and concluded "no impact" on induced population growth in an area, either directly or indirectly (EIR §4.12(a)). As discussed below, an addendum to the General Plan EIR is the appropriate level of environmental review for the proposed amendments, because none of the conditions set forth in CEQA Guidelines section 15162 exist.

The California Environmental Quality Act (CEQA §15164[a]) states:

*"(a) The lead agency or a responsible agency shall prepare an addendum to a previously certified EIR if some changes or additions are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent EIR have occurred."*

In turn, §15162 states that preparation of a subsequent EIR is required where one or more of the following occurs:

*"(a) When an EIR has been certified or a negative declaration adopted for a project, no subsequent EIR shall be prepared for that project unless the lead agency determines, on the basis of substantial evidence in the light of the whole record, one or more of the following:*

*(1) Substantial changes are proposed in the project which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant*



*environmental effects or a substantial increase in the severity of previously identified significant effects;*

*(2) Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; or*

*(3) New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete shows any of the following:*

*(A) the project will have one or more significant effects not discussed in the previous EIR or negative declaration;*

*(B) significant effects previously examined will be substantially more severe than shown in the previous EIR;*

*(C) mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or*

*(D) mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative."*

## **DISCUSSION OF IMPACTS**

The current General Plan contains an existing policy allowing for transient rentals in certain existing single family areas (Chapter 25), and provides for the regulation of these properties through Chapter 26, Transient Rental Standards & Enforcement. Chapter 26 remains the same and is not being modified. The proposed Chapter 25 language amendments (Chapter 25 Amendments) do not require major revisions to the General Plan EIR because they do not involve new significant environmental effects or a substantial increase in the severity of previously identified significant effects; there are no substantial changes with respect to the circumstances under which the project is undertaken; and there is no new information of substantial importance, which was not known and could not have been known with the exercise of due diligence at the time the previous EIR was certified as complete which shows any of the following listed above under headings (3) (A) through (3) (D), for the following reasons:

1. The Chapter 25 Amendments will not have a significant effect on the environment nor increase the severity of previously identified significant effects. Transient rentals are currently allowed in the existing 2015 General Plan through Chapter 25, and the 2015 RTP/GPU EIR concluded "no impact" for substantial induced population growth in an area, either directly or indirectly (see EIR §4.12(a)). The Chapter 25 Amendments potentially reduce the intensity of existing policy by eliminating the solicitation of districts and allowing for an owner-occupied rental type (Type I), which are anticipated to accommodate smaller parties as only accessory dwelling units or a limited portion of an existing and occupied single-family residence are available for rent. The other changes are related to the process, such as 30-day noticing and the standard for approval, and do not have environmental impacts.
2. The Chapter 25 Amendments do not change the underlying property use. Single-family homes that are now used seasonally or periodically by the owner, or are rented on a long-term basis, will still be used as single-family homes and in a manner that is not substantially different from how they would be used if they were occupied by full time

residents or long-term renters. In addition, transient rentals will continue to be subject to compliance with regulations governing the management of these units stipulated in Chapter 26. These existing regulations remain the same as the currently adopted 2015 RTP/GPU (Chapter 26) and as analyzed in the EIR, and address aesthetics, noise, parking, utilities, or other similar issues. Accordingly, the impacts of the proposed project would not be increased beyond those analyzed in the 2015 RTP/GPU EIR.

## **CONCLUSION**

*CEQA Sections 15164(c) through 15164(e) states, "An Addendum need not be circulated for public review but can be included in or attached to the final EIR or adopted negative declaration. The decision-making body shall consider the addendum with the final EIR or adopted negative declaration prior to making a decision on the project. A brief explanation of the decision not to prepare a subsequent EIR pursuant to §15162 shall be included in an addendum to an EIR, the lead agency's findings on the project, or elsewhere in the record. The explanation must be supported by substantial evidence."*

The information presented above indicates that the proposed General Plan Amendment does not represent a substantive change to the number of significant effects, severity of effects, or the feasibility and or effectiveness of applicable mitigation measures or alternatives previously addressed in the 2015 RTP/GPU EIR. Therefore, a subsequent EIR is not required because none of the conditions set forth in CEQA Guidelines section 15162 exist for this project.

MONO COUNTY  
PLANNING COMMISSION

---

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## TRANSIENT RENTALS

### RESOURCE MATERIALS

#### POLICIES & REGULATIONS

- General Plan Land Use Amendment 12-001 (December 2012)
  - [Ch. 25: Transient Rental Overlay District \(TROD\)](#)
  - [Ch. 26: Transient Rental Standards & Enforcement](#)

#### TRANSIENT RENTAL MEETINGS IN SEQUENCE

##### April 11, 2013: Planning Commission

- Agenda packet <http://monocounty.ca.gov/sites/default/files/pcagendapkt04.11.13.pdf>
  - R13-02: Virginia Lakes/Ragland (APNs 019-051-008, -009 & -010)
    - Comment letters on R13-02
  - R13-03: June Lake/Double Eagle Resort (APNs 016-094-007, -008, -009 & 016-098-015)
- Minutes <http://monocounty.ca.gov/sites/default/files/pcadoptedminutes04.11.13.pdf>

##### September 12, 2013: Planning Commission

- Agenda packet [http://www.monocounty.ca.gov/sites/default/files/pc\\_agenda\\_pkt\\_09.12.13.pdf](http://www.monocounty.ca.gov/sites/default/files/pc_agenda_pkt_09.12.13.pdf)
  - R13-05: Lundy Canyon/Kibbee (APN 019-140-011)
  - R13-06: June Lake/Anderson (APNs 016-096-005 & 016-098-011)
- Minutes <http://www.monocounty.ca.gov/sites/default/files/pcadoptedminutes09.12.13.pdf>

##### November 14, 2013: Planning Commission

- Agenda packet <http://www.monocounty.ca.gov/sites/default/files/pcagendapkt.14.130.pdf>
  - R13-07: June Lake/Boulder Drive (APNs 015-140-035, -034, -033, -032)
- Minutes <http://www.monocounty.ca.gov/sites/default/files/pcadoptedminutes11.14.13.pdf>

##### October 9, 2014: Planning Commission

- Agenda packet <http://monocounty.ca.gov/sites/default/files/pcagendapkt10.09.14.pdf>
  - R14-07: Rosas Chalet, June Lake
    - Comment letters on R14-07
  - R14-08: Victory Lodge, June Lake
    - Comment letters on R14-08
- Minutes [http://monocounty.ca.gov/sites/default/files/pc\\_adopted\\_minutes\\_10.09.14.pdf](http://monocounty.ca.gov/sites/default/files/pc_adopted_minutes_10.09.14.pdf)

##### May 14, 2015: Planning Commission

- Agenda packet [http://monocounty.ca.gov/sites/default/files/pc\\_agenda\\_pkt\\_05.14.15.pdf](http://monocounty.ca.gov/sites/default/files/pc_agenda_pkt_05.14.15.pdf)
  - R15-02: Hackamore Place, Twin Lakes Bridgeport/Farias
    - Hackamore Place rental plan
    - Bridgeport FPD letter
  - R15-03: June Lake /Shear
    - Mountain View operations plan

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DISTRICT #1  
Mary Pipersky

DISTRICT #2  
Roberta Lagomarsini

DISTRICT #3  
Daniel Roberts

DISTRICT #4  
Scott Bush

DISTRICT #5  
Chris I. Lizza

- Resident petition in opposition
- Comment letters on R15-02 & R15-03
- Comment letters after agenda packet was released  
<http://monocounty.ca.gov/sites/default/files/finalcommentsafterpacket05.14.15.pdf>
- Minutes [http://monocounty.ca.gov/sites/default/files/pc adopted minutes 05.14.15.pdf](http://monocounty.ca.gov/sites/default/files/pc%20adopted%20minutes%2005.14.15.pdf)

**November 12, 2015: Planning Commission**

- Agenda packet [http://monocounty.ca.gov/sites/default/files/pc agenda\\_pkt 11.12.15.pdf](http://monocounty.ca.gov/sites/default/files/pc_agenda_pkt_11.12.15.pdf)
  - R15-04: June Lake TROD (four-parcel proposal reduced to two)
  - All comment letters
- Minutes <http://monocounty.ca.gov/sites/default/files/pcadoptedminutes11.12.15.pdf>

**February 11, 2016: BOS/Planning Commission joint workshop on status of TRODs**

- Agenda packet <http://monocounty.ca.gov/sites/default/files/pcagendapkt.11.160.pdf>
  - TROD PowerPoint/Weiche
  - FAQ on transient rental process
  - Comment letters in favor
- Minutes <http://monocounty.ca.gov/sites/default/files/pcadoptedminutes02.11.16.pdf> NOTE: BOS directed Planning Commission & staff to resolve transient rental issues & present recommendation to BOS (*see July 12, 2016, meeting below*)

**March 8, 2016: BOS Moratorium on TRODs ORD16-02**

[file:///C:/Users/cd/Downloads/Mono Ordinance \(2\)%20\(1\).pdf](file:///C:/Users/cd/Downloads/Mono%20Ordinance%20(2)%20(1).pdf)

**March 10, 2016: Planning Commission**

- Agenda packet [http://monocounty.ca.gov/sites/default/files/pc agenda\\_pkt.10.16\\_0.pdf](http://monocounty.ca.gov/sites/default/files/pc_agenda_pkt.10.16_0.pdf)
  - "Could You Bnb My Neighbor?"
  - 2010 Census housing tenure
  - TROD PowerPoint/Weiche
  - Resident correspondence
- Minutes <http://monocounty.ca.gov/sites/default/files/pcadoptedminutes03.10.16.pdf>

**April 19, 2016: BOS moratorium on transient rentals extended to March 2, 2017**

[file:///C:/Users/cd/Downloads/STAFFREPORT\(4.19.16\)%20\(4\).pdf](file:///C:/Users/cd/Downloads/STAFFREPORT(4.19.16)%20(4).pdf)

**May 12, 2016: Planning Commission**

- Agenda packet <http://monocounty.ca.gov/sites/default/files/pcagendapkt05.12.16.pdf>
  - Ch. 25 existing
  - Ch. 25 discussion draft
- Minutes [http://monocounty.ca.gov/sites/default/files/pc adopted minutes.12.16\\_0.pdf](http://monocounty.ca.gov/sites/default/files/pc_adopted_minutes.12.16_0.pdf)

**June 9, 2016: Planning Commission**

- Agenda packet [http://monocounty.ca.gov/sites/default/files/pc agenda\\_pkt 06.09.16.pdf](http://monocounty.ca.gov/sites/default/files/pc_agenda_pkt_06.09.16.pdf)
  - Ch. 25 discussion draft with edits
- Minutes (*to be adopted 08.11.16*)

**July 12, 2016: Board of Supervisors**

- Workshop on Planning Commission's recommended revisions to General Plan Ch. 25 concerning transient rental of single-family homes  
[http://monocounty.ca.gov/sites/default/files/fileattachments/planning\\_division/page/5439/page 4 from 07 jul 12 2016.pdf](http://monocounty.ca.gov/sites/default/files/fileattachments/planning_division/page/5439/page_4_from_07_jul_12_2016.pdf)
  - Staff report + revised Ch. 25  
[http://monocounty.ca.gov/sites/default/files/staff report ch. 25 07.12.16.pdf](http://monocounty.ca.gov/sites/default/files/staff_report_ch._25_07.12.16.pdf)

- Minute Order M16-150  
<http://monocounty.ca.gov/sites/default/files/m16-15007.12.16.pdf>

#### **October 4, 2016: Board of Supervisors**

- Agenda  
[http://monocounty.ca.gov/sites/default/files/fileattachments/board\\_of\\_supervisors/calendar\\_event/4712/10\\_oct\\_04\\_2016\\_agenda\\_only.pdf](http://monocounty.ca.gov/sites/default/files/fileattachments/board_of_supervisors/calendar_event/4712/10_oct_04_2016_agenda_only.pdf)
- Agenda packet  
<https://agenda.mono.ca.gov/agendapublic/CoverSheet.aspx?ItemID=8278&MeetingID=486>

#### **RPAC/CAC review of PC Ch. 25 revisions July 13 to December 6, 2016**

- **August 2: June Lake CAC**  
[Agenda](#)  
[Minutes](#)
- **August 10: Mono Basin RPAC**  
[Agenda](#)  
[Minutes](#)
- **August 18: Bridgeport Valley RPAC**  
[Agenda](#)
- **September 1: Antelope Valley RPAC**  
[Agenda](#)
- **September 6: June Lake CAC**  
[Agenda](#)
- **December 6, 2016: June Lake CAC**  
[Agenda](#)  
[Nightly rental work plan](#)

#### **Comments received since Oct. 4 BOS**

#### **December 15, 2016: Planning Commission**

- [Agenda](#)
- [Minutes](#)
- Ch. 25 proposed amendment  
[http://monocounty.ca.gov/sites/default/files/ch\\_25\\_cac\\_changes.29.16\\_0.pdf](http://monocounty.ca.gov/sites/default/files/ch_25_cac_changes.29.16_0.pdf)
- [Supervisor Johnston's comments/proposal](#)
- Planning Commission action: Recommend that BOS adopt General Plan Amendment 16-02 that revises General Plan Land Use Element Ch. 25 concerning transient rentals, rename Ch. 25 as "Short-Term Rentals," accept addendum to General Plan EIR, find that proposed amendment is consistent with the county General Plan and applicable area plans, and exclude June Lake till its area plan revision is concluded. (*Bush/Lagomarsini. Ayes: 3. Noes: 2.*)

## **SUMMARY OF ACTIONS**

### **TRANSIENT RENTALS RECOMMENDED FOR BOS APPROVAL (7)**

- June Lake/Double Eagle Resort
- Lundy Canyon/Kibbee
- June Lake/Anderson
- June Lake/Boulder Drive
- June Lake/Rosas Chalet
- June Lake/Victory Lodge
- June Lake/122 & 139 Nevada St. out of four proposed

### **TRANSIENT RENTAL RECOMMENDED FOR BOS DENIAL (1)**

- June Lake/Mountain View/Shear

### **TRANSIENT RENTAL APPLICATIONS WITHDRAWN (3)**

- Virginia Lakes/Ragland
- Twin Lakes/Bridgeport: Hackamore Place/Farias
- June Lake/Nevada Street (two of original six parcels by same owner)

**TRANSIENT RENTALS APPROVED (6)**

- June Lake/Double Eagle Resort
- Lundy Canyon/Kibbee
- June Lake/Anderson
- June Lake/Boulder Drive
- June Lake/Rosas Chalet
- June Lake/Victory Lodge

**TRANSIENT RENTALS DENIED (2)**

- June Lake/Mountain View/Shear
- June Lake/122 & 139 Nevada St.

## K cf\_ Dfc[ fUa - June Lake Nightly Rental Issue

Based on June Lake CAC Discussion 11.01.16

### **BASIS**

1. **Purpose:** Conduct a community conversation to update June Lake Area Plan policies to address nightly rentals in residential areas.
2. **Need:** The initial reasons for providing the Transient Rental Overlay District (TROD) may have been different; however, the current reality is that nightly rentals are a common issue in resort communities and are not going away. The current process has limitations and an alternate mechanism is desired by the community.
3. **Principles:**
  - a. Adequate opportunity to express opinions and provide input must be available to all community members, and community members should feel like their input was heard and considered (with the recognition that not every individual will "get what they want").
  - b. We will develop consensus and agreement to the best of our ability, and a sense that the decision is made in the best interests of the community as a whole. There is recognition and understanding that 100% agreement is unrealistic, but we will strive for something most people "can live with."
  - c. Community involvement, engagement, and participation is critical, and we will seek to achieve as much as we can.
  - d. Finality and certainty is needed – finality in that a decision will be made and we do not need to continue revisiting this conversation regularly, and certainty for homeowners about the status of nightly rentals for their property.

### **INTEGRATION OF SUPERVISOR JOHNSTON'S PROPOSAL**

Supervisor Johnston's proposal essentially contains three components:

1. Map "neighborhoods" in the June Lake area. Staff initially identifies the neighborhoods, then the community provides comment.
2. Identify neighborhoods where nightly rentals are viable and acceptable, and neighborhoods where they aren't. Staff initially determines which neighborhoods are not viable based on technical issues, then the community provides comment.
3. Take these neighborhood proposals to a vote of the community. An 80% approval rating is proposed. Amend the General Plan with a new Land Use Designation that allows for nightly rentals for those neighborhoods with voter approval.

These components are integrated into the work plan that follows. Based on the principles identified by the CAC and community, community-based planning is relied upon to develop consensus about defining neighborhoods and acceptable locations for nightly rentals. The final decision mechanism – whether a vote or some other mechanism is used – is undetermined at this point. However, since the outcome will be reflected in the June Lake Area Plan, the ultimate decision will be based on recommendations of the JLCAC and Planning Commission, with the final decision by the BOS. As the conversation, direction, and areas of agreement evolve, the most appropriate or preferred decision method will become clearer.



## WORK PLAN

### 1. DETERMINE PROCESS, METHODOLOGY, AND CALENDAR – Dec. 6, 2016 CAC workshop

### 2. DEVELOP NEIGHBORHOOD MAPS

- Are maps needed? Is there another method that should be considered? These questions must be asked...
- Who draws the lines? CAC vet first?
- Suggestion: boundaries can overlap, subareas can be identified within neighborhoods, and entire areas do not need to be treated the same.
- Initial maps are for outreach purposes, and further refined though public discussion and meetings.

### 3. IMPLEMENT OUTREACH CAMPAIGN

- Options for advertising & notification
  - Tax base mailing
  - PO Box mailing
  - Email to County subscription list
  - Personal email distribution
  - Phone calls (from CAC/community members)
  - Radio/newspaper announcements, calendars, publications, PSAs
  - Flyers: distribution by community members, post in community location and County website
  - Spanish translation
  - Word-of-mouth
  - Other?
- Options for engagement and input
  - Community-wide meetings
  - Neighborhood meetings
    - Who is allowed to participate?
  - Survey (see "Collect Data" section)
  - Phone calls
  - Door to door
  - Anonymous suggestion box
  - Formal Public Hearings by the Planning Commission and Board of Supervisors
  - Other?
- Timing: establish calendar

### 4. COLLECT DATA

- **Survey?:** The housing survey is going to occur regardless, and the June Lake community has an opportunity to include questions specific to nightly rentals (or not). A specific question for/against nightly rentals has the problems of bias and education that have already been discussed. Here are some other options:
  - Ask about the types of housing units that are needed, and include the whole spectrum: long-term rentals, short-term rentals, multi-family units, affordable housing, nightly rentals, single-family units, etc.
  - Ask about the biggest problems/concerns with housing in your neighborhood, such as dilapidated properties, noise, infrastructure, too far from work, no non-motorized way to get to work, etc.
  - Ask about the best features of your neighborhood that make it a desirable place to live, such as quiet, no traffic, etc.

- Include a demographics section (needed for the last two questions), which can include neighborhood and residential status (full time, seasonal, renter, second homeowner, etc.).
- Other?
- Timing: Jan/Feb 2017
- **Technical information:** Physical mapping, such as road grades, surface, pothole locations, snow removal circumstances, flood areas, avalanche locations, land ownership (INF permittee cabins), etc.
- **Community and Neighborhood Meetings:** This general meeting structure/agenda can be used for both community-wide and neighborhood meetings.
  1. Purpose and Need
  2. Background/Education
    - a. JL Vision
    - b. TROD history and context
    - c. Current land use maps to identify "single-family" neighborhoods and where nightly rentals are currently permitted
  3. Constraints: policy outcome must be legal and enforceable
  4. Concerns/fears/negatives about nightly rentals in the neighborhood
  5. Opportunities/benefits/positives of nightly rentals
  6. Discuss neighborhood maps:
    - a. Are the maps drawn/defined correctly?
    - b. Technical characteristics for nightly rentals
    - c. Social/neighborhood considerations for nightly rentals
  7. What can people live with? Is there some degree of perceived consensus on where nightly rentals should and shouldn't be allowed in this neighborhood area?

## 5. ANALYSIS – PHASE I

- Compile all public input, retain verbatim documentation when possible
- Provide analysis of data to identify areas of agreement and controversy by community and neighborhood, identify ownership status (full time resident, second homeowner, renter, etc.) when possible
- Provide analysis of potential solutions
- Explore and determine policy tools: GP/AP policies, ordinance, etc.
- Determine direction of policy development, consider initiating a vote, consider other decision making tools

## 6. ANALYSIS – PHASE II

- Write up a draft document for feedback and review by the June Lake CAC/community. Multiple drafts may be needed, and how we proceed from here depends on the discussion at this point in time.

## 7. FINAL DECISION

- The ultimate decision will be based on recommendations of the JLCAC and Planning Commission, with the final decision by the BOS.

MONO COUNTY  
PLANNING COMMISSION

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**MINUTES**

December 15, 2016  
(Adopted February 16, 2017)

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**COMMISSIONERS:** Scott Bush, Roberta Lagomarsini, Chris I. Lizza, Mary Pipersky, Dan Roberts.

**STAFF:** Scott Burns, director; Paul McFarland, assistant planner; Nick Criss, compliance officer; Wendy Sugimura, associate analyst; Christy Milovich, assistant county counsel; CD Ritter, commission secretary

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**1. CALL TO ORDER & PLEDGE OF ALLEGIANCE:** Chair Chris Lizza called the meeting to order at 10:08 a.m. in the board chambers at the county courthouse in Bridgeport, and attendees recited the pledge of allegiance to the flag.

**2. PUBLIC COMMENT:** No items

**3. MEETING MINUTES**

***MOTION:*** Adopt minutes of Nov. 17, 2016, as amended

**4. ACTION ITEM:** Adopt changes to Planning Commission Rules & Regulations recommended Nov. 17, 2016. Codes reflect quorum issue: applicant can request full commission.

**5. PUBLIC HEARING**

**10:10 A.M.**

**A. GENERAL PLAN AMENDMENT 16-02:** Revise General Plan Land Use Element Chapter 25 concerning transient rentals. Highlights of the recommended changes include: establish a process to permit transient rentals in residential areas if specific proposals are compatible with applicable area plans, extend noticing requirements for public hearings to 30 days, define Type I rentals as owner-occupied properties and set Use Permit Process for approval, define Type II rentals as vacant properties with off-site management and set a General Plan Amendment process for approval, require Vacation Home Rental Permits (Ch. 26) for both Type I and Type II rentals, eliminate solicitation of multi-parcel applications or setup of districts, focus on standard for approval as lack of reasonable opposition by neighbors directly affected rather than neighborhood support, and clarify "neighbor." In accordance with the California Environmental Quality Act, an addendum to the existing General Plan EIR is being utilized.

Nick Criss recalled contentious applications in Clark Tract, BOS stated Ch. 25 not working well, held joint workshop Feb. 11, 2016. Set up moratorium and recommended staff and Planning Commission work out details. Three separate workshops were held. Ch. 25 separated Type I (owner-occupied with Use Permit) from Type II (vacant, file GPA), required vacation home rental permits for both, discouraged multi-parcel applications. Focus is now on opposition rather than support. Presented to BOS July 12, recommended 30-day notice, waived appeal fees for Type I, directed to RPACs. CDD staff presented revised Ch. 25 to RPACs, recommended move ahead.

June Lake CAC wanted local area plan to determine where rentals would/would not be allowed. At Oct. 4 BOS Supervisor Larry Johnston suggested proposal for June Lake, mapping neighborhoods, eliminating some due to access or geographic limitations. Remaining neighborhoods could take vote with 80% approval to allow rentals. BOS recommended combining Johnston's proposal with staff ideas, and CAC was OK with it. Letters, emails from June Lake, some in support, some in opposition. Today recommending moving ahead with no short-term rentals in June Lake till area plan is revised. Rest of Mono could move forward. Ch. 25 refers to "short-term rentals" instead of TRODs (Transient Rental Overlay Districts).

How would 80% be ascertained? Sugimura stated decision has been deferred. Once degree of common ground/conflict is known, it would help inform good decision-making. Have conversation/analysis first. Bush

suggested when get there, send out to be returned by property owners. Lizza reminded that specifics are subject to area plan revisions. Pipersky considered approving I & II except for June Lake. Criss cited ordinance that says no June Lake till area plan is done. Pipersky stated Supervisor Johnston may be brought in later on separate track. Bush wanted to move rest of county along, let June Lake be separate.

**OPEN PUBLIC COMMENT: Pat Hoefer**, Clark Tract, objected to I and II nomenclature. Sees no difference. Could have III with arbitrary delineation. Certain assumptions ignored entirety of difference. Gets down to renters, where no difference exists. Instructions to renters would still violate local SFR (Single-Family Residential) [standards]. Same safety issues, still could violate parking, trespass, party, etc. Violations upset owners, but renters would be gone. Matters to neighbors impacted. Why I and II?

Bush contrasted owner on site vs. management company, LA owner. Be careful. Why not ban in-laws? Have some faith they'll control.

Hoefer described problematic incident. Type I owner can't control long-term. Bush noted some people violate rules; that's why there's jail. Hoefer did not want to distinguish between I and II. Long-term OK for Clark Tract. Bush asked how it would be different if family drove stuck car? Have somebody to talk to. Lagomarsini thought it sounded like a bad owner.

**Ann Tozier** confirmed CAC is actively working on area plan update, wanted moratorium to continue till done. Get word out to all owners in June Lake. Wants way for neighborhoods to eliminate possibility of renters so not have to continue to come to meetings, keep going through this over and over. If neighborhoods exclude new applications, what about existing rentals. What if countywide wants I and II?

Lizza: Support current proposal where area plans can prohibit or allow?

Sugimura explained Tozier is on subcommittee for work plan on June Lake policy development. Need for certainty was expressed. No answer yet, but was clearly emphasized.

**Ross Biederman** reported enthusiastic support for Supervisor Johnston's proposal. Exclude June Lake. [Issue] is different, distinct at June Lake. Rescind I/II, no functional difference. Ability to vet on parking, road conditions. Difference in awareness, education. Unlike guests, short-term renter has no clue. Consider very few June Lake homes qualify as owner-occupied. Make so much profit, fine is not an issue. Should not reward for such behavior. Definition of neighbor has nothing to do with geography or proximity. Should be person who knows/cares about people in area. Example of two seats away with no say. Only immediate neighbor has any say. Sometimes one or two access routes are directly affected. Easy to form theoretical idea of what's appropriate, but more difficult to live with practicality of issues. Stick with definition of neighbor. Keep wording as support, not opposition – undue burden. If owner feels threatened, should count heavily. Appreciated moratorium for more thoughtful consideration and analysis of data and outcomes. Literature from other communities shows net outcome. ADA is not incorporated into thinking. Carpinteria residents have sued city for unlevel playing field. Hotels are at disadvantage.

**Ralph Lockhart**, Double Eagle owner, disagreed with friends in room. In workshops, summary materials showed concerns about rentals, but support also was expressed. Verified existing districts have not had a single complaint in six areas established. Problem is illegal rentals, not existing districts. Mono gets no TOT revenue. Create legal way, produce revenue for county. Having rental districts is disadvantage to hotel owner. If done properly, rentals can increase property value. Bears enter vacant places. What legislation ever passes with 80% threshold? Essentially says nobody can do short-term rentals. Presented support letters to continue short-term rentals. Do not eliminate existing districts. Significant expense to create, no complaints. Rusty Gregory said hot beds are essential to June Lake economy. County services were in jeopardy (paramedics) unless capture revenue. Gale & Fettes disapproved. Defer to overall definition of neighbor. Concern about area plan in small rural county, June Lake is diverse. To have one size fits all doesn't recognize differences in area. Yes, ballot measure in Mammoth Lakes was difficult and contentious. June Lake hovers around a tiny ski area and lakes. Use good judgment, respect concerns of neighbors. Focus on illegals.

Criss noted that building official researched ADA. More than 10 people/dwelling go to commercial standards. ADA was considered.

Tozier claimed decision for area plan is not one size fits all. Get whole community involved, let areas decide. **CLOSE PUBLIC COMMENT.**

**DISCUSSION:** Questions of staff:

Will TRODs be brought into compliance? Burns stated new proposal still uses Ch. 26. No conversion problem.

Remove word "district" or keep? Burns cited same boundaries. Changing name but Ch. 26 continues to apply.

Lagomarsini asked about I and II. Pipersky thought if owner was on site, it would be managed differently, efficiently, fewer problems. Bush compared teacher in classroom vs. down hallway.

Lagomarsini noted owner is there all time, but a problem house. How would that make a difference?

Pipersky: Ugly, why pay money?

Bush saw discussion as re-litigating stuff spent time on. Johnston wanted to treat all as Use Permit, not GPA. I/II is compromise. Nobody on site to regulate. If good families have bad actor, don't just eliminate families. Set up so not punish 80% of people for what 20% want. Let June Lake figure it out. Rest of county is not complaining, so why delay?

**REOPEN PUBLIC COMMENT:** Definition of on site: Same driveway? Across street? Management five minutes down road?

Lizza thought owner living there would be more responsive.

Pipersky noted European model of owner on site, more effort to have quiet, rural renter, as property is at stake. Consider how housing market changes. Bush thought enforcement would be the same.

Roberts: Other jurisdictions found ministerial process if owner.

Criss: Whole point of Ch. 26: parking, etc. address. Enforcement can assess fines, revoke eventually.

Bush noted car in driveway could be towed.

Tozier cited workforce housing issue.

Bush indicated foreclosed home affects property values, can't be made illegal. Could prevent.

Biederman read formal research on Sedona, Atlanta, Santa Barbara, and Carpinteria. Home prices went up, then stabilized. Unaffordable to lower-income individuals, so in essence would eliminate work force. If no employees, no town. **CLOSE PUBLIC COMMENT.**

**DISCUSSION:** Roberts saw it as a question of balance. Reasonable decisions are needed despite less-than-reasonable opinions on both sides of issue. June Lake has neighborhoods not conducive to a lot of traffic. Johnston came to CAC for years as planner, has background with June Lake community. Shared concern with steep requirement of 80% approval. Thought process was on right track. Let CAC determine its outcome.

Pipersky opined that when zoning, promises are made by government so people can make plans, know what neighborhoods will be like. Important to make possible for neighborhoods to see if suitable for STR. Should be high bar, but lots of opportunities to have a say. Can 12 people say what 1,200 people can do? Should have owners on property, too many potential starter homes taken out with rentals, so eliminate II, all be the same. If live in LA and want to rent, buy a condo. Eliminate June Lake for now, rest of county in residential area owner has to be present on property.

Lagomarsini was intrigued by eliminating II. Ch. 25 reflects what most communities in county are doing. Concerned about notice requirement, definition of neighbor.

Bush appreciated staff/communities working so hard. Guaranteed to have what you purchased only when you purchase. Need a process not governed by three or four people, certain types only. Thinking about rest of county, where no problems exist. June Lake should not say what rest of Mono can do, and vice versa. Antelope Valley is only part of county that opted out of dark skies. June Lake will fix, and he would support it when it's fixed.

Lizza asked how to take advantage of excess capacity without negative effect on workforce housing. Take each application on case-by-case basis. Best solution is for each community to come up with guidelines. Types I/II very important. I: owner is host. II: owner more of hotelier. Potential for abuse in II. Limit number of days property can be rented for II. Reduces potential for property to be purchased by investors who never live there, commercial opportunity – purchased by investor not young local family. Eliminate area plan condition to I, let it be anywhere without community chiming in.

If Type II limits days, why have it? Bush indicated BOS looked at plight of homeowner with two households. If could rent, would not foreclose. Limiting number of days eliminates investors. Let area limit

total numbers allowed to avoid sprawl. Limit number, see how it works. Allow for areas to evolve or have dirt roads, adobe houses. Definition of neighbors: In proximity, but still not be neighbors.

Pipersky saw no evidence June Lake needs more beds, as Gregory stated. If could show going into foreclosure, OK to rent.

Bush originally opposed whole idea "sold" to Planning Commission. Property rights to look at, if it helps them, do it.

Pipersky saw it as either a home owner or a business. Time limit is not necessary. Not help people fill up excess capacity. No proof need more beds in June Lake or Mammoth Lakes. Illegal usage is issue.

Bush thought if it's done anyway, might as well collect tax.

Roberts noted in some neighborhoods, it's not an issue. Could buy solely to rent out.

Criss contended time limit is impossible, but make legal ones without problems into problems. If want to limit something, maybe number of houses rather than time frames. Illegal rentals are lucrative. People can claim renters are just "friends."

Lizza saw it as a risk property owner takes, could lose the right.

Roberts noted Ch. 26 requirement to report, pay tax.

Bush noted if limit number, code could enforce. Do not take away from people who have it. Need some rules that make sense.

Criss indicated ski town study showed money's there, people try to do it. Puts enforcement back to square one. Could book place solid in some areas.

Lizza noted people don't rent every day of year. Deterrent to commercial property if limit is 120 days.

***MOTION:*** PC approve R16-02, eliminating distinction of I vs II. *Motion failed.*

***MOTION:*** PC approve R16-02, make sure BOS understands having only one type of rental. *Motion failed.*

Lizza found the draft too messy, old wording, typos. He did ~~not~~ want dissuasion of property investors for rentals. Sugimura explained outreach was under that language, so retain till adoption and change to short-term rentals. Burns explained staff recommendation that the term TROD has a negative cloud, hence new label STR (short-term rentals). Make conforming changes for BOS. Roberts supported time limits.

***MOTION:*** Recommend that BOS adopt General Plan Amendment 16-02 that revises General Plan Land Use Element Ch. 25 concerning transient rentals, rename Ch. 25 as "Short-Term Rentals," accept addendum to General Plan EIR, find that proposed amendment is consistent with the county General Plan and applicable area plans, and exclude June Lake till its area plan revision is concluded. *(Bush/Lagomarsini. Ayes: 3. Noes: 2.)*

## 6. WORKSHOP

**A. JAIL NEEDS ASSESSMENT:** Garrett Higerd noted various contributing factors. The 2009-10 assessment thought running out of 48-bed capacity, projected significant increase. Since then, significant changes in whole corrections system in California. AB 109, realignment: State prisoners were put in county jails. Length of stay longer now, creating other needs of healthcare, dental care, etc. Sentencing on drug crimes not as severe or as long. Capacity now seems adequate, but programming needs exist. Availability of bond revenue program approve by CA Legislature tailored for small-, medium-, large-scale jails. Mono is small, so proposal for project due by end February. Will BOS be ready to submit. Consultant suggested feasible alternatives.

Bush, who works at the jail, stated everyone expected to outgrow Mono's jail. Actually, State outgrew its prisons, gave prisoners to county jails. Could serve long-term stays, most about four years. Legalized weed will change jail to mini-prison, not as many, but there longer.

Higerd stated Mono is trying to comply with requirements. Most obvious way would be renovation, but revenue bonds require upgrading all that doesn't meet current code. Off the table, not cost effective. New seismic calculations. Constructed in mid-1980s, but jails get lots of use 365 days/year.

Bush noted automatic functions wear out, can't find parts. What to do with prisoners when renovating?

Higerd stated Annex building to provide services makeshift now. Family visitation. Respiratory isolation room with special ventilation system so rest of population does not get sick. Mental health, telepsychiatry,

released probationers. Mono does not own land, owned by Frontier utility. Other areas on same property not as preferable. Already disturbed, same land use designation (PF), has garage on it. Alt 2: New jail facility at site of Bridgeport hospital (not since 1980s). Now used as cold storage. Demolish, larger square footage but not beds. Holistic design not add-on. Also PF. Both locations are already impacted with buildings; consistent with PF designation.

Input on alternatives...

Bush thought money from State. Higerd cited revenue bonds, \$150 million for small counties, maximum \$25 million per. Do budget analysis on issues. Operational costs: 911 dispatch in same area, with staffing efficiency. Jails are not "essential facilities." Construct as such to keep 911 dispatch.

Mono and Inyo not house juvies; they go north somewhere.

Grand Jury involved? Bush recalled two needs assessments done. Grand Jury understands needs for future.

Higerd stated proposals are due by end of February, with package of material to be included. Need BOS resolution of support on other resources, complete CEQA process (PF is good fit, already disturbed) with addendum to General Plan EIR.

Bush stated all Mammoth Lakes offenders go to Bridgeport.

Higerd noted needs assessment looked at smaller jail at Mammoth, but two separate facilities are cost-prohibitive for staffing. Make sure new facility is near existing facility. Use old jail for storage of stuff from hospital.

Bush indicated could have medical staff for community as well as jail. Higerd suggested hiring outside providers instead of transporting out.

Bush stated law requires female corrections officers for female inmates. Every corrections officer is cross trained in dispatch, so have two skills. Personnel is most expensive, especially 24/7, so dual purpose works well.

## 7. REPORTS

**A. DIRECTOR:** 1) **Jail:** PF (Public Facility) designation usually requires conditional use permit, but BOS can go forward without Planning Commission input. 2) **Building codes:** January meeting BOS. 3) **January meeting:** Will have items. 4) **Tioga Inn:** Staff & consultant have met with proponent. 5) **Weed moratorium:** Task force will be comprised of all departments involved. 45-day. 6) **Sage grouse:** Wendy and Jake are developing new webpage; 7) **Compliance Appeal:** Lizza presided as hearing officer. 8) **Staff:** Planning Analyst Michael Draper came from Inyo County; 9) **Info item:** Mono intervening in action against Center for Biological Diversity. Sugimura noted lawsuit not to list grouse. Intervention brief on behalf of USFWS; if settlement agreement is reached, need Mono at table. Local jurisdiction is involved in regulating private property, Nevada is doing scientific. 10) **GPA:** Under 90-day tribal consultation.

**B. COMMISSIONERS:** **Bush:** Met with Supervisor-elect John Peters, who does not intend to reinvent wheel, will reappoint Bush. **Lizza:** Is County clerk an appointed position? Burns indicated looking at interim.

## 8. INFORMATIONAL

**A. REQUEST FOR NOTICE REGARDING CONWAY RANCH ACTIONS.** *Center for Biological Diversity*

9. **ADJOURN** to January 19, 2017. Lagomarsini and Lizza will miss meeting.

*Prepared by CD Ritter, commission secretary*

# MONO COUNTY PLANNING COMMISSION

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PO Box 347  
Mammoth Lakes, CA 93546  
760.924.1800, fax 924.1801  
[commdev@mono.ca.gov](mailto:commdev@mono.ca.gov)

PO Box 8  
Bridgeport, CA 93517  
760.932.5420, fax 932.5431  
[www.monocounty.ca.gov](http://www.monocounty.ca.gov)

Date: February 7, 2017

To: Mammoth Times

From: CD Ritter

Re: Legal Notice for Feb. 9

Format: **Quarter-page display legal as required by law for General Plan Amendments**

Invoice: Megan Mahaffey, PO Box 347, Mammoth Lakes, CA 93546

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## NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that the Mono County Board of Supervisors will conduct a public hearing **March 7, 2017, at 10:00 am** in the Board of Supervisors Chambers, Mono County Courthouse, Bridgeport, CA, to consider **GENERAL PLAN AMENDMENT 16-02: Part A)** 1. Change Land Use Designation (LUD) of former Mountain Gate property from Rural Residential (RR) 5 & 10 to Open Space (OS) (affected APNs 002-140-033, 002-490-002, -007, -008 & -011 are owned by Mono County); 2. Change LUD for Walker Behavioral Health property from Mixed Use one-acre minimum to Public Facility (PF) (APN is 002-361-012 and is owned by Mono County); 3. Change LUD for Public Works property at West Walker River/North River Lane from Estate Residential (ER) to Public Facility (PF) (APN is 002-310-056); 4. Change LUD of Walker tennis courts from Estate Residential to Public Facility (APNs are 002-362-008 & -009); 5. Change LUD on various FEMA properties along North River Lane and Meadow Drive from Estate Residential (ER) to Open Space (OS) (APNs are 002-290-005, 006, 007, 002-300-002, 002-310-001, -009, -038, -037, -035, and 002-343-005); 6. Change LUD on APN 002-450-014 Antelope Valley Fire Station from Agricultural 10 (AG10) to Public Facilities (PF); 7. Add policy to Land Use Element, Antelope Valley Plan as follows: *The RPAC endorses the use of FEMA/County properties on N. River Road and Meadow Lane as open space, without development for public improvements and facilities until 2041*; 8. Change setback in Mixed Use district for residential uses from 0 feet to 10 feet; 9. Specify that a General Plan Amendment initiated by a private landowner must go before the Board of Supervisors for approval if the GPA is a major policy change with potential significant impacts countywide; and 10. Amend Chapter 16, Accessory Dwelling Units, to comply with AB2200 and SB1069. **Part B)** Revise General Plan Land Use Element Chapter 25 concerning transient rentals. Highlights of recommended changes include: establish process to permit short-term rentals in residential areas if specific proposals are compatible with applicable area plans, extend noticing requirements for public hearings to 30 days, define Type I rentals as owner-occupied properties and set Use Permit Process for approval, define Type II rentals as vacant properties with off-site management and set a General Plan Amendment process for approval, require Vacation Home Rental Permits (Ch. 26) for both Type I and Type II rentals, eliminate solicitation of multi-parcel applications or setup of districts, focus on standard for approval as lack of reasonable opposition by neighbors directly affected rather than neighborhood support, and clarify "neighbor." (The June Lake Area Plan is presently under revision to determine areas appropriate for single-family neighborhood short-term rentals. The June Lake Citizens Advisory Committee (JLCAC) recommends that no short-term rental applications be processed for June Lake until the Area Plan revision is concluded.) In accordance with the California Environmental Quality Act, an addendum to the existing General Plan EIR is being utilized. Project materials are available for public review at the Community Development Department offices in Bridgeport and Mammoth Lakes; for more information call 760.924.1800. INTERESTED PERSONS may appear before the Board of Supervisors to present testimony or, prior to or at the hearing, file written correspondence with: Board Clerk, PO Box 715, Bridgeport, CA 93517. If you challenge the proposed action(s) in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to Board Clerk at, or prior to, the public hearing.

###



# MONO COUNTY PLANNING COMMISSION

PO Box 347  
Mammoth Lakes, CA 93546  
760.924.1800, fax 924.1801  
commdev@mono.ca.gov

PO Box 8  
Bridgeport, CA 93517  
760.932.5420, fax 932.5431  
[www.monocounty.ca.gov](http://www.monocounty.ca.gov)

Date: February 7, 2017

To: The Sheet

From: CD Ritter

Re: Legal Notice for Feb. 11

Format: **Quarter-page display legal as required by law for General Plan Amendments**

Invoice: Megan Mahaffey, PO Box 347, Mammoth Lakes, CA 93546

## NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that the Mono County Board of Supervisors will conduct a public hearing **March 7, 2017, at 10:00 am** in the Board of Supervisors Chambers, Mono County Courthouse, Bridgeport, CA, to consider **GENERAL PLAN AMENDMENT 16-02: Part A** 1. Change Land Use Designation (LUD) of former Mountain Gate property from Rural Residential (RR) 5 & 10 to Open Space (OS) (affected APNs 002-140-033, 002-490-002, -007, -008 & -011 are owned by Mono County); 2. Change LUD for Walker Behavioral Health property from Mixed Use one-acre minimum to Public Facility (PF) (APN is 002-361-012 and is owned by Mono County); 3. Change LUD for Public Works property at West Walker River/North River Lane from Estate Residential (ER) to Public Facility (PF) (APN is 002-310-056); 4. Change LUD of Walker tennis courts from Estate Residential to Public Facility (APNs are 002-362-008 & -009); 5. Change LUD on various FEMA properties along North River Lane and Meadow Drive from Estate Residential (ER) to Open Space (OS) (APNs are 002-290-005, 006, 007, 002-300-002, 002-310-001, -009, -038, -037, -035, and 002-343-005); 6. Change LUD on APN 002-450-014 Antelope Valley Fire Station from Agricultural 10 (AG10) to Public Facilities (PF); 7. Add policy to Land Use Element, Antelope Valley Plan as follows: *The RPAC endorses the use of FEMA/County properties on N. River Road and Meadow Lane as open space, without development for public improvements and facilities until 2041*; 8. Change setback in Mixed Use district for residential uses from 0 feet to 10 feet; 9. Specify that a General Plan Amendment initiated by a private landowner must go before the Board of Supervisors for approval if the GPA is a major policy change with potential significant impacts countywide; and 10. Amend Chapter 16, Accessory Dwelling Units, to comply with AB2200 and SB1069. **Part B** Revise General Plan Land Use Element Chapter 25 concerning transient rentals. Highlights of recommended changes include: establish process to permit short-term rentals in residential areas if specific proposals are compatible with applicable area plans, extend noticing requirements for public hearings to 30 days, define Type I rentals as owner-occupied properties and set Use Permit Process for approval, define Type II rentals as vacant properties with off-site management and set a General Plan Amendment process for approval, require Vacation Home Rental Permits (Ch. 26) for both Type I and Type II rentals, eliminate solicitation of multi-parcel applications or setup of districts, focus on standard for approval as lack of reasonable opposition by neighbors directly affected rather than neighborhood support, and clarify "neighbor." (The June Lake Area Plan is presently under revision to determine areas appropriate for single-family neighborhood short-term rentals. The June Lake Citizens Advisory Committee (JLCAC) recommends that no short-term rental applications be processed for June Lake until the Area Plan revision is concluded.) In accordance with the California Environmental Quality Act, an addendum to the existing General Plan EIR is being utilized. Project materials are available for public review at the Community Development Department offices in Bridgeport and Mammoth Lakes; for more information call 760.924.1800. INTERESTED PERSONS may appear before the Board of Supervisors to present testimony or, prior to or at the hearing, file written correspondence with: Board Clerk, PO Box 715, Bridgeport, CA 93517. If you challenge the proposed action(s) in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to Board Clerk at, or prior to, the public hearing.

###



**OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS**

**REGULAR AGENDA REQUEST**

Print

**MEETING DATE** March 7, 2017

**TIME REQUIRED** 1.5 hours (30 minute presentation; 1 hour discussion)      **PERSONS APPEARING BEFORE THE BOARD** CA DFW staff and USFWS staff

**SUBJECT** Presentation on Sierra Nevada Bighorn Sheep

**AGENDA DESCRIPTION:**

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Presentation by CA DFW and USFWS regarding Sierra Nevada Bighorn Sheep Recovery efforts.

**RECOMMENDED ACTION:**

None (informational only). Provide any desired direction to staff.

**FISCAL IMPACT:**

None.

**CONTACT NAME:** tdublino@mono.ca.gov

**PHONE/EMAIL:** 760.932.5453 / tdublino@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH ATTACHMENTS TO THE OFFICE OF THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

**SEND COPIES TO:**

**MINUTE ORDER REQUESTED:**

YES  NO

**ATTACHMENTS:**

<b>Click to download</b>
<input type="checkbox"/> <a href="#">CDFW letter</a>
<input type="checkbox"/> <a href="#">Report2014-2015</a>
<input type="checkbox"/> <a href="#">Besser Pneumonia</a>
<input type="checkbox"/> <a href="#">Buchalski Genetic</a>
<input type="checkbox"/> <a href="#">Wehausen et al</a>
<input type="checkbox"/> <a href="#">Theisen letter - Reno Fish and Wildlife</a>

**History**

<b>Time</b>	<b>Who</b>	<b>Approval</b>
3/1/2017 5:06 AM	County Administrative Office	Yes
2/28/2017 6:15 PM	County Counsel	Yes
2/24/2017 1:47 PM	Finance	Yes



February 15, 2017

Board of Supervisors  
Mono County  
PO Box 715  
Bridgeport, California 93517

Dear Mono County Supervisors:

The California Department of Fish and Wildlife (CDFW) has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants and habitat necessary for biologically sustainable populations of such species. In that capacity, CDFW administers the California Endangered Species Act (CESA), as well as other provisions of the California Fish and Game Code that afford protection to the State's fish and wildlife resources. Furthermore, CDFW is the lead agency for implementation of recovery efforts for federally endangered Sierra Nevada bighorn sheep. It is the goal and responsibility of CDFW to protect and maintain viable populations of fish and wildlife resources throughout the State. The purpose of this letter is to clarify the risk to bighorn sheep posed by the grazing of domestic sheep.

Historically there were thousands of bighorn sheep in the Sierra Nevada but their numbers declined dramatically with the arrival of European settlers in the mid-1800s and the domestic sheep they grazed throughout the Sierra<sup>1</sup>. Domestic sheep brought diseases to which bighorn have no immunity. By the 1980s there were less than 300 bighorn in the Sierra Nevada and by the 1990s they had declined to just over 100. Consequently, Sierra Nevada bighorn were listed as State and federally endangered in 1999. CDFW has led the implementation of recovery efforts since that time and the population has grown to more than 600 bighorn.

Recent genetic analyses have confirmed that Sierra bighorn are one of three unique subspecies of bighorn sheep in North America<sup>2</sup>. Bighorn sheep are adapted to the extreme winter conditions experienced in the Sierra Nevada and are able to survive the heavy snowfall in Mono County and Yosemite National Park by wintering on alpine ridges where high winds scour away the snow. In fact, recent analyses indicate that individuals that spend their winters high in the alpine may be more successful at recruiting lambs than individuals that use lower elevation winter ranges<sup>3</sup>.

Along with CDFW, numerous cooperating agencies have worked diligently and spent millions of dollars to implement recovery actions. Sierra bighorn are approaching the numerical and geographic goals for downlisting from endangered to threatened status under the Endangered Species Act. An additional goal that must be met for downlisting is the management of domestic sheep to prevent contact with bighorn such that the risk of disease transmission is eliminated. CDFW is concerned that Mono County's continued grazing of domestic sheep on Conway ranch will prevent downlisting of Sierra bighorn. The biggest threat to Sierra bighorn is disease from domestic sheep and goats, as disease can have dramatic and prolonged detrimental population effects on bighorn sheep<sup>4</sup>. In this letter we will summarize the evidence



linking domestic sheep to disease in bighorn sheep, the likely consequences if a disease outbreak were to occur, and why Conway Ranch (including both Conway and Mattly parcels) are of particular concern.

### **Domestic sheep transmit fatal disease to bighorn sheep**

Many experimental<sup>5-7</sup> and case studies<sup>8-10</sup> have shown a direct link between domestic sheep contact with bighorn sheep and pneumonia outbreaks. The results of 11 experimental studies in which bighorn sheep were penned with domestic sheep was almost always bighorn death (98% mortality of 90 bighorn), while the domestic sheep remained healthy<sup>7</sup>. Research on the respiratory disease responsible for these deaths has been challenging because pneumonia outbreaks often involve multiple pathogens and some bacteria can be hard to sample<sup>7</sup>. There is definitive evidence, however, that the bacteria *Mannheimia haemolytica*, often associated with pneumonia in bighorn sheep<sup>11</sup>, has been transferred from domestic sheep to bighorn sheep<sup>6,12</sup>. This was done by genetically tagging bacteria in domestic sheep and then locating those tagged bacteria in bighorn sheep during comingling experiments<sup>6</sup>. In addition, disease pathogens (including *Mycoplasma ovipneumoniae*) have been transmitted between animals in separate pens spaced 25-39 feet apart<sup>13</sup>.

Respiratory disease outbreaks in bighorn sheep are often linked to exposure or interaction with domestic sheep. Summary of bighorn declines and die-offs include eleven cases of pneumonia that began after contact with domestic sheep and resulted in 50-100% of the population dying<sup>8,10</sup>. These die-offs occurred across the west: British Columbia, Oregon, Washington, South Dakota, Nevada, Colorado, New Mexico, and California (Warner Mountains). In addition, bighorn and domestic sheep interactions were confirmed prior to two outbreaks in Montana with 68-88% mortality rates<sup>9</sup>. These represent only a subset of documented pneumonia outbreaks in which a connection to domestic sheep can be made.

Disease outbreaks in bighorn are often catastrophic, initially causing all age die-offs followed by long term reduced lamb recruitment<sup>14</sup>. Careful and long term study of the pneumonia outbreak in the Hell's Canyon region, which includes 14 populations of bighorn sheep has found that for decades after an outbreak most or all lambs die due to continued reoccurrence of pneumonia<sup>14</sup>. This persistent reduction in recruitment has already shifted the age structure of the population to older animals and the infected populations are projected to go locally extinct in time without intervention<sup>15</sup>.

Wildlife managers and professionals throughout the west recognize that disease can be transmitted from domestic to bighorn sheep and that domestic and bighorn sheep should be effectively separated. These concepts are clearly demonstrated in the Desert Bighorn Council's *Guidelines for Management of Domestic Sheep*<sup>10</sup>, the Western Association of Fish and Wildlife Agencies' *Recommendations for domestic sheep and goat management in wild sheep habitat*<sup>16</sup>, and The Wildlife Society and American Association of Wildlife Veterinarians Joint Issue Statement, *Domestic sheep and goats disease transmission risk to wild sheep*<sup>17</sup>. Recently, the Montana Wool Growers Association and the Montana Wild Sheep Foundation agreed that at

this time “the best method to prevent disease transmission is effective separation in time and space”<sup>18</sup>. In addition, the Bureau of Land Management (BLM) has guidelines<sup>19</sup> and both the BLM and the US Forest Service<sup>20</sup> have issued decisions directed at effectively separating domestic and bighorn sheep.

**Conway Ranch threatens Mt. Warren Herd**

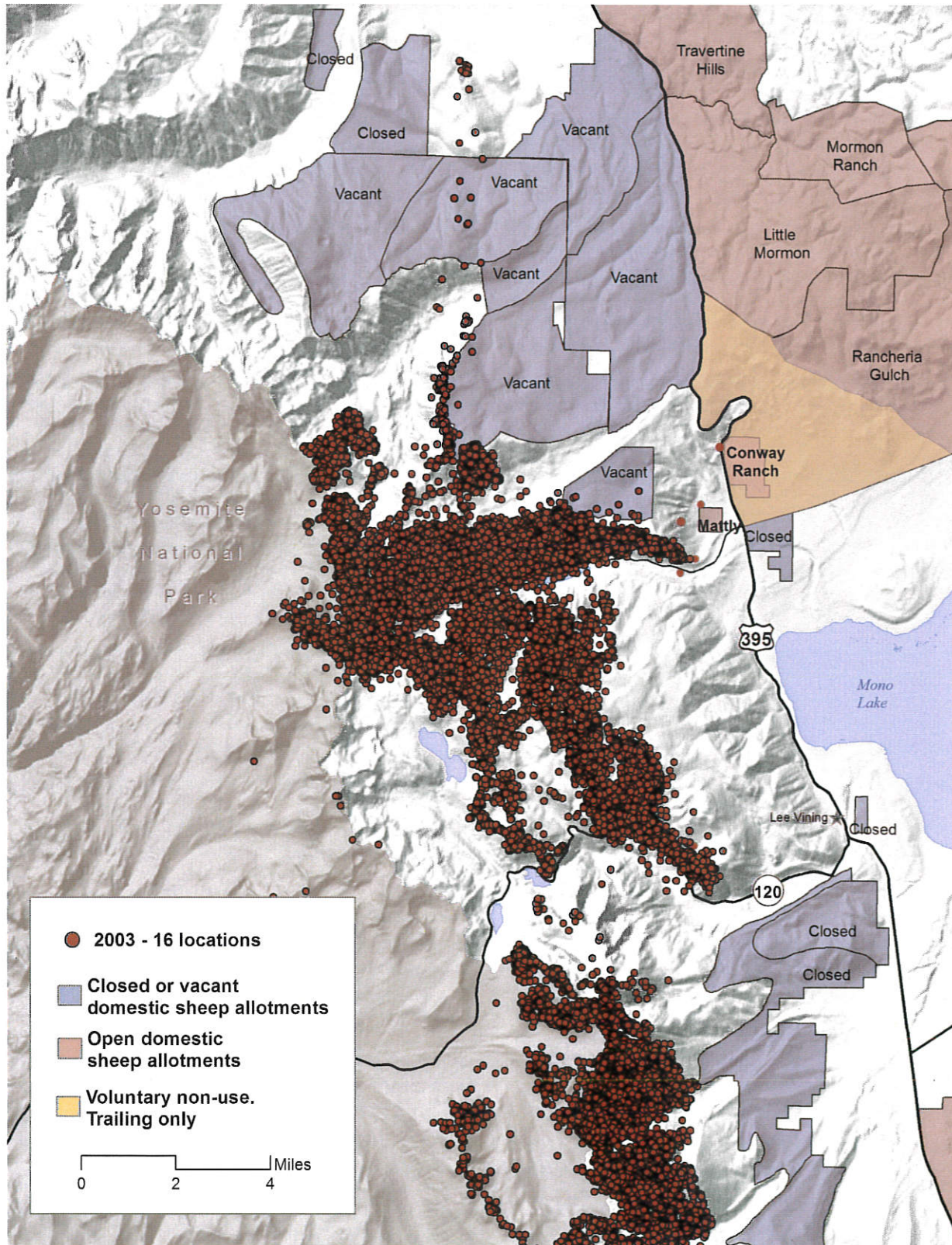
The Department has repeatedly expressed concern to Mono County regarding domestic sheep grazing at Conway and Mattly Ranches (Letters submitted June 5, 2014, October 14, 2014, September 29, 2015, and during numerous County meetings).

Specifically Conway Ranch is of concern because of the close proximity to the occupied Mt. Warren herd. This map includes use by 9 animals within 1 mile of Conway Ranch. The striking of ram S21 by a car on 395 indicates the area near Conway summit has been perceived by Sierra bighorn as habitat and that the highway is not a barrier to bighorn sheep movement.

Location	Date	Method	Animal Description
NW corner of Conway	11/30/03	Ground	1 ram (S21) hit by car on 395
West of Mattly	12/8/03	Ground	1 ram (S21) mortality location
Within 1 mile	2005-2013	Collar & Ground	8 collared rams (S20, S44, S69, S105, S122, S156, S158, S239), 1 uncollared ram

As part of a risk assessment process, directed by a subgroup of the Sierra Nevada bighorn sheep recovery team, CDFW developed a quantitative spatial model of risk that predicts the likelihood of Sierra bighorn movement onto domestic sheep allotments within 37 miles (60 km) of occupied bighorn core habitat.<sup>21,22</sup> This approach uses habitat suitability and distance to estimate the likelihood that Sierra bighorn will move beyond their core habitat to areas where domestic sheep are grazed. Based on known Sierra bighorn movements, these analyses demonstrate that Conway Ranch falls within a zone of high potential for contact.<sup>21,22</sup> Because of the risk of contact and disease transmission, domestic sheep grazing no longer occurs on federal land within the high risk zone for Sierra bighorn. In addition, if domestic sheep were to spread disease into bighorn occupying adjacent habitat, it would likely spread to other nearby herds in the Sierra and reduce population viability and prospects for recovery.<sup>23</sup>







**Separation is the key to minimizing disease threat**

Due to the very close proximity of Conway Ranch to known bighorn use, and propensity of both Sierra bighorn and domestic sheep to wander, minimization measures such as increased use of guard and herd dogs or fencing are inadequate in creating effective separation. Both male and female Sierra bighorn are known to make forays throughout the year. In addition to a general increase in ram movements during the rut (October-December), GPS collared ewes have made long distance forays during all seasons (table includes notable GPS collared ewe movements during the last 5 years).

Ewe ID	Herd Unit	Notable Movement	Timing	Described in Annual Report
S166	Mt. Williamson	Movements throughout Mt. Baxter, Mt. Williamson, and Mt. Langley herd units	Year round	2012, 2013, 2014
S167	Mt. Baxter	Moved south and west outside of are generally used by Mt. Baxter herd	Year round	2012, 2013, 2014
S89	Mt. Warren	Migration between Lundy Canyon and Camiaca Peak	November 2013, repeatedly May-September 2014	2014
S240, S241, S242, S243, S244	Wheeler	Expansion into granite park	Summer 2013	2014

Domestic sheep are also known to stray in small groups, particularly in response to predators<sup>24</sup>. We have observed small groups of domestic sheep that wandered away from their herd without knowledge of the herder. In addition, there is no scientific literature showing the effectiveness of herding or guard dogs in preventing bighorn sheep from coming in to contact with domestic sheep.<sup>22</sup>

Pneumonia transmission from domestic to bighorn sheep does not require nose to nose contact. Disease transmission that later resulted in bighorn mortality, has been documented between animals in pens 25-39 feet apart<sup>13</sup>. Viable pneumonia bacteria has persisted after traveling airborne more than 60 feet<sup>25</sup>. Aerosol transmission of pneumonia bacteria indicates the need for double fencing to reduce the potential for disease transmission. However, at this time there is no tested standard of fencing structure and spacing that is known to prevent disease transmission. In addition, double fencing that is robust enough to keep domestic lambs from



escaping and high enough to keep bighorn sheep from clearing, would prohibit movement of other wildlife use at Conway Ranch including mule deer and sage grouse.

Mono County has received considerable conservation recognition for their role in protecting the Bi-State sage grouse population. We encourage the County to exhibit comparable leadership in the conservation of Sierra bighorn. We hope Mono County will take advantage of the opportunity to join in the significant efforts on behalf of Sierra bighorn recovery. We appreciate the opportunity to express our concerns about Conway Ranch and look forward to answering questions and sharing more information with you on February 21, 2017.

If you have any questions or concerns regarding wildlife issues, please contact me at (760) 937-0238 or [tom.stephenson@wildlife.ca.gov](mailto:tom.stephenson@wildlife.ca.gov).

Sincerely,

A handwritten signature in blue ink, appearing to read "Tom Stephenson".

Tom Stephenson, Ph.D.

Program Leader for Sierra Nevada Bighorn Sheep Recovery

cc: Alisa Ellsworth, CDFW Environmental Scientist  
Lacey Greene, CDFW Environmental Scientist  
David Elms, CDFW Environmental Program Manager  
Leslie MacNair, CDFW Regional Manager  
Erin Nordin, USFWS  
Carolyn Swed, USFWS

**References** (Many of these are available at <http://www.dfg.ca.gov/snbs/Literature.html>)

1. Buechner, H. K. The bighorn sheep in the United States: its past, present, and future. *Wildl. Monogr.* **4**, 174 (1960).
2. Buchalski, M. R. *et al.* Phylogeographic and population genetic structure of bighorn sheep (*Ovis canadensis*) in North American deserts. *J. Mammal.* 1–16 (2016). doi:10.1093/jmammal/gyw011
3. Spitz, D. B. Causes and consequences of migratory behavior in Sierra Nevada bighorn sheep. (2015).
4. U.S. Fish and Wildlife Service. Recovery Plan for the Sierra Nevada Bighorn Sheep. 215 (2007).
5. Wehausen, J., Kelley, S. & Ramey II, R. Domestic sheep, bighorn sheep, and respiratory disease: a review of the experimental evidence. *Calif. Fish Game* **97**, 7–24 (2011).
6. Lawrence, P. K. *et al.* Transmission of *Mannheimia haemolytica* from domestic sheep (*Ovis aries*) to bighorn sheep (*Ovis canadensis*): unequivocal demonstration with green fluorescent protein-tagged organisms. *J. Wildl. Dis.* **46**, 706–717 (2010).
7. Besser, T. E. *et al.* Survival of Bighorn Sheep (*Ovis canadensis*) Commingled with Domestic Sheep (*Ovis aries*) in the Absence of *Mycoplasma ovipneumoniae*. *J. Wildl. Dis.* **48**, 168–172 (2012).
8. Cassaigne G, I., Medellín, R. a & Guasco O, J. a. Mortality during epizootics in bighorn sheep: effects of initial population size and cause. *J. Wildl. Dis.* **46**, 763–771 (2010).
9. Howard, T. A. Comparison of wild-domestic sheep interaction policies in bighorn disease outbreak locations in the continental U.S., 1990-2010. (2013).
10. Staff, T. Guidelines for management of domestic sheep in the vicinity of desert bighorn habitat. *Desert Bighorn Counc. Trans.* (1990).
11. Bemani, E., Esmailzadeh, S., Gharibi, D. & Ghorbanpoor, M. Immunohistochemical and bacteriological investigations of *Mannheimia haemolytica* in sheep bronchopneumonia. *Kafkas Univ. Vet. Fak. Derg.* **23**, 1–8 (2016).
12. Lawrence, P. K. *et al.* CORRECTION: Transmission of *Mannheimia haemolytica* from domestic sheep (*Ovis aries*) to bighorn sheep (*Ovis canadensis*): unequivocal demonstration with green fluorescent protein-tagged organisms. *J. Wildl. Dis.* **46**, 1346–1347 (2010).
13. Besser, T. E. *et al.* Epizootic pneumonia of bighorn sheep following experimental exposure to *Mycoplasma ovipneumoniae*. *PLoS One* **9**, (2014).
14. Besser, T. E. *et al.* Causes of pneumonia epizootics among bighorn sheep, Western United States, 2008-2010. *Emerg. Infect. Dis.* **18**, 406–414 (2012).

15. Manlove, K., Frances Cassirer, E., Cross, P. C., Plowright, R. K. & Hudson, P. J. Disease introduction is associated with a phase transition in bighorn sheep demographics. *Ecology* **97**, 2593–2602 (2016).
16. Wild Sheep Working Group. Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat. 28 (2012).
17. The Wildlife Society & American Association of Wildlife Veterinarians. *Domestic sheep and goats disease transmission risk to wild sheep*. (2015).
18. Solan, Brian, M. & McEwen, Dave, M. *Montana Wool Growers Association and Montana Wild Sheep Foundation cooperative efforts letter*. (2016).
19. Ellis, S. A. *US BLM Management of Domestic Sheep and Goats to Sustain Wild Sheep*. **2**, (2016).
20. Rainville, Suzanne C., U. *Record of decision for the: Final supplementnal environmental impact statement and forest plan amendment identifying suitable rangeland for domestic sheep and goat grazing to maintain habitat for viable bighorn sheep populations, Payette National Forest*. (2010).
21. Baumer, A. *et al*. *A process for identifying and managing risk of contact between Sierra Nevada bighorn sheep and domestic sheep*. (2009).
22. Croft, B. *et al*. *A process for identifying and managing risk of contact between Sierra Nevada Bighorn Sheep and domestic sheep*. (2010).
23. Clifford, D. L. *et al*. *Assessing disease risk at the wildlife-livestock interface: A study of Sierra Nevada bighorn sheep*. *Biol. Conserv.* **142**, 2559–2568 (2009).
24. CDFW. *The efficacy of measures to minimize contact between domestic sheep and Sierra Nevada Bighorn Sheep on the Humboldt-Toiyabe National Forest, Mono County, California*. (2006).
25. Dixon, D. M. *et al*. *Viability of air-borne Pasteurella spp*. 6–13 (2002).



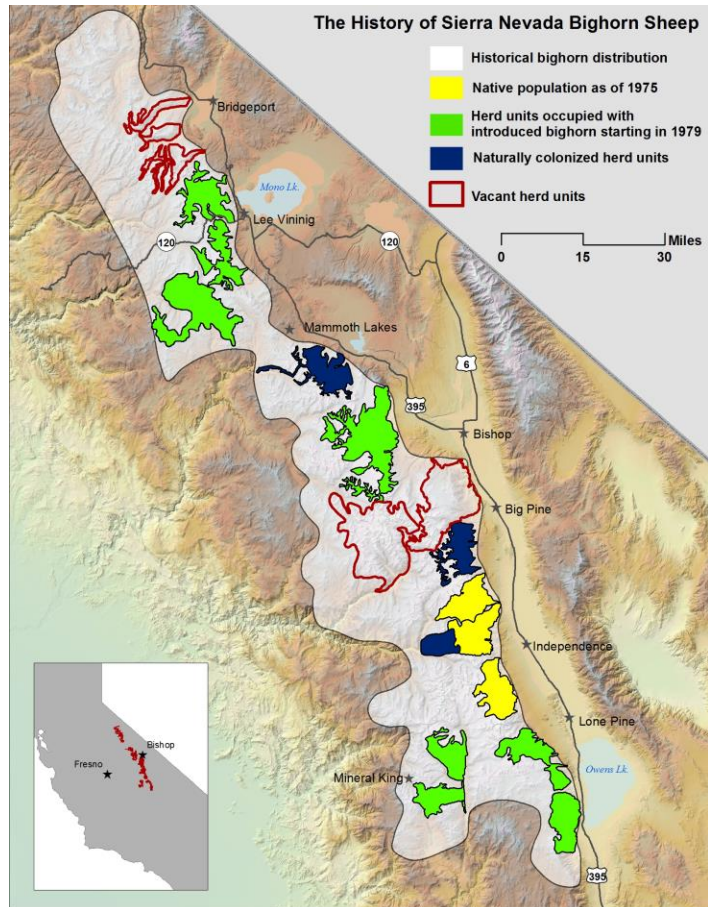


## 2014-2015 Annual Report of the Sierra Nevada Bighorn Sheep Recovery Program

Julia M. Runcie, Alexandra P. Few, David W. German, John D. Wehausen, and Thomas R. Stephenson

### Summary of Progress

This report documents conservation and monitoring activities carried out between May 1, 2014 and April 30, 2015 by California Department of Fish and Wildlife's (CDFW) Sierra Nevada Bighorn Sheep Recovery Program (the Recovery Program). The Recovery Program works to return the population of Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*; hereafter Sierra bighorn) to a stable level through adaptive management based on an understanding of their distribution and demographics following the guidelines established by the *Recovery Plan for Sierra Nevada Bighorn Sheep* (the Recovery Plan, USFW 2007). Chief among the Recovery Program's activities are regular population counts, cause-specific mortality investigations, habitat and demographic modeling, captures to deploy radio collars, and translocations to increase the distribution of bighorn throughout the range.



**Figure 1.** Distribution of Sierra bighorn herd units, April 30, 2015. All herd units considered essential for recovery are occupied.

As a result of the translocations completed in March and April 2015 and the recent natural colonization of the Taboose Creek herd unit, Sierra bighorn have now met the distribution requirements identified in the Recovery Plan, occupying 14 herd units (Figure 1). Survey data from this season indicate that there are now at least 288 adult and yearling ewes in the Sierra; the Recovery Plan identifies a minimum target population size of 305 females distributed among 4 recovery units. We project that the Sierra bighorn population may reach all demographic criteria required for downlisting of the species within the next 5 years.

## **Conservation Activities**

### ***Translocations***

In March and April 2015, we captured and translocated 31 animals, reintroducing herds to the Laurel Creek area of the Kern Recovery Unit in Sequoia National Park and to the Cathedral Range of the Northern Recovery Unit in Yosemite National Park. A new deme in the Mt. Gibbs herd unit was created, and the Olancha Peak herd unit was augmented.

The Kern Recovery Unit is the most remote area currently occupied by Sierra bighorn; though limited connectivity exists with the Olancha Peak and Mt. Langley herds, we expect that this recovery unit could serve as a refuge for Sierra bighorn in the event of a disease outbreak in the more connected herds along the Sierra Crest. We reintroduced bighorn to the Big Arroyo drainage of the Kern Recovery Unit in March 2014; the recent addition of 7 ewes and 4 rams to the Laurel Creek drainage will speed the growth and increase the genetic diversity present in this recovery unit.

The Northern Recovery Unit contains two of the smallest herds in the Sierra (Mt. Gibbs and Mt. Warren). Both have exhibited slow population growth, and the Mt. Warren herd has recently experienced a high rate of mortality (Few et al. 2013, Runcie et al. 2014). In September 2012, biologists from the Recovery Program and Yosemite National Park began discussing the possibility that the Northern Recovery Unit may require an additional herd to reach its recovery goal of 50 females. The Washburn Lake area of the Merced drainage and the adjacent Cathedral Range were identified as suitable habitat (Few et al. 2015), and in March and April 2015 we introduced 10 ewes and 3 rams to this area to initiate the Cathedral Range herd. We also augmented the Mt. Gibbs herd with 5 collared ewes known to have high genetic diversity; these ewes were placed in the Alger Creek drainage below Mt. Wood, an area of high-quality habitat south of the currently-occupied Mt. Gibbs range.

The Olancha Peak herd unit was created in March 2013 with 10 ewes and 4 rams, and augmented with an additional 4 ewes in March 2014. Two of the rams introduced to the herd have since died. In March 2015 we captured 2 high-heterozygosity rams from the Mt. Baxter herd unit and translocated them to Olancha Peak in an effort to maintain high genetic diversity and reproductive success within this herd unit.

### ***Disease Management***

Domestic sheep and goats carry respiratory pathogens that can cause fatal pneumonia when transmitted to wild bighorn (Lawrence et al. 2010, Wehausen et al. 2011). The only effective means to prevent disease transmission is to prevent contact by maintaining separation both in time and space (Wild Sheep Working Group 2012). Domestic sheep grazing that occurs in proximity to bighorn habitat can pose a significant threat to Sierra bighorn recovery, and the Recovery Plan stipulates that measures to prevent contact must be implemented and be successful before the subspecies can be

downlisted (USFWS 2007). For decades, CDFW has worked closely with land management agencies, landowners and permit-holders to mitigate this threat by vacating high risk allotments and performing actions like double-fencing and scheduled grazing to minimize the possibility of contact between bighorn and domestic animals.

During this reporting period we applied a disease risk model, combining a resource selection function model based on ram occurrences with a cost distance analysis to quantify the proximity of domestic sheep and goat grazing to bighorn core home ranges and the risk of contact of bighorn with domestic sheep and goats. We then examined the robustness of this model to the expanding distribution of Sierra bighorn. This model will directly inform translocation efforts, allowing identification of suitable areas for future Sierra bighorn reintroductions.

Some of the highest risk grazing occurs on the Conway and Mattly Ranches, which are owned and managed by Mono County and abut the Mt. Warren herd unit. Recovery Program leaders met with Mono County to continue discussing the risk that grazing on the Conway and Mattly Ranches poses to Sierra bighorn. In 2015, CDFW will monitor domestic sheep grazing operations on the Mattly Ranch at the mouth of Lundy Canyon.

## **Sierra Bighorn Population Monitoring**

### ***Herd Unit Surveys***

Demographic data provide a foundation for the Recovery Program's adaptive management strategy, shaping our understanding of the health and growth of the Sierra bighorn population. Each year we focus on obtaining ground surveys from multiple populations and comparing these results with data from previous years. Certain herds (specifically Mt. Baxter and Wheeler Ridge) provide better survey opportunities in the winter, when animals congregate on low-elevation range; however surveys of most herds are more feasible in the summer. When possible, we compare minimum counts with mark-resight (MR) estimates, in which the total population is estimated from the ratio of marked to unmarked animals in an unbiased sample. During this reporting period we attempted surveys of all occupied herd units except Bubbs Creek (see Table 1 for survey results).

### ***Olancha Peak***

We surveyed Olancha Peak in June and September 2014 and April 2015 and accounted for 14 adult ewes, 2 yearling ewes, 6 lambs, 2 adult rams, and 2 yearling rams. One ram (S196) died of unknown causes before these surveys, and 3 ewes (S273, S206, and S272) died between November and April. S272 was seen in very poor condition in September 2014 and was nursing a late lamb. Her poor condition likely led to her death. We classified S273's death as a probable mountain lion kill, but were unable to determine the cause of death for S206. During the March 2015 capture we augmented this herd with two collared rams (S358 and S197) from the Mt. Baxter herd. At the end of this

reporting period, we estimate that this population contained 11 adult ewes, 2 yearling ewes, 2 yearling rams, 6 lambs, and 4 adult rams. All adult ewes and rams are collared.

### ***Laurel Creek***

In March 2015 we introduced 6 adult ewes, 1 yearling ewe, and 4 adult rams to the previously-vacant Laurel Creek herd unit in the Kern Recovery Unit. All of the ewes were pregnant. One ram (S364, originally from Mt. Baxter) left Laurel Creek on April 2 and traveled to Cartago Creek at the north end of the Olancha Peak herd unit. On April 28 he left Olancha Peak and started a return journey toward the Kern River; at the time of this report he was on the Boreal Plateau. Another ram (S311, originally from Sawmill Canyon) left the herd unit boundary on April 13 and traveled to the Mt. Langley herd unit, where he remained for several weeks before joining S364 on the Boreal Plateau. Ram S322 also left Laurel Creek for the Boreal Plateau in May 2015, leaving only 1 ram, S204, in the Laurel Creek herd unit.

### ***Big Arroyo***

We introduced 10 Sierra bighorn ewes and 4 rams to the Big Arroyo herd unit in March 2014. One adult ewe (S281) and one adult ram (S233) died of unknown causes during this reporting period. Summer surveys and subsequent genotyping of lamb pellets confirmed the survival of 5 lambs; therefore the population of the Big Arroyo in May 2015 was 9 adult ewes, 5 lambs, and 3 adult rams.

### ***Mt. Langley***

Surveys of the Mt. Langley herd in August 2014 accounted for 45 adult ewes, 10 yearling ewes, 18 lambs, 57 adult rams, and 8 yearling rams. One collared adult ewe (S86) was censored (due to collar failure) during this reporting period and so was not included in this count. During a capture in October 2014, 3 adult ewes and 2 yearling ewes were collared and 1 previously-collared adult ewe was recaptured and her collar replaced. In March 2015, we removed 8 uncollared adult ewes, 1 uncollared yearling ewe, and 3 previously-collared adult ewes for translocations. We also collared 1 adult ewe who was re-released at Mt. Langley. Three collared adult rams (S179, S189, and S220) and 1 collared adult ewe (S341) died during this reporting period. S179's cause of death was unknown, S189 died from rockfall, S220 was classified as a probable lion kill, and S341 was determined to be a certain lion kill. As of May 2015, we estimate that this population contained 34 adult ewes, 9 yearling ewes, 18 lambs, 54 adult rams, and 8 yearling rams. Twenty-four percent of adult ewes and nine percent of adult rams have functional telemetry collars.

### ***Mt. Williamson***

In October 2014 we conducted the first survey of the Mt. Williamson herd unit since 2010. Our observations resulted in a minimum count of 11 adult ewes, 2 yearling ewes, 4 lambs, 8 adult rams, and 2 yearling rams. This is likely a significant undercount. One adult ram (S135) was killed by rockfall in June 2014.

***Bubbs Creek***

We did not survey the Bubbs Creek herd during this reporting period.

***Mt. Baxter***

In spring 2015, ground surveys led us to a minimum count of 46 adult ewes, 6 yearling ewes, 29 lambs, 25 adult rams, and 8 yearling rams. In October 2014 we collared 7 adult ewes, 1 yearling ewe, and 7 adult rams in this herd unit. In February 2015 we collared an additional 4 adult rams and 1 yearling ram. One 5 year old collared adult ram, S318, died of malnutrition in February 2015. In March 2015 we removed 6 uncollared adult ewes and 1 uncollared yearling ewe for translocation to Laurel Creek; we also removed 5 previously-collared rams for translocation to Laurel Creek, the Cathedral Range, and Olancha Peak. We estimate that at the end of this reporting period the Mt. Baxter population contained a minimum of 40 adult ewes, 5 yearling ewes, 29 lambs, 19 adult rams, and 8 yearling rams. Based on these minimum figures, a maximum of 38% of adult ewes and 26% of adult rams carry functional collars. Rams were probably significantly undercounted in 2015; thus the percent collared is likely considerably lower than 26%.

***Sawmill Canyon***

A survey in August 2014 resulted in a minimum count of 77 bighorn: 38 adult ewes, 6 yearling ewes, 17 lambs, 8 adult rams (2 seen and 6 collars not seen), and 8 yearling rams. Because our survey efforts focused on ewe groups, we expect that many adult rams were missed in this count. We collared 9 adult ewes, 8 adult rams, and 1 yearling ram in October 2014. One collared ewe (S231) and 1 collared ram (S313) died during this capture. In February 2015 we collared 4 more adult rams. In March and April 2015 we removed 3 collared adult ewes for translocation to Alger Creek in the Mt. Gibbs herd unit, and 3 collared adult rams for translocation to Laurel Creek. We estimate that at the end of this reporting period the Sawmill Canyon herd contained 34 adult ewes (of which 41% wear functional collars). Without a reasonable count of adult rams we cannot estimate the percentage of rams collared, but there are currently 13 functional collars on rams in this population.

***Taboose Creek***

On April 24, 2014, 2 biologists saw a group of 12 bighorn in this herd unit consisting of 11 adult rams and 1 yearling ewe. This was the first occasion on which Recovery Program staff made a confirmed observation of a female in the Taboose Creek herd unit. Subsequent observations were made in July, August of 2014, and February, and April of 2015. To date, the maximum numbers of each class of animal seen at one time has been 2 adult ewes, 1 yearling ewe, 15 adult rams, and 2 yearling rams. In October and February 2015 we collared 3 rams in this herd unit; 1 on Split Mountain and 2 on Birch Mountain in the northern end of the herd unit. All 3 have since traveled between the Taboose Creek and Sawmill Canyon herd units. In addition, 3 rams collared in Sawmill Canyon have made forays into Taboose Creek. We cannot yet provide estimates of the size or composition of the population that uses the Taboose Creek herd unit, nor



can we confidently describe the relationship between this population and the Sawmill Canyon bighorn.

### ***Wheeler Ridge***

During the exceptionally dry winter of 2014-2015 bighorn did not congregate on the low-elevation winter range at Wheeler Ridge; several attempts to survey this herd during the winter months were unsuccessful. However, numerous yearlings (4 female and 9 male) were observed suggesting good recruitment. We will attempt a summer survey in 2015 to obtain better population data.

### ***Convict Creek***

June 2014 surveys counted a minimum of 13 adult ewes, 8 lambs, 2 adult rams, 1 yearling ram, and 1 unclassified yearling in the Convict Creek herd unit. One 2-year-old ram was observed in 2013 and 1 in 2012, so the adult rams seen may be the 3- and 4-year-old rams produced by this population. While it is possible there are only 2 adult rams in this herd, it seems unlikely. On December 17, 2014, a group containing 1 yearling ewe and 2 yearling rams was observed, which added 1 yearling to the summer's count. In October 2015 we collared 2 adult females, 1 adult male, and 1 male lamb in this herd unit. The collared adult male, S337, was killed by a mountain lion on April 15, 2015. Based on our counts we estimate a maximum of 38% of ewes and 0% of rams have functional telemetry collars.

### ***Cathedral Range***

In March and April 2015 we introduced 9 adult ewes, 1 yearling ewe, and 3 adult rams to this newly-designated herd unit in Yosemite National Park. The ewes were moved from the Mt. Langley herd unit and all but the yearling were pregnant. Two rams were from Mt. Baxter and 1 was from Wheeler Ridge. On April 12, 14 days after translocation, 1 ram (S359) died of unknown causes. A mortality investigation noted that he had been scavenged by a black bear. He was 12 years old which is close to the maximum age for rams. Prior to his translocation, we recognized that he might be close to the end of his life. Nevertheless, because of his high genetic diversity and that it was unlikely for him to be competitive for mates in his native herd; we opted to give him a chance to breed in a new herd.

### ***Mt. Gibbs***

Biologists surveyed the Mt. Gibbs herd unit in July and September 2014 and accounted for 10 adult ewes, 3 yearling ewes, 8 lambs, 4 adult rams, and 1 yearling ram. Preliminary analyses of fecal samples from Mt. Gibbs rams in combination with observational data indicate that there may be as many as 9 adult rams in this herd. In October 2014 we replaced 1 nonfunctional ewe collar and 2 ram collars; we also captured and collared 1 yearling ewe. In April 2015 we introduced 5 adult ewes from the Sawmill Canyon and Mt. Langley herds to the Alger Creek area of the Mt. Gibbs herd unit with the intention of creating a new deme in that habitat and continuing genetic

rescue efforts for that population. Sixty-seven percent of adult ewes in this herd unit now wear functional collars, and 3 adult rams have working collars.

Herd	Ewes				Lambs	Rams			Total
	Adult	Yearling	Total	MR Est.		Adult	Yearling	Total	
Olancha	14	2	16		6	2	2	4	26
Laurel	6	1	7		0	4	0	4	11
Big Arroyo	9	0	9		5	4	0	4	18
Langley	45	10	55	68 (50-91)	18	57	8	65	138
Williamson	11	2	13		4	8	2	10	27
Baxter	46	6	52		29	25	8	33	114
Sawmill	38	6	44		17	8	8	16	77
Taboose	2	1	3		0	15	2	17	20
Convict	13	1	14		8	2	2	4	26
Cathedral	9	1	10		0	3	0	3	13
Gibbs	10	3	13*		8	4	1	5	26
Warren	11	0	11		8	7	3	10	29

**Table 1.** Minimum count data and mark-resight estimates (MR Est.) from surveys conducted during the 2014-2015 reporting period. Lambs are not identified by sex. Because translocations occurred after surveys were completed, translocated animals are shown both in their original herd units and in the herd units to which they were translocated.

\*These data do not include ewes translocated into this population in March 2015.

### ***Mt. Warren***

Our usual early summer survey of this herd unit in July of 2014 identified 8 adult ewes, 6 lambs, and 3 yearling rams in this herd unit. Those yearlings were consistent with 3 lambs identified during counts in 2013 and 3 male lamb genotypes identified from lamb fecal samples that year; however, the count of 8 ewes was 3 lower than expected from 2013 data. During subsequent field work in 2014, three ewes and 2 lambs were sighted unexpectedly from a long distance on the top of the Dore Cliffs south of Lundy Canyon, where no ewes have been known since a small female deme that resided in that area perished during the heavy winter of 2010-2011. Genotyping of lamb fecal pellets identified two lambs from samples collected below the Dore cliffs which were different from 6 lambs similarly sampled and identified genetically from the opposite side of Lundy Canyon. This brought the total minimum count for this herd unit to 11 ewes, 8 lambs, and 3 yearling rams. The origin of the 3 ewes seen on the Dore Cliffs in 2014 has not yet been determined.

In October 2014, a biologist observed a group of 7 adult rams including all the collared rams known to be alive (S65, S239, and S185). This observation likely accounted for all of the adult rams in the Mt. Warren herd, bringing the total population size at that time to at least 29.

At the end of October we collared 2 adult ewes, 2 adult rams, and 1 yearling ram in the Mt. Warren herd unit, and replaced 2 adult ram collars. Genetic analysis showed that the yearling ram did not match any of the 3 male lamb genotypes from the 2013 season. This indicates the existence of at least one more ewe than was counted in 2013. One adult ewe died during capture. One collared adult ram was killed by a mountain lion in January 2015. At the end of this reporting period we estimate that the Mt. Warren herd unit contained 10 adult ewes of which 3 have functional telemetry collars, 8 lambs, 3 yearling rams, and 6 adult rams, 5 of which have functional telemetry collars.

### ***Geographic Distribution***

Sierra bighorn now occupy 14 herd units in 4 recovery units spanning a nearly 150-mile stretch of the Sierra Nevada (Figure 1). The Recovery Plan designates 16 herd units historically occupied by Sierra bighorn (USFWS 2007); the recently-completed Translocation Plan demarcates 2 additional herd units identified as suitable for reintroductions (Few et al. 2015). Of these 18 areas, 12 are included in recovery goals for the subspecies. All 12 of these herd units are now inhabited. Over the next few years, continued population monitoring and augmentation of recently-introduced herds will be essential to confirm that bighorn are persisting and flourishing in these areas.

### ***Collaring Efforts***

The Recovery Program strives to maintain a high proportion (30-35%) of marked animals within each herd to facilitate accurate population surveys, monitoring of reproductive success, and cause-specific mortality investigations (Table 2). The data we collect from GPS collars are central to our ongoing studies of habitat selection, seasonal migration, home range use, and survival. We conduct annual captures to create new marks, replace nonfunctional collars, and translocate animals to new habitat in accordance with the Translocation Plan (Few et al. 2015). Captures also give us the opportunity to assess the health and reproductive status of captured animals and to collect samples for genetic analysis.

We carried out 3 captures during this reporting period. Wildlife capture specialists from Leading Edge Aviation captured Sierra bighorn from 8 herds (Mt. Langley, Mt. Baxter, Sawmill Canyon, Bubbs Creek, Taboose Creek, Convict Creek, Mt. Gibbs, and Mt. Warren) using a net-gun fired from a helicopter. During October 18-28, 2014, we captured 62 Sierra bighorn (33 ewes, 27 rams, and 2 lambs) in order to increase the percentage and distribution of collared animals in each herd to aid us in obtaining accurate counts and survival data and to obtain genetic data on rams to allow selection of members of that sex for translocations based on genetic diversity. Three mortalities occurred as a result of this capture. A previously-collared Sawmill Canyon ewe, S231, died of spinal cord trauma when she was caught in the net with another animal. A previously-uncollared Mt. Warren ewe was captured alive under ordinary circumstances but was dead on arrival at basecamp; a field necropsy revealed that the pericardium and the bottom portions of the lungs were filled with blood. S313, a newly-collared Sawmill Canyon ram, moved about half a mile after his release on October 19 and died the next

day; although no injuries or unusual behaviors were evident during his capture, the timing of his death indicates it was probably capture-related.

	Langley		Williamson		Baxter		Sawmill		Taboose		Bubbs		Wheeler		Convict		Gibbs		Warren	
Sex	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
<b>5/1/2014</b>	<b>7</b>	<b>7</b>	<b>5</b>	<b>3</b>	<b>11</b>	<b>3</b>	<b>12</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>3</b>	<b>12</b>	<b>7</b>	<b>3</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>1</b>	<b>4</b>
Additions	+7	0	0	0	+6	+11	+6	+13	0	+3	+2	+2	0	+6	+2	+1	+6	0	+2	+3
Subtractions	-6	-2	-1	-2	-2	-9	-4	-4	0	0	-1	-1	-1	-2	0	-1	0	-1	0	-2
<b>4/30/2015</b>	<b>8</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>15</b>	<b>5</b>	<b>14</b>	<b>13</b>	<b>0</b>	<b>3</b>	<b>5</b>	<b>4</b>	<b>11</b>	<b>11</b>	<b>5</b>	<b>0</b>	<b>10</b>	<b>3</b>	<b>3</b>	<b>5</b>
% Collared	<b>24</b>	<b>9</b>	<b>36</b>	<b>13</b>	<b>38</b>	<b>26</b>	<b>41</b>	*	<b>0</b>	<b>20</b>	<b>50</b>	*	<b>26</b>	<b>55</b>	<b>38</b>	<b>0</b>	<b>67</b>	<b>33</b>	<b>30</b>	<b>83</b>

**Table 2.** Distribution of radio collars by herd unit; new herd units created with introduced animals are not included because 100% of adults are collared. Additions include new captures, recaptures where nonfunctional collars were replaced, and augmentations. Subtractions include removals for translocation, mortalities, censors, and nonfunctional collars. The percent of the population collared is based on functional collars and adult population size from the most recent complete minimum counts. Because the number of collars is always known, but the population data are the minima, what is presented is the maximum %.

\* Indicates a population from which the minimum number of rams is not known; thus, a maximum % collared cannot be determined.

On February 19, 2015 and February 20, 2015, we captured 18 Sierra bighorn rams in an effort to gain a larger pool of individuals known to have high genetic diversity; the Translocation Plan calls for selecting rams with high heterozygosity when initiating new herds (Few et al. 2015).

Over 5 days in March and April 2015 we translocated 31 Sierra bighorn. We reintroduced bighorn to 2 previously-vacant areas of historic habitat by moving 10 ewes and 3 rams to the Cathedral Range in Yosemite National Park and 7 ewes and 4 rams to the Laurel Creek area in Sequoia National Park. We supplemented the Olancha Peak herd, which was reintroduced in 2013, with 2 rams to maximize genetic diversity. We augmented the Mt. Gibbs herd with 5 ewes to increase genetic diversity while also creating a new deme in the Alger Creek basin south of Mt. Wood.

## Sierra Bighorn Population Dynamics

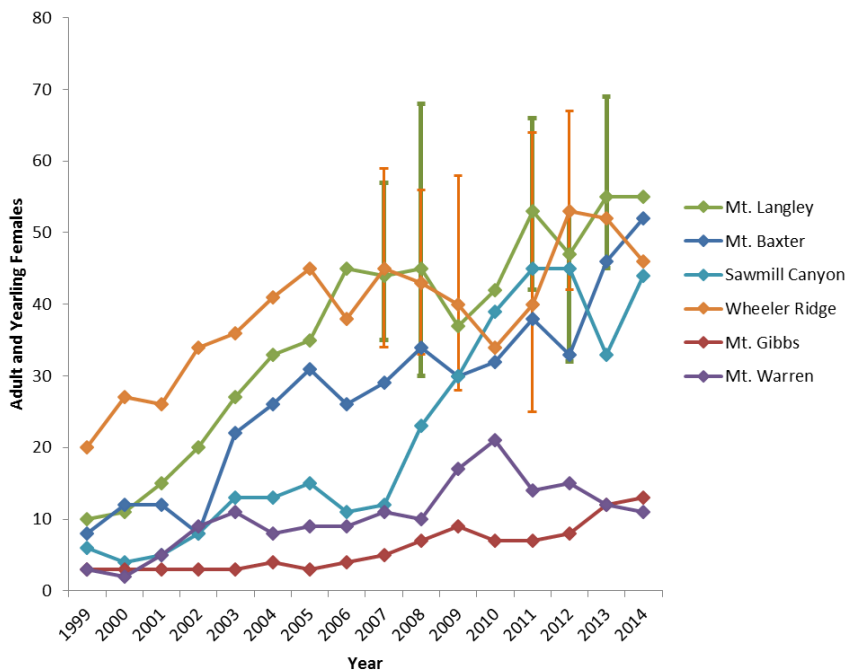
### *Population Size*

When Sierra bighorn were listed as an endangered species in 1999, only about 125 animals were known to exist in the range. We now estimate the total population size at over 600 bighorn (Few et al. 2015); the largest herds contain more than 40 adult and yearling females (Figure 2).

Because we did not obtain a complete survey of the Wheeler Ridge herd this year, the estimate shown was derived from the total females found in the previous year's surveys minus 10 removals for translocation to Big Arroyo and including the 4 yearling ewes

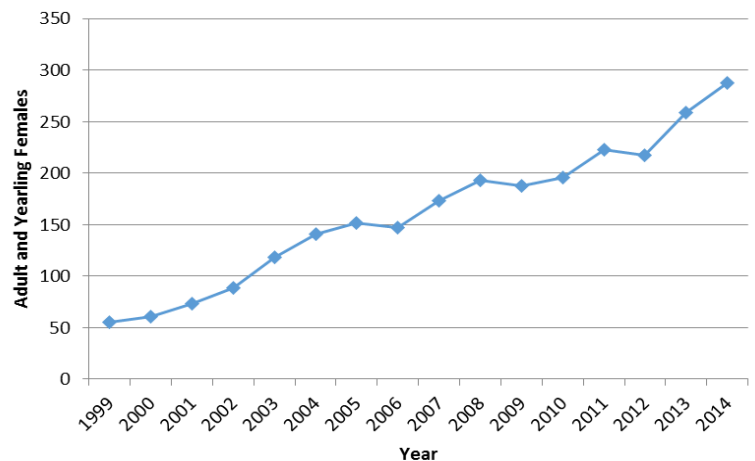
observed during our December survey attempts. The apparent increase in the Sawmill Canyon population is likely the result of a more complete count this year.

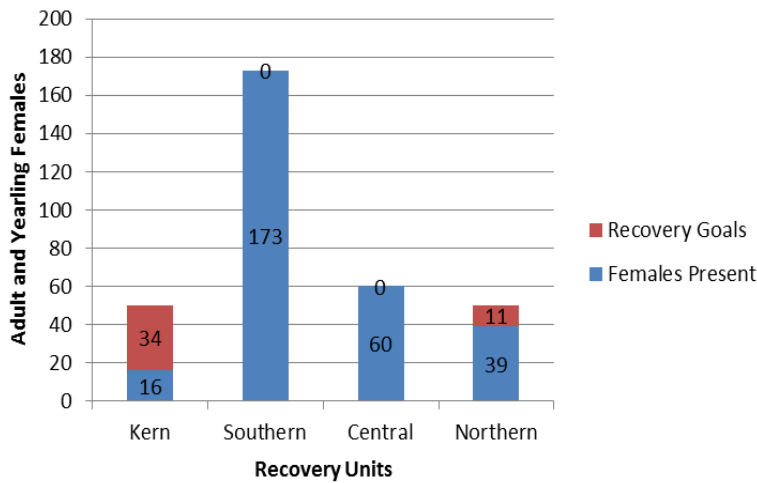
At the end of the 2014-2015 survey season we estimate that there were at least 288 female bighorn in the Sierra (Figure 3). The Recovery Plan recommends downlisting when the female population reaches 305 animals distributed throughout the recovery units (50 in the Kern Recovery Unit, 155 in the Southern Recovery Unit, 50 in the Central Recovery Unit, and 50 in the Northern Recovery Unit; USFWS 2007). We anticipate reaching this goal within 5 years. The Southern and Central Recovery Units exceed the number needed for recovery. The Northern and Kern Recovery Units are 11 and 34 females, respectively, under their recovery goals.



**Figure 3.** Combined population trajectories for adult and yearling ewes from all occupied herds (Olancho Peak, Big Arroyo, Mt. Langley, Mt. Williamson, Bubbs Creek, Mt. Baxter, Sawmill Canyon, Taboose Creek, Wheeler Ridge, Convict Creek, Mt. Gibbs, and Mt. Warren) from 1999-2014 surveys. Population estimates in earlier years lack data for some herds. Some of the significant increases have been due to better data and cannot be construed as population gains; for example, the increase between 2012 and 2013 is the result of more complete counts in 2013.

**Figure 2.** Population trajectories for adult and yearling females from 1999-2014 based on a combination of minimum counts, mark-resight estimates, and reconstructed data for 6 herds in the Sierra Nevada with annual population data. In years when no data were available or when surveys were incomplete, survey totals from the most recent complete count were used. Data from mark-resight estimates are plotted with error bars representing 95% confidence intervals. In all figures, years are defined from May 1 to April 30 of the following year.

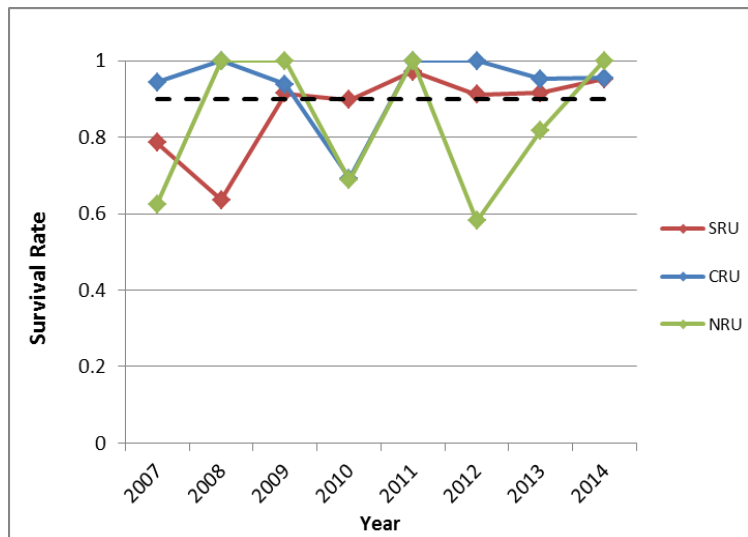




**Figure 4.** Adult and yearling females present in each recovery unit at the end of the 2014-2015 reporting period relative to the distribution of females specified in recovery goals.

**Survival and Cause-Specific Mortality**

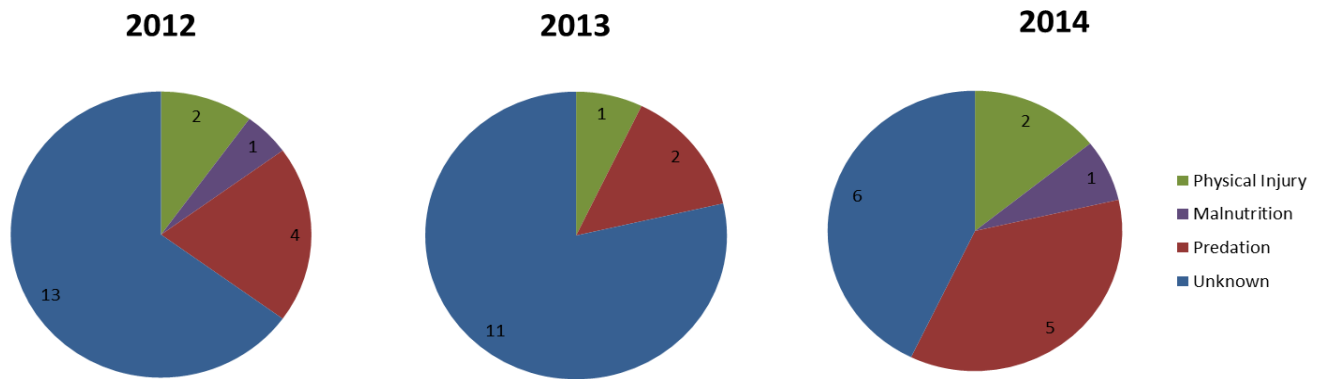
Demographic rates are important tools for evaluating population health and growth. Adult female survival is the primary factor driving population growth or decline in Sierra bighorn herds (Johnson et al. 2010). Maintaining radio collars on 30-35% of females in each herd unit allows us to detect and investigate mortalities; we use this information to calculate annual Kaplan-Meier survival rates of radio-collared ewes (Kaplan and Meier 1958). Following these rates over time gives us an understanding of the year-to-year variation in adult ewe survival and the general trend of this metric in different populations.



**Figure 5.** Annual Kaplan-Meier survival rates of radio-collared ewes in the Northern, Central, and Southern Recovery Units for 2007-2014. The dashed line represents 90% survival.

Between 2007 and 2014, survival rates varied from 0.58 to 1.0 (Figure 5). The lowest survival rates occurred in the Northern Recovery Unit in 2012, in the Central Recovery Unit in 2010, and in the Southern Recovery Unit in 2008. In 2014 survival rates were high in all herd units; survival rates above 90% are associated with population growth (unpublished data).

The Recovery Program prioritizes prompt mortality investigations. Understanding the predominant causes of bighorn mortality can help develop conservation measures that may increase survival and population growth. During this reporting period we detected 14 natural mortalities of collared bighorn (5 female, 9 male; Figure 6). We were unable to determine the cause of 6 of these mortalities. One ram at Mt. Baxter died of malnutrition. One ram at Mt. Langley and one ram at Mt. Williamson died of physical injury (the former due to a fall from a cliff, the latter due to rockfall). We determined that 3 Sierra bighorn (1 ewe at Mt. Langley, 1 ram at Mt. Warren, and 1 ram at Convict Creek) were killed by mountain lions; 2 additional mortalities (1 ram at Mt. Langley and 1 ewe at Olancha Peak) were considered probable mountain lion kills.



**Figure 6.** Cause-specific natural mortalities of radio-collared bighorn from May 1 to April 30 of the following year.

**Reproduction and Recruitment**

Recruitment, the proportion of females that reach reproductive age, can be measured by comparing the number of adult and yearling females observed in each herd unit in one year with the total number of adult females observed there the following year. Assuming accurate minimum counts in both years and 100% survival, the two numbers would be equal. This is rarely the case; yet, in 4 herd units, Olancha Peak, Mt. Langley,

<b>Herd</b>	<b>2013</b>				<b>2014</b>
	Adult Ewes	Yearling Ewes	Total Ewes	Known Gains/Losses	Adult Ewes
<b>Olancha</b>	14	0	<b>14</b>		<b>14</b>
<b>Langley</b>	38	9	<b>47</b>	-2	<b>45</b>
<b>Baxter</b>	40	6	<b>46</b>		<b>46</b>
<b>Convict</b>	12	1	<b>13</b>		<b>13</b>
<b>Gibbs</b>	11	1	<b>12</b>	-1	<b>10</b>
<b>Warren</b>	7	4	<b>11</b>		<b>11</b>

**Table 3.** Comparison of the number of adult ewes in 2014 to the total number of ewes in 2013 after accounting for recruitment of yearlings and known losses or gains from mortalities or translocations. Populations with poor minimum counts in either year are not included.

Mt. Baxter and Convict Creek (Table 3) the 2014 totals of adult ewes corresponded exactly to the number of adult and yearling ewes observed in 2013 after known losses were subtracted. 2014 totals in the two remaining herd units, Mt. Gibbs and Mt. Warren (Table 3), are only one ewe short of projected totals based on 2013 data. These findings suggest high adult survival and yearling recruitment in all of those herd units.

Additional metrics to assess herd health are the observed ratio of yearlings to ewes and the ratio of lambs to ewes which indicate recruitment and fecundity (reproductive output depending on the age at which lambs are observed), respectively. Yearling to ewe ratios vary from 0.23 to 0.44 in 2014 (Table 4) which indicate positive or stable population growth assuming high adult survival. Lamb to ewe ratios vary from 0.33 to 0.8 in 2014 (Table 4) which are within the healthy range for these populations indicating good reproductive success.

<i>Herd</i>	<i>Lamb:Ewe</i>	<i>Total Yearling:Ewe</i>
<b>Olancha</b>	0.33	0.44
<b>Langley</b>	0.42	0.42
<b>Baxter</b>	0.74	0.36
<b>Convict</b>	0.62	0.23
<b>Gibbs</b>	0.8	0.40
<b>Warren</b>	0.72	0.27

**Table 4.** Ratios of juvenile age classes to ewes from 2014. Populations with poor minimum counts in either year are not included.

Another way to assess lamb survival is to compare the total number of yearlings observed in each herd unit with the number of lambs observed there in the previous survey season. Observed lamb survival between 2013 and 2014 varied from 0.5 to 1.0 (Table 5). These values represent lamb survival between annual surveys, which occur months after lambs are born. Thus these estimates of lamb survival do not include survival rates of neonatal lambs. While a 50% survival rate may seem low compared to adult survival, it is not unusual for juvenile age classes.

<i>Herd</i>	<i>2013 Lambs</i>	<i>2014 Yearlings</i>	<i>Lamb Survival</i>
<b>Olancha</b>	8	4	0.50
<b>Baxter</b>	24	14	0.58
<b>Convict</b>	5	3	0.60
<b>Gibbs</b>	7	4	0.57
<b>Warren</b>	3	3	1.00

**Table 5.** Lamb survival estimated by comparing the number of yearlings in 2013 to the number of lambs in 2012. All data are from minimum counts. Populations with incomplete minimum counts in either year are not included.

## **New Findings**

### ***Taboose Creek Occupation***

For several years, the Recovery Program has suspected that a natural colonization of the Taboose Creek herd unit by Sawmill Canyon bighorn was underway (Stephenson et al. 2012). Observations made during this reporting period and collars deployed in these 2



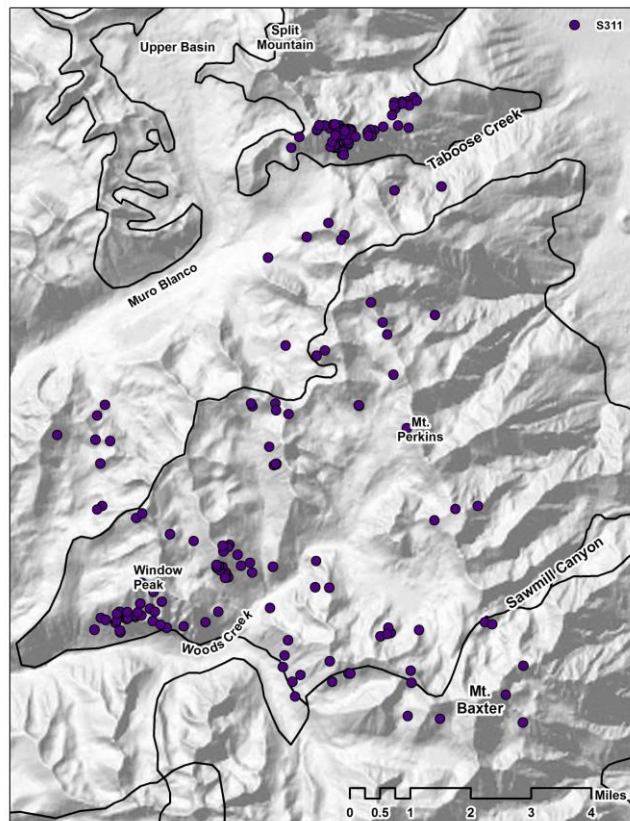
herd units confirm that numerous rams make regular use of both areas. It is likely that a population of rams also resides permanently in the Taboose Creek herd unit, and several recent sightings of adult and yearling ewes strongly suggest that a reproductive population exists here as well. The Recovery Program will continue to make investigation of this herd unit a priority in 2015-2016.

### ***New Habitat Use, Possible Range Expansions, and Long-Distance Movements***

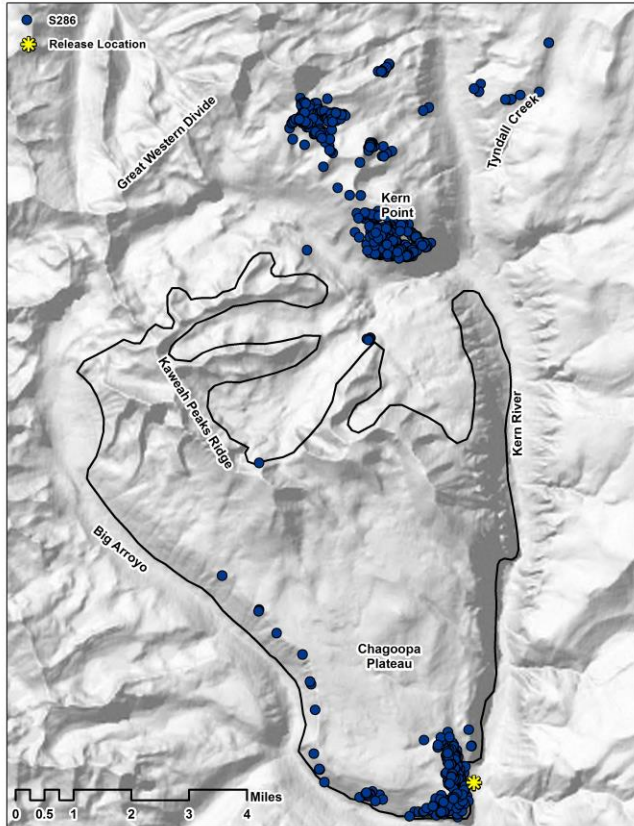
Deployed GPS collars provide insight into habitat use and long-distance movements by Sierra bighorn. In the Mt. Warren herd unit, a small ewe group has continued to use the Camiaca Peak area, where collared ewe S89 moved in November 2013. A summer survey also located 3 adult ewes and 2 lambs on Dore Peak, an area south of Lundy Canyon where no bighorn have been seen since avalanches during the heavy winter of 2010-2011 killed all animals known to use that habitat. It is possible that this small ewe group has persisted undetected in the area since 2010; an alternative explanation is that occupation of this area represents a recent range expansion or repossession for ewes in the Mt. Warren herd.

Studies of bighorn rams have often documented long-range movements, particularly during the rut (Geist 1971, Leslie and Douglas 1979, O'Brien et al. 2014). Deploying collars on Sierra bighorn rams allows us to document the significant distances that specific individuals travel. S311, a 9-year-old ram first captured in October 2014 in the Window Peak area of the Sawmill Canyon herd unit, traveled throughout the Sawmill Canyon herd unit and into the northern end of the Mt. Baxter herd unit before spending most of the winter on Cardinal Peak in the southern Taboose Creek herd unit (Figure 7).

These movements suggest the Sawmill Canyon, Mt. Baxter, and Taboose Creek herds function as a metapopulation with gene flow occurring between herds.



**Figure 7.** Movements of S311, a 9-year-old Sawmill Canyon ram, between October 2014 and March 2015.

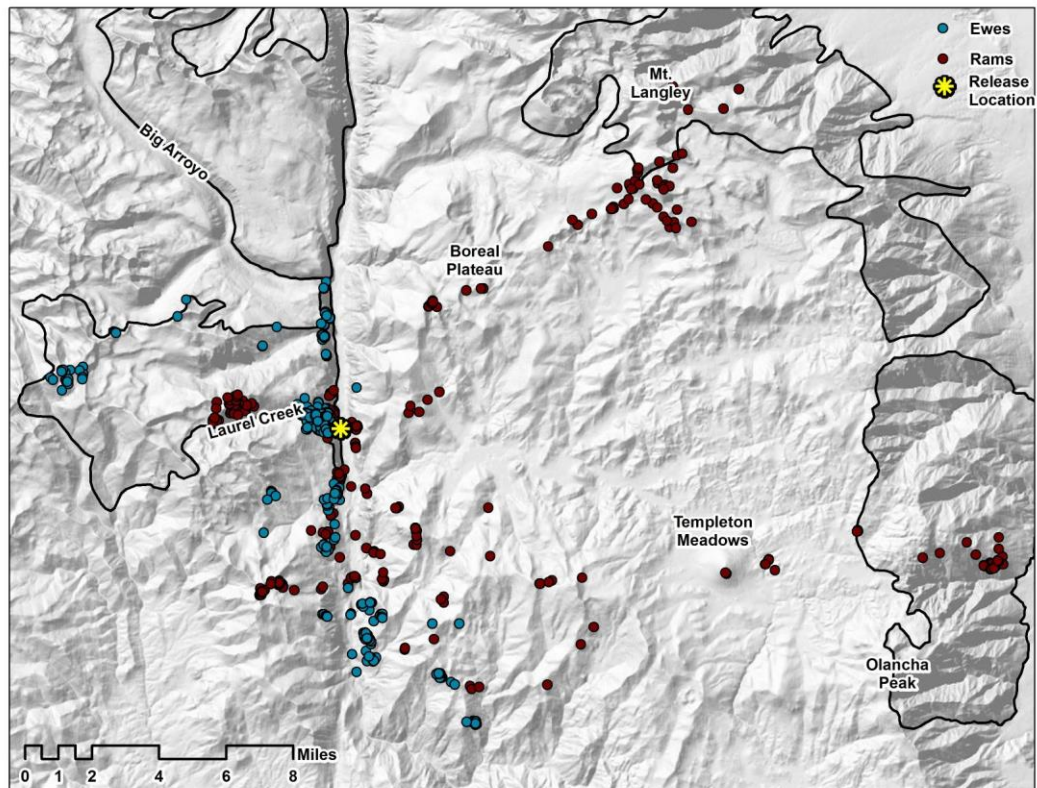


**Figure 8.** Movements of Big Arroyo ewe S286 since her translocation in March 2014.

**Habitat Exploration by Naïve Animals**

Translocating Sierra bighorn often results in unanticipated movements by the naïve animals as they explore their new habitat. S286, a Wheeler Ridge ewe who was translocated to the Big Arroyo in March 2014, left that drainage on June 30, 2014 and traveled north, accompanied only by her lamb. She briefly crossed the Kern River north of Tyndall Creek, then crossed back to the Kern Ridge and eventually settled on Kern Point, where she has remained since late July 2014 (Figure 8). No other collared ewe has ever traveled to her location.

The 11 bighorn translocated to the Laurel Creek herd unit in March 2014 have since dispersed widely (Figure 9). Some traveled over 6 miles south to Coyote Peaks while others crossed the Kern River to the east, and 3 rams left the herd unit boundary for the Boreal



**Figure 9.** Movements of Laurel Creek animals after translocation in March 2015.

Plateau, just west of the Mt. Langley herd unit. Three ewes, S377, S378, and S382, have remained east of the Kern River near the Hell-For-Sure drainage for several weeks. We will continue to monitor these animals over the 2015 summer, when the search for high-elevation habitat may draw them back within the Laurel Creek herd unit boundary.

By contrast, the animals translocated to the Cathedral Range herd unit in Yosemite National Park have all remained in the immediate vicinity of their release site, on the slopes above Washburn Lake.

## Research Priorities

### ***Genetic Research***

Sierra bighorn are recognized for their genetic uniqueness as a separate subspecies; therefore, recovery efforts for this taxon are ultimately about conserving and enhancing this unique gene pool. Sierra bighorn survived epizootics caused by past domestic sheep grazing only in three herds in the southern Owens Valley, but they did not survive without genetic scars. They exhibit signatures of a genetic bottleneck and have the lowest genetic diversity measured for free-ranging native populations in the desert region. Genetic diversity in Sierra bighorn herds is sufficiently low that individuals at the lowest end of the heterozygosity (individual genetic diversity) spectrum may be less fit (Johnson et al. 2011). This presents a potential opportunity to increase genetic diversity in small and reintroduced populations to enhance population fitness and success.

Various authors have recommended that large numbers of bighorn sheep (more than 20) be used in reintroductions to maximize the representation of genetic diversity in new herds and to minimize founder effects (Fitzsimmons et al. 1997, Griffiths et al. 1982, and Wolf et al. 1996). However, Sierra bighorn translocation stock is both limited in the numbers of animals available and in the genetic diversity of those animals. With careful genetic planning including selective captures of individual bighorn, it might be possible to initiate highly diverse herds with fewer animals by maximizing genetic diversity in the founding gene pool.

To explore different genetic management options, we employed sampling experiments of existing data to examine the genetic consequences of three different approaches that might be used for founding populations: 1) all individuals selected for higher heterozygosity, 2) all individuals selected at random, and 3) all ewes selected randomly but rams selected individually for higher heterozygosity. In our sampling experiments, we measured average heterozygosity at 17 microsatellite loci and interpreted this as a direct measurement of genetic diversity. However, we did not look at allele structure or loss at the individual loci.

These sampling experiments revealed that (1) the first approach can produce founding gene pools with notably higher heterozygosity than any existing population, but that there are too few alleles remaining in the Sierra bighorn gene pool to support that level of genetic diversity over time (heterozygosity excess); (2) the third approach of selecting

only high heterozygosity rams provides a significant genetic improvement over random selection of bighorn, does not produce a large heterozygosity excess, and minimizes the number of sheep that need to be selectively recaptured; (3) genetic diversity is improved for this third approach if the rams are selected from multiple populations; and (4) random selection of ewes from a single population mating with selected rams resulted in genetic diversity similar to the remaining native populations. As a result of these findings, all recent reintroductions (Olancho Peak, Laurel Creek, Big Arroyo, and the Cathedral Range) initially translocated 7-10 pregnant females randomly captured from a single herd and 3-4 specific males selected for high individual heterozygosity from multiple source herds.

Greater selectivity in the individuals used to initiate a population should allow for fewer animals to represent variation in the gene pool. However, a downside of a smaller founding population is that matings between close relatives are more likely to occur, and such inbreeding will work against the advantages of the initial selectivity. The Olancho Peak herd was reintroduced in 2013 and augmented in 2014. This is the only recently-reintroduced herd where bighorn have been present long enough that rams now have the potential opportunity to breed their daughters. Of 6 lambs that were born in 2014 and survived to be sampled in late summer, genetic and observational studies found that 3 belonged to pregnant ewes moved there in 2014. Of the other 3, 2 are females that have the potential to be bred by their fathers. One of these was born very late, thus is very unlikely to breed in 2015 as a yearling. In 2015 we added 2 high heterozygosity rams to this population to dilute the probability of a father-daughter mating. We will consider this strategy in our other newly created populations as well.

It is at small population sizes that we can have the greatest influence on genetic population structure by adding high heterozygosity individuals. Within Sierra bighorn, the Mt. Gibbs herd unit stands out in showing clear signs of low genetic diversity, which is consistent with its demographic history and substantial isolation (Stephenson et al. 2012). This has raised the question of whether the population's growth rate might be improved by increasing genetic diversity through a genetic rescue by selective augmentation with high heterozygosity individuals. To increase the genetic diversity of this herd we have implemented two approaches, both of which used translocated ewes selected for high genetic diversity. First, in 2013, we augmented the existing ewe group (7 ewes) on Mt. Gibbs with 3 high heterozygosity ewes, two of which were pregnant. Second in 2015, we created a new deme of high heterozygosity ewes in the Alger Creek area on the south side of Mt. Wood, an area Mt. Gibbs rams have used regularly. This new deme was founded with 3 ewes translocated from the Sawmill Canyon herd and 2 ewes from the Mt. Langley herd, all of which were pregnant. This results in the current total 15 adult ewes of which 8 (>50%) are ewes selected for high genetic diversity.

### ***Pine Creek Recreation Study***

Over the last ten years, the Pine Creek area of the Wheeler Ridge herd unit has become an increasingly popular destination for hikers, sightseers, and rock climbers. Pine Creek

Canyon is also routinely used as lambing habitat by Wheeler Ridge ewes. In 2014-2015 the Recovery Program began a study to develop a baseline estimate of current recreational use of this canyon. Tracking recreation over time will allow us to quantify this trend and detect any relationship between increased recreation and Sierra bighorn use of Pine Creek.

### ***Home Range Analysis***

Recovery Program staff used a dataset containing a decade's worth of GPS collar locations to define the home ranges of Sierra bighorn both at the individual and at the population level. They examined variation in home range size from year to year and in different seasons, as well as the relationship between home range size and population size. The results of this study may contribute to a better understanding of habitat selection and availability. Results will be summarized in next year's report.

### ***Resource Selection Function***

Species distribution models (SDMs) provide a measure of the importance of ecological variables that correlate with species occurrence. These models can provide a framework for the implementation of adaptive management in the recovery of Sierra bighorn. Model results can be applied to spatial data to produce maps representing the likelihood of species occurrence. In a study currently underway, we used one type of SDM, a resource selection function (RSF) generated by logistic regression, to examine how species rarity affects model predictions of the likelihood of occurrence.

This model and a winter RSF that accounts for altitudinal migration identified two large patches of bighorn habitat unrecognized by the Recovery Plan in remote geographic areas where there is a paucity of historic occurrence data (the Cathedral Range and Black Divide herd units) compared to more easily accessible areas east of the Sierra crest (Wehausen and Jones 2014). By quantifying habitat quality, these models will directly inform translocation efforts, allowing the Recovery Program to identify suitable areas for future Sierra bighorn reintroductions.

## **Public Outreach**

### ***Educating the Community***

Community support is crucial to the success of conservation efforts for the recovery of Sierra bighorn. Because these animals are rare and occupy remote areas, most residents of the Eastern Sierra have never seen a Sierra bighorn in the wild and know very little about them. The Recovery Program partners with the Sierra Nevada Bighorn Sheep Foundation (SNBSF) to increase public awareness of this endangered subspecies and conservation work on its behalf.

The SNBSF continues to expand its educational programs. Since May 2014, the SNBSF has planned and carried out 23 public events, reaching over 1,500 people throughout the region. The events range from booths at local celebrations like Bishop Earth Day, CDFW's Trout Fest, and the Tri-County Fair, to school programs in which children

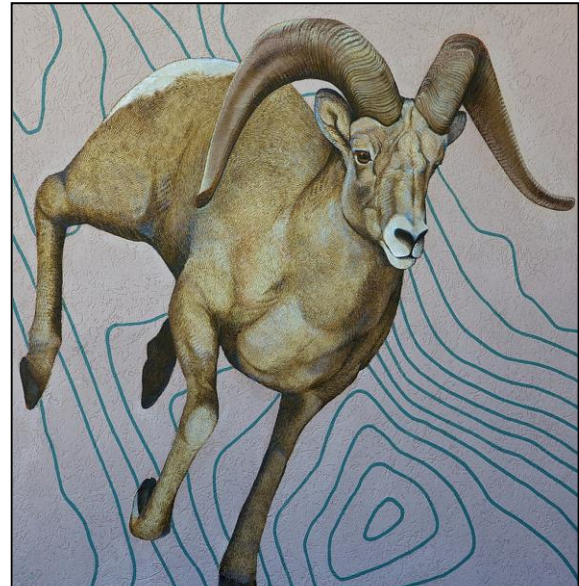


simulate the capture and processing of a toy bighorn sheep, entering the animal's measurements into a datasheet, fitting it with a radio collar, and using its heterozygosity score to determine its suitability for translocation.

In conjunction with the SNBSF, the Recovery Program also led 2 free public field trips in February and March 2015. Over 60 participants were given the opportunity to observe groups of Sierra bighorn on winter ranges, while Recovery Program staff members and SNBSF volunteers answered questions and provided historical and biological context.

### ***Permanent Outreach Displays***

The Migrating Mural, created by scientific illustrator Jane Kim, is a series of paintings depicting life-size Sierra bighorn on buildings along the Highway 395 corridor. Kim hopes the murals will bring public attention to the plight of Sierra bighorn and raise support for recovery efforts. The final mural in the series, painted on the Forest Service Visitor Center in Lee Vining, was completed in May 2014. Other Migrating Mural scenes appear at the Bishop Gun Club, Sage to Summit running store in Bishop, the Mt. Williamson Motel in Independence, and the Lone Pine Airport, spanning most of the north-south range of bighorn in the Sierra.



**Figure 10.** Detail from Jane Kim's Migrating Mural in Lee Vining; photograph courtesy of Jane Kim, [www.inkdwell.com](http://www.inkdwell.com).

### **Future Recovery Actions**

The Translocation Plan completed in 2015 outlines the augmentations and reintroductions the Recovery Program may carry out within the next 10 to 20 years. These translocations are a means of recreating the population distribution that characterized the subspecies before endangerment, while also increasing the genetic diversity and long-term viability of smaller herd units (Few et al. 2015). No translocations or augmentations are scheduled during the next reporting period.

Downlisting to threatened status will not occur until the risk of contact between wild bighorn and domestic sheep is eliminated. The Recovery Program will increase its focus on reducing the risk of contact between wild bighorn and domestic sheep. Program leaders will continue working to mitigate this risk in cooperation with land management agencies, landowners, and grazing permittees.

Since its inception in 2000, the Recovery Program has helped to catalyze and document significant increases in the size and distribution of the Sierra bighorn population. The 2014-2015 reporting period witnessed the realization of a major objective: all 12 herd units included in recovery goals for the subspecies are now occupied. With additional translocations, continued population growth, and further steps taken to mitigate disease risk, Sierra bighorn may achieve Recovery Plan goals for downlisting to threatened status within the next 5 years.

### **Literature Cited**

Few, A.P., J.M. Runcie, D.W. German, J.D. Wehausen, and T.R. Stephenson. 2013. 2012-2013 Annual Report of the Sierra Nevada Bighorn Sheep Recovery Program. California Department of Fish and Wildlife. 19pp.

Few, A.P., K. Knox, D. W. German, J. D. Wehausen, and T. R. Stephenson. 2015. 2015 Translocation Plan for Sierra Nevada Bighorn Sheep: A Focus on Strategic Planning. California Department of Fish and Wildlife. 54pp.

Geist, V. 1971. Mountain Sheep: A Study in Behavior and Evolution. The University of Chicago Press, Illinois, USA.

Johnson, H. E., L. S. Mills, T. R. Stephenson, and J. D. Wehausen. 2010. Population-specific vital rate contributions influence management of an endangered ungulate. *Ecological Applications* 20: 1753-1765.

Kaplan, E. L. and P. Meier. 1958. Nonparametric estimation from incomplete observations. *Journal of the American Statistical Association* 53: 457-481.

Lawrence, P. K., S. Shanthalingam, R. P. Dassanayake, R. Subramaniam, C. N. Herndon, D. P. Knowles, F. R. Rurangirwa, W. J. Foreyt, G. Wayman, A. M. Marciel, S. K. Highlander, and S. Srikumaran. 2010. Transmission of *Mannheimia haemolytica* from domestic sheep (*Ovis aries*) to bighorn sheep (*Ovis canadensis*): unequivocal demonstration with green fluorescent protein-tagged organisms. *Journal of Wildlife Diseases* 46:706-717, and erratum 46: 1346-1347.

Leslie, D. M., and C. L. Douglas. 1979. Desert bighorn sheep of the River Mountains, Nevada. *Wildlife Monographs* 66:1-56.

O'Brien, J. M., C. S. O'Brien, C. McCarthy, and T. E. Carpenter. Incorporating foray behavior into models estimating contact risk between bighorn sheep and areas occupied by domestic sheep. *Wildlife Society Bulletin* 38:321-331.

Runcie, J. M., A. P. Few, D. W. German, J. D. Wehausen, and T. R. Stephenson. 2014. 2013-2014 Annual Report of the Sierra Nevada Bighorn Sheep Recovery Program. California Department of Fish and Wildlife. 19pp.

Stephenson, T. R., J.D. Wehausen, A.P. Few, D.W. German, D.F. Jensen, D. Spitz, K. Knox, B.M. Pierce, J.L. Davis, J. Ostergard, and J. Fusaro. 2012. Annual Report of the Sierra Nevada Bighorn Sheep Recovery Program: A Decade in Review. California Department of Fish and Game. 57 pp.

Wehausen, J. D. and F. L. Jones. 2014. The historic distribution of bighorn sheep in the Sierra Nevada, California. California Fish and Game 100:417-435.

Wehausen, J. D., R. R. Ramey II, and S. T. Kelley. 2011. Domestic sheep, bighorn sheep, and respiratory disease: a review of experimental evidence. California Fish and Game 97: 7-24.

Wild Sheep Working Group. 2012. Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat. Western Association of Fish and Wildlife Agencies.

U.S. Fish and Wildlife Service. 2007. Recovery Plan for the Sierra Nevada Bighorn Sheep. Sacramento, California. 199 pp.

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# Epizootic Pneumonia of Bighorn Sheep following Experimental Exposure to *Mycoplasma ovipneumoniae*

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## Abstract

**Background:** Bronchopneumonia is a population limiting disease of bighorn sheep (*Ovis canadensis*). The cause of this disease has been a subject of debate. Leukotoxin expressing *Mannheimia haemolytica* and *Bibersteinia trehalosi* produce acute pneumonia after experimental challenge but are infrequently isolated from animals in natural outbreaks. *Mycoplasma ovipneumoniae*, epidemiologically implicated in naturally occurring outbreaks, has received little experimental evaluation as a primary agent of bighorn sheep pneumonia.

**Methodology/Principal Findings:** In two experiments, bighorn sheep housed in multiple pens 7.6 to 12 m apart were exposed to *M. ovipneumoniae* by introduction of a single infected or challenged animal to a single pen. Respiratory disease was monitored by observation of clinical signs and confirmed by necropsy. Bacterial involvement in the pneumonic lungs was evaluated by conventional aerobic bacteriology and by culture-independent methods. In both experiments the challenge strain of *M. ovipneumoniae* was transmitted to all animals both within and between pens and all infected bighorn sheep developed bronchopneumonia. In six bighorn sheep in which the disease was allowed to run its course, three died with bronchopneumonia 34, 65, and 109 days after *M. ovipneumoniae* introduction. Diverse bacterial populations, predominantly including multiple obligate anaerobic species, were present in pneumonic lung tissues at necropsy.

**Conclusions/Significance:** Exposure to a single *M. ovipneumoniae* infected animal resulted in transmission of infection to all bighorn sheep both within the pen and in adjacent pens, and all infected sheep developed bronchopneumonia. The epidemiologic, pathologic and microbiologic findings in these experimental animals resembled those seen in naturally occurring pneumonia outbreaks in free ranging bighorn sheep.

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**Data Availability:** The authors confirm that all data underlying the findings are fully available without restriction. All relevant data are within the paper.

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## Introduction

Bighorn sheep are a North American species that has failed to recover from steep declines at the turn of the 20<sup>th</sup> century despite strict protections and intensive management, and two populations (Sierra Nevada and Peninsular) are currently classified as endangered [1]. Epizootic pneumonia is limiting bighorn sheep population restoration and as such, the etiology is of considerable interest. The first appearance of the disease in a population is typically in the form of epizootics that affect animals of all ages and is sometimes accompanied by high (>50%) mortality rates. Subsequently, epizootics affecting primarily lambs may occur for decades [2]. Various causes have been proposed for this disease, including lungworms (*Protostrongylus* sp.) [3–6], Pasteurellaceae, especially *Mannheimia* (*Pasteurella*) *haemolytica*, [7–12] and more recently, *Mycoplasma ovipneumoniae* [13–16]. In a recent

comparative review of the evidence supporting each of these possible etiologies we concluded that *M. ovipneumoniae* was most strongly supported as the primary epizootic agent of bighorn sheep pneumonia [14]. However, the only two previous experimental challenge studies with *M. ovipneumoniae* either did not reproduce disease [13] or were confounded by challenges with other agents [16]. The objective of this study was to improve upon previous investigations to better assess the outcome of experimental introduction of *M. ovipneumoniae* to naive bighorn sheep.

## Methods

### Ethics statement

This study was carried out in accordance with the recommendations in the Guide for the Care and Use of Laboratory Animals of the National Institutes of Health and in conformance with

United States Department of Agriculture animal research guidelines, under protocols #03854 and #04482 approved by the Washington State University (WSU) Institutional Animal Care and Use Committee. As described in those protocols, euthanasia was performed by intravenous injection of sodium pentobarbital for animals observed to be in severe distress associated with pneumonia during the study and prior to necropsy examination for surviving animals at the end of each experiment.

### Experimental aims

Experiment 1 was conducted to investigate the transmission of *M. ovipneumoniae* to bighorn sheep and their subsequent development of disease, using an infected domestic sheep source. Experiment 2 was conducted to investigate experimental direct *M. ovipneumoniae* infection of a single bighorn sheep and the subsequent transmission of this agent to conspecifics. Both experiments were conducted in multiple pens separated by short distances, which allowed investigation of transmission to both commingled and non-commingled animals.

### Experimental animals

All experimental animals originated from herds and flocks unexposed to *M. ovipneumoniae* as determined by repeated testing with both serology on blood serum and PCR on enriched nasal swab cultures (using the methods described later in the 'Microbiological testing' section). In Experiment 1, three hand-reared bighorn sheep (yearling rams BHS #82 and #89 and yearling ewe BHS #07) that originated from a captive flock at WSU and three purchased domestic sheep (adult ewes DS #00 and #01 and yearling ewe DS #LA) were co-housed in three 46 m<sup>2</sup> pens, with one domestic and one bighorn sheep per pen. Pens were separated by 7.6–12 m. Experiment 1 animals had all been commingled in a single pen for 104 days immediately prior to the beginning of this experiment, as previously described [15]. One of the four bighorn sheep used in that prior study had died of *M. haemolytica* pneumonia, while the other three, which had demonstrated no signs of respiratory disease in that study, were used in experiment 1. In Experiment 2, wild bighorn sheep captured from the Asotin Creek population in Hells Canyon were housed in two 700 m<sup>2</sup> pens, 7.6 m apart, with three animals per pen (Pen #1: adult ewe BHS #40, yearling ewe BHS #38, and yearling ram BHS #39; Pen #2: adult ewes BHS #41 and #42 and adult ram BHS #C). The study pens had either never previously housed domestic or bighorn sheep (pen 1 in experiment 1; both pens in experiment 2) or had been rested for greater than one year since their previous occupancy by any *M. ovipneumoniae* infected sheep (pens 2 and 3 in experiment 1) prior to these experiments.

### Experimental design

**Experiment 1.** A domestic ewe (DS #00) was placed in isolation and experimentally infected with *M. ovipneumoniae*. The inoculum consisted of ceftiofur-treated (100 ug/ml, 2 hrs, 37°C; Pfizer, Florham Park, NJ) nasal wash fluids from a domestic sheep naturally colonized with *M. ovipneumoniae* [16]. Following ceftiofur treatment, no aerobic bacterial growth was observed from the nasal wash fluids cultured under conditions expected to permit growth of *M. haemolytica*, *B. trehalosi*, or *P. multocida* (Columbia blood agar with 5% sheep blood, 35°C, overnight, 5% CO<sub>2</sub>). DS #00 was then challenged with the treated nasal wash fluid by infusion of 15 ml in each nares, 10 ml orally and 5 ml into each conjunctival sac. Subsequent nasal swab samples obtained on days 1, 2, 4 and 7 post-challenge were all PCR positive for *M. ovipneumoniae* using the method described later in the 'Microbiological testing' section confirming that the experimental infection

had been successful. On post challenge day 7, DS #00 was introduced into pen #1 with BHS #82. Following commingling, DS #00 and BHS #82 were restrained for collection of nasal swab samples on days 1, 2, 4, 7, 14, 21, 28, and subsequently at 30 day intervals until the experiment was terminated. Rectal temperatures were recorded from both sheep approximately twice each week. Sheep in pens #2 (BHS #89 and DS #01) and #3 (BHS #07 and DS #LA) were restrained for rectal temperature determination and collection of nasal swabs for microbiology at approximately monthly intervals. All pens were observed daily for clinical signs of respiratory disease. The experiment was conducted October 2009–January 2010.

**Experiment 2.** BHS #39 was inoculated with *M. ovipneumoniae* just prior to its release into pen #1 with non-inoculated BHS #38 and #40. Non-inoculated BHS #C, #41, and #42 were housed in pen #2 on the same day. The inoculum for BHS #39 was prepared as described for that used in experiment 1 but originated from a different domestic sheep source. In lieu of computation of colony forming units, which is not possible for *M. ovipneumoniae* due to inconsistent growth on plated media, viable *M. ovipneumoniae* counts in the inoculum were determined using most probable number (MPN) using a custom 3×4 format: Triplicate enrichment broth tubes were inoculated at each of four decimal dilutions (10<sup>-2</sup>–10<sup>-5</sup>) of the treated nasal wash fluid [17], incubated (72 hrs, 35C) then PCR was used to detect growth of viable *M. ovipneumoniae*. The treated fluid was determined to contain 930 MPN/ml (95% confidence interval, 230 to 3800 MPN). Two of the bighorn sheep (BHS #38 and #39) in pen 1 were recaptured by drive net on day 21 of the experiment for nasal swab sampling to detect *M. ovipneumoniae* infection; otherwise, no live animal sampling was conducted in experiment #2 to reduce the risk of traumatic injury of the wild bighorn sheep involved. The experiment was conducted December 2011–June 2012.

**Biosecurity.** In both experiments, routine biosecurity measures included: 1) the pens containing the single *M. ovipneumoniae*-challenged animals (exposed pens) were located downwind of the prevailing wind direction from the pens containing no experimentally *M. ovipneumoniae* exposed animals (clean pens), 2) order of entry rules were established so that on any single day exposed pens were routinely entered by animal care staff for feeding and cleaning only after all work in clean pens had been completed, and 3) personal protective equipment (coveralls and boots) used in exposed pens were either not reused, or were sanitized prior to use in clean pens.

**Clinical scores.** Clinical score data were determined using the following cumulative point system: observed anorexia (1), nasal discharge (1), cough (2), dyspnea (1), head shaking (1), ear paresis (1) and weakness/incoordination (1).

**Microbiological testing.** Routine diagnostic testing performed by the Washington Animal Diagnostic Laboratory (fully accredited by the American Association of Veterinary Laboratory Diagnosticians) included detection of *M. ovipneumoniae*-specific and small ruminant lentivirus-specific antibodies in serum samples using competitive enzyme-linked immunosorbent assays (cELISA) [14,18,19], detection of *M. ovipneumoniae* colonization by broth enrichment of nasal swabs followed by *M. ovipneumoniae*-specific PCR testing of the broths [20,21], detection of Pasteurellaceae in pharyngeal swab samples by aerobic bacteriologic cultures, and detection of exposure to parainfluenza-3, border disease, and respiratory syncytial viruses by virus neutralization antibody assays applied to serum samples.

PCR tests specific for detection of *M. haemolytica*, *B. trehalosi*, and *P. multocida*, and *lktA* (the gene encoding the principal

virulence factor of *M. haemolytica* and *B. trehalosi*) were applied to DNA extracted from pneumonic lung tissues using previously described primers (Table 1) and methods with minor modifications. All reactions were conducted individually in 20 µL volumes containing 80–300 ng of template DNA. For *M. haemolytica*, *B. trehalosi*, *lktA* and *P. multocida*, reactions contained 0.5 units of HotStar Taq DNA polymerase (Qiagen), 2 µL 10x PCR buffer (Qiagen), 4 µL Q-solution (Qiagen), 40 µM of each dNTP (Invitrogen). The *M. ovipneumoniae* reaction used QIAGEN Multiplex PCR mix. Primers were used at final concentrations of 0.2 µM (*M. haemolytica*, *B. trehalosi*, *P. multocida*, and *M. ovipneumoniae*) or 0.5 µM (leukotoxin A). Each reaction included an initial activation and denaturation step (95°C, 15 min) and a final 72°C extension step (10 min for Mhgcp-2, lktA, lktA set-1, and LM primers; 9 min for KMT primers; 5 min for Btsod and Mhgcp primers). Cycling conditions were as follows: *M. ovipneumoniae*, 30 cycles of 95°C for 30 s, 58°C for 30 s, 72°C for 30 s; *B. trehalosi* and *M. haemolytica* (Mhgcp and Btsod primers), 35 cycles of 95°C for 30 s, 55°C for 30 s, 72°C for 40 s; *P. multocida* and *lktA* (lktA primers), 30 cycles of 95°C for 60 s, 55°C for 60 s, 72°C for 60 s; *M. haemolytica* (Mhgcp-2 primers), 40 cycles of 95°C for 30 s, 54°C for 30 s, 72°C for 30 s; *lktA* (lktA set-1 primers), 40 cycles of 95°C for 30 s, 52°C for 30 s, 72°C for 40 s. Leukotoxin expression was detected in Pasteurellaceae isolates by MTT dye reduction cytotoxicity assay as described previously [22].

The 16S–23S ribosomal operon intergenic spacer (IGS) regions of *M. ovipneumoniae* recovered from animals in these studies were PCR amplified (Table 1) and sequenced as previously described [23].

**16S rDNA analyses to identify the predominant bacterial flora in pneumonic lung tissues.** In previous studies, culture-independent evaluation of the microbial flora of lung tissues in naturally occurring bighorn sheep pneumonia revealed a polymicrobial flora late in the disease course [13,23]. For comparison, we applied the same methods to lung tissues of the experimentally challenged animals in this study. Note that more sensitive

detection of specific respiratory pathogens was provided by the PCR assays described earlier, whereas these 16S studies were designed instead to identify the numerically predominant bacteria in affected lungs. The library size used was based on the binary distribution to provide a 95% chance of detection of each taxon comprising 10% or more of the ribosomal operon frequency in the source tissue. Two 1 g samples of pneumonic lung tissues were aseptically collected from sites at least 10 cm apart, homogenized by stomaching, and DNA was extracted (DNeasy tissue kit; Qiagen, Valencia, CA) from 100 µL aliquots of each homogenate. 16S rDNA segments were PCR amplified and cloned as described [13]. Insert DNA was sequenced from 16 clones derived from each of the two homogenates from each animal, and each sequence was attributed to species (≥99% identity) or genus (≥97% identity) based on BLAST GenBank similarity [24].

**Results**

**Experiment 1**

*M. ovipneumoniae* infection of DS #00, introduced into pen 1 to start the experiment, was confirmed by positive nasal swab samples obtained on days 1, 4, and 7 after inoculation prior to its introduction into pen #1, and on days 1, 2, 4, 7, 14, 21, 28, 60 and 90 after its introduction into pen #1, confirming that the experimental colonization had been successful and maintained throughout experiment 1. *M. ovipneumoniae* was first detected in the bighorn sheep (BHS #82) commingled with DS #00 in pen #1 on day 28, and subsequent tests on days 60 and 90 were also positive. BHS #82 developed signs of respiratory disease including nasal discharge (onset day 37); coughing and fever (onset day 42); and lethargy and ear paresis (onset day 61) (Figure 1a). Signs of respiratory disease were observed in the bighorn sheep in pens #2 (BHS #89) and #3 (BHS #07) beginning on days 62 and 67, respectively; these signs also included fever, lethargy, paroxysmal coughing, nasal discharge, head shaking, and drooping ears. No signs of respiratory disease were observed in the commingled domestic sheep at any time during the experiment. *M.*

**Table 1.** Primers and PCR reaction targets used in these experiments.

Pathogen/Virulence gene	Target	Primer Name	Sequence (5' → 3')	Size (bp)	Reference
<i>M. haemolytica</i>	<i>gcp</i>	MhgcpF	AGA GGC CAA TCT GCA AAC CTC G	267	[33]
		MhgcpR	GTT CGT ATT GCC CAA CGC CG		
<i>M. haemolytica</i>	<i>gcp</i>	MhgcpF2	TGG GCA ATA CGA ACT ACT CGG G	227	[34]
		MhgcpR2	CTT TAA TCG TAT TCG CAG		
<i>B. trehalosi</i>	<i>sodA</i>	BtsodAF	GCC TGC GGA CAA ACG TGT TG	144	[33]
		BtsodAR	TTT CAA CAG AAC CAA AAT CAC GAA TG		
<i>P. multocida</i>	<i>kmt1</i>	KMT1T7	ATC CGC TAT TTA CCC AGT GG	460	[35]
		KMT1SP6	GCT GTA AAC GAA CTC GCC AC		
Pasteurellaceae leukotoxin	<i>lktA</i>	lktAF	TGT GGA TGC GTT TGA AGA AGG	1,145	[36]
		lktAR	ACT TGC TTT GAG GTG ATC CG		
<i>M. haemolytica</i> leukotoxin	<i>lktA</i>	lktAF set-1	CTT ACA TTT TAG CCC AAC GTG	497	[34]
		lktAR set-1	TAA ATT CGC AAG ATA ACG GG		
<i>Mycoplasma ovipneumoniae</i>	16s rDNA	LMF	TGA ACG GAA TAT GTT AGC TT	361	[20,21]
		LMR	GAC TTC ATC CTG CAC TCT GT		
<i>Mycoplasma ovipneumoniae</i>	16S–23S IGS	MolGSF	GGA ACA CCT CCT TTC TAC GG	Variable~490	[23]
		MolGSR	CCA AGG CAT CCA CCA AAT AC		

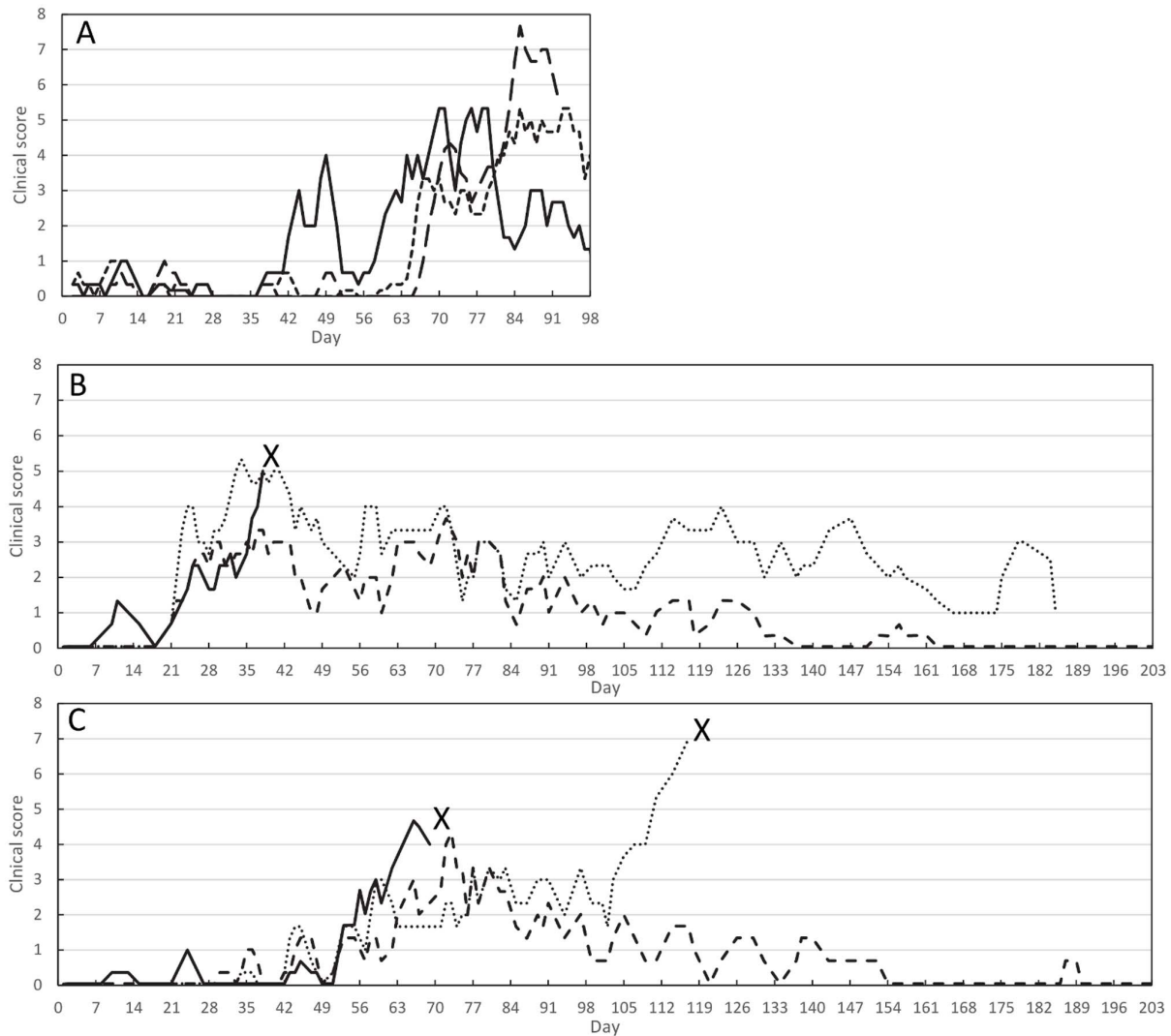
doi:10.1371/journal.pone.0110039.t001

*ovipneumoniae* was detected in nasal swab samples from all bighorn and domestic sheep in pens #2 and #3 when sampled on day 70. The bighorn sheep were euthanized for necropsy on days 93 (BHS #89) and 99 (BHS #82 and #07). At necropsy, significant abnormal findings were limited to the respiratory tract. Bronchopneumonia affecting 25–50% of the lung volume was observed in all three bighorn sheep (Figure 2). Histopathological examination revealed peribronchiolitis with large lymphoid cuffs, bronchiectasis with purulent exudates, pulmonary atelectasis, and hyperplastic bronchial epithelia lacking visible cilia (Figure 2).

**Experiment 2**

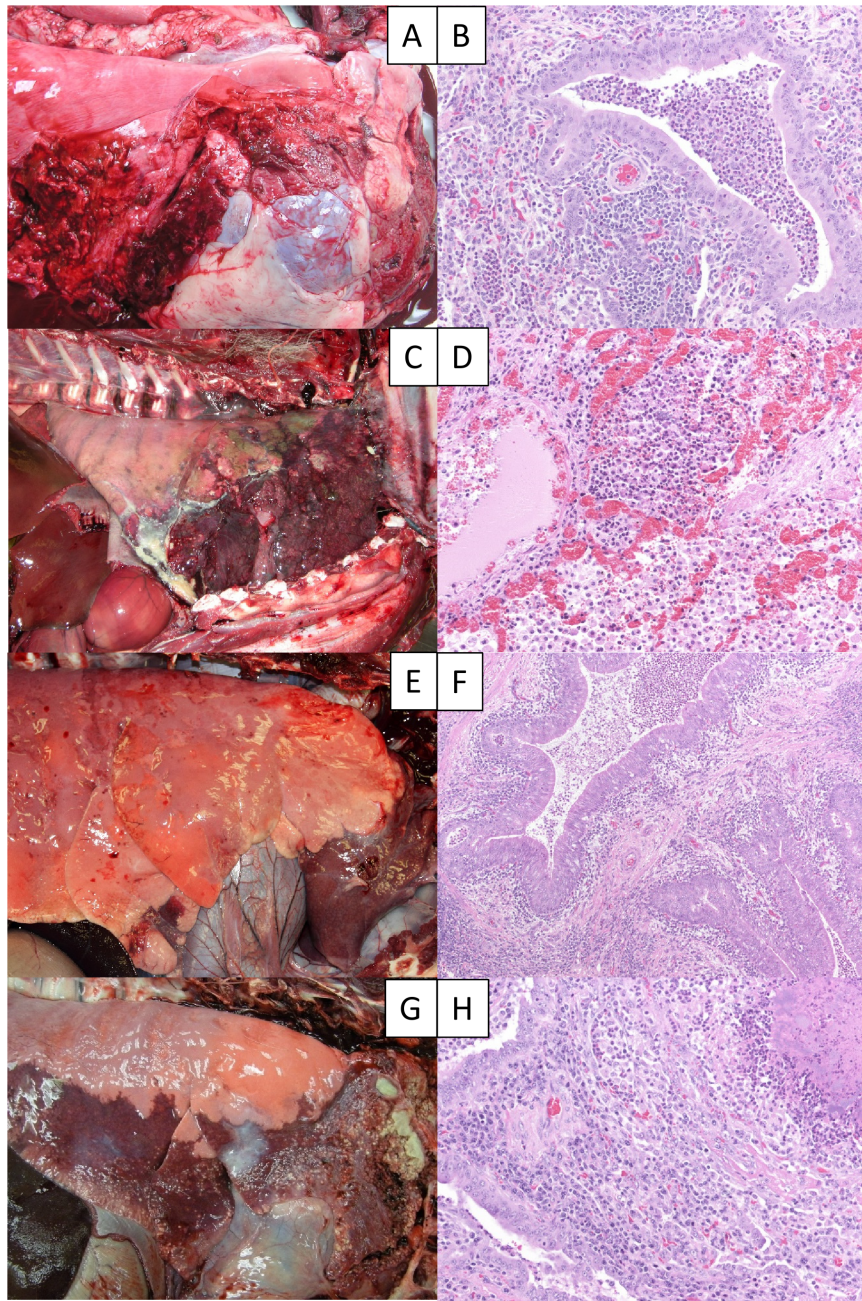
On day 21 following release of the inoculated bighorn into pen #1, *M. ovipneumoniae* was detected in the inoculated animal and one pen mate (BHS #38 and #39); the third animal (BHS #40) evaded capture and sampling on that day. The first signs of respiratory disease were observed in pen #1 animals on day 21 during drive net capture for sampling, apparently triggered by exertion (Figure 2a). On day 34, inoculated BHS #39 died in pen

#1. On day 49, signs of respiratory disease were first observed in the bighorn sheep in pen #2 (Figure 2b). On days 65 and 109, #41, and #42 in pen #2 died or were euthanized *in extremis*. The surviving three bighorn sheep exhibited varying degrees of respiratory disease: BHS #38 showed persistent respiratory disease, while BHS #40 and #C showed decreasing respiratory disease over time, which became minimal after days 161 and 154, respectively. On day 204, the three surviving bighorn sheep were euthanized for necropsy. At necropsy, significant abnormal findings were limited to the respiratory tract. All six bighorn sheep had bronchopneumonia, with consolidation of lung tissue volumes ranging from an estimated 5% (BHS #40) to 80–100% (BHS #41) (Figure 2). Histopathological examination revealed severe peribronchiolitis with large lymphoid cuffs as seen in experiment 1. Animals that died or were euthanized in extremis had an overlying necrotizing bronchiolitis (#39) or abscessing bronchiolitis with bronchiectasis (BHS #41, #42) (Figure 2).



**Figure 1. Clinical signs exhibited by *M. ovipneumoniae* infected bighorn sheep.** Clinical scores (3-day moving averages) of bighorn sheep following introduction of *M. ovipneumoniae*: A) Experiment 1, 3 separate pens; solid line, Pen 1, BHS #82; dashed line, Pen 2, BHS #89; dotted line, Pen 3, BHS #07; B) Experiment 2, Pen 1: solid line, BHS #39 (died day 34); dashed line, BHS #40; dotted line; BHS #38; C) Experiment 2, Pen 2: solid line, BHS #42 (euthanized day 109); dotted line, BHS #41 (died day 65); dashed line, BHS #C. doi:10.1371/journal.pone.0110039.g001





**Figure 2. Gross and histologic lesions in lungs of bighorn sheep experimentally infected with *M. ovipneumoniae*.** Images of BHS #82 (A, B), BHS #39 (C, D), BHS #C (E, F) and BHS #42 (G, H). Original magnification of histologic images was 200X (B, D, H) or 100X (F). doi:10.1371/journal.pone.0110039.g002

### Microbiology

All bighorn sheep in both experiments seroconverted to *M. ovipneumoniae* (Table 2). Most experimental animals had neutralizing antibody to parainfluenza-3 virus, but no significant changes in antibody titers were observed during the experimental period. Detectable antibody to other ovine respiratory viruses, including border disease virus, ovine progressive pneumonia virus, and respiratory syncytial virus was occasionally observed in single samples.

*M. ovipneumoniae* was detected at necropsy in both upper and lower respiratory tracts of all bighorn sheep except BHS #40 whose lung tissues were PCR negative and whose upper

respiratory samples were PCR indeterminate (Table 3). Aerobic cultures and/or PCR tests identified *B. trehalosi* from pneumonic lung tissues from all bighorn sheep in both experiments (Table 3). *B. trehalosi* isolates from BHS #82 and #07 carried *lktA* and expressed leukotoxin activity (Table 3). *P. multocida* and *M. haemolytica* were not detected in these animals by either aerobic culture or PCR.

### Culture independent survey of bacteria in pneumonic bighorn sheep lung tissues

DNA sequences of cloned 16S rDNA revealed that the predominant bacterial species in pneumonic sections of lung were

**Table 2.** Antibody responses to *M. ovipneumoniae* and parainfluenza-3 (PI-3) virus.

Experiment	ID	Pen	<i>M. ovipneumoniae</i> <sup>1</sup>		PI-3 virus <sup>2</sup>	
			Pre <sup>3</sup>	Post <sup>3</sup>	Pre <sup>3</sup>	Post <sup>3</sup>
1	82	1	-8%	93%	512	512
1	89	2	-7%	88%	128	128
1	07	3	-1%	92%	256	512
2	38	1	-6%	74%	Neg	64
2	39	1	-13%	67%	Neg	<32
2	40	1	-23%	75%	64	512
2	41	2	-19%	82%	512	NT
2	42	2	-11%	82%	256	NT
2	C	2	-4%	66%	256	512

<sup>1</sup>*M. ovipneumoniae* antibody detected by cELISA, expressed as percentage inhibition of the binding of an agent-specific monoclonal antibody [14,18].

<sup>2</sup>PI-3 virus neutralizing antibody detected by virus neutralization [37].

<sup>3</sup>Pre samples in experiment 1 were obtained on the day that the *M. ovipneumoniae* colonized domestic sheep was introduced to pen 1 and in experiment 2 were obtained on the day that BHS #39 was inoculated with *M. ovipneumoniae*. 'Post' samples in both experiments were obtained at necropsy. Neg = No titer detected. NT = Not tested, due to inadequate specimen volume.

doi:10.1371/journal.pone.0110039.t002

diverse (Table 4). In experiment 1, *M. ovipneumoniae* was detected in the lung tissues of all animals. *B. trehalosi* also comprised substantial proportions of the pneumonic lung flora in two animals (BHS #82 and #07), while obligate anaerobic species, primarily *Fusobacterium* spp., predominated in the third animal (BHS #89). The flora identified in the pneumonic lungs of the animals in experiment 2 was also substantially comprised of mixed obligate anaerobes especially *Fusobacterium* spp. (Table 4).

**Molecular epidemiology of respiratory pathogens.** Consistent with epidemic transmission, *M. ovipneumoniae* strains recovered from all experimental sheep within each experiment shared identical IGS DNA sequences with the respective challenge inoculum (GenBank HQ615162 in experiment 1; KJ551511 in experiment 2).

**Discussion**

The most striking finding of these experiments was the high transmissibility of *M. ovipneumoniae* and the consistent development of pneumonia that followed infection of bighorn sheep. The bacterium was naturally transmitted from single experimentally inoculated animals (a domestic sheep in experiment 1 and a bighorn sheep in experiment 2) to all animals within and between pens up to 12 m distant. Eight of nine bighorn sheep exposed to *M. ovipneumoniae* developed severe bronchopneumonia and three died, while all the domestic sheep remained healthy.

Previous experimental challenge studies conducted with *M. haemolytica* or *B. trehalosi* in the absence of *M. ovipneumoniae* have not documented transmission. For example, Foreyt et al. [8]

**Table 3.** Microbiologic findings from pneumonic lung tissues, based on aerobic culture and species specific PCR.

Expt.	ID	Bacterial pathogens identified in pneumonic lung tissues				
		<i>B. trehalosi</i>	<i>M. haemolytica</i>	<i>lktA</i>	<i>M. ovipneumoniae</i>	Other <sup>5</sup>
1	82	Cult, <i>sodA</i> <sup>1</sup>	Neg <sup>2</sup>	Pos <sup>3</sup>	16S <sup>4</sup>	None
1	89	Cult, <i>sodA</i>	Neg	Neg <sup>3</sup>	16S	<i>Pasteurella</i> sp. <sup>5</sup>
1	07	Cult, <i>sodA</i>	Neg	Pos	16S	<i>Pasteurella</i> sp.
2	38	Cult, <i>sodA</i>	Neg	Neg	16S	<i>Pasteurella</i> sp.
2	39	NT, <i>sodA</i>	NT, Neg <sup>2</sup>	Neg	16S	NT <sup>5</sup>
2	40	Cult	Neg	Neg	Neg <sup>4</sup>	<i>Trueperella pyogenes</i> <sup>5</sup>
2	41	Cult, <i>sodA</i>	Neg	Neg	16S	None
2	42	Cult	Neg	Neg	16S	None
2	C	Cult	Neg	Neg	16S	<i>Pasteurella</i> sp.

<sup>1</sup>Cult = *B. trehalosi* detected by bacterial culture; *sodA* = *B. trehalosi* detected by *sodA* species-specific PCR (Table 1); NT = Unable to test by bacterial culture (overgrowth by *Proteus* sp.).

<sup>2</sup>Neg = *M. haemolytica* not detected by either bacterial culture or by PCR with either *gcp* primer set (Table 1); NT = Unable to test by bacterial culture (overgrowth by *Proteus* sp.).

<sup>3</sup>Neg = Pasteurellaceae *lktA* not detected in DNA extracts from pneumonic lung tissues by two different *lktA* PCRs (Table 1) [34,36]. Pos = *lktA* detected in *B. trehalosi* isolates obtained from BHS #82 and #07 [36].

<sup>4</sup>16S = *M. ovipneumoniae* detected by PCR (Table 1) [20]; Neg = *M. ovipneumoniae* not detected by PCR.

<sup>5</sup>*Pasteurella* sp., *Trueperella pyogenes* = Bacteria isolated and identified by aerobic culture; *Pasteurella* sp. were determined not to be *B. trehalosi*, *M. haemolytica*, or *P. multocida*; NT = Unable to test by bacterial culture due to overgrowth by *Proteus* sp.

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**Table 4.** Microbiologic findings by 16S clone library (culture independent) method.

Expt.	ID	Bacterial species identified in pneumonic lung tissues						
		Btre <sup>1</sup>	Movi <sup>1</sup>	Fuso <sup>1</sup>	Prev <sup>1</sup>	Porphyro <sup>1</sup>	Other <sup>1</sup>	
1	82	20 (62.5) <sup>2</sup>	8 (25)	0	3 (9.4)	0	1 (3.1)	
1	89	1 (3.1)	7 (21.9)	21 (65.6)	1 (3.1)	0	2 (6.3)	
1	07	16 (50.0)	12 (37.5)	0	0	0	4 (12.5)	
2	38	4 (7.1)	2 (3.6)	8 (14.3)	20 (35.7)	9 (16.1)	13 (23.2)	
2	C	0	0	17 (30.4)	5 (8.9)	19 (33.9)	15 (26.8)	
2	39	2 (6.3)	0	24 (75.0)	0	0	6 (18.8)	
2	40	0	0	0	0	0	56 (100.0)	
2	41	1 (3.1)	0	21 (65.6)	5 (15.6)	0	5 (15.6)	
2	42	0	0	31 (96.9)	0	0	1 (3.1)	

<sup>1</sup>Btre = *B. trehalosi*; Movi = *M. ovipneumoniae*; Fuso = *Fusobacterium* sp.; Prev = *Prevotella* sp.; Porphyro = *Porphyromonas* sp.; Other = taxa other than those previously listed, each comprising <5% of sequenced clones.  
<sup>2</sup>N (%) of the sequenced 16S clones from each animal whose DNA sequences were identical to those of the tabulated bacterial species in each column.  
 doi:10.1371/journal.pone.0110039.t004

reported a series of three experiments in which commingled bighorn sheep were either challenged with intra-tracheal *M. haemolytica* or given sterile BHI as controls. Four of the five control bighorn sheep survived without evidence of disease while commingled with eight *M. haemolytica*-challenged bighorn sheep, of which seven died of pneumonia [8]. Commingled bighorn sheep also remained healthy in several other studies where individual bighorn sheep died with apparent *M. haemolytica* bronchopneumonia (confirmed by isolation of this bacterium from lung tissues) [15,25,26].

In addition to high transmissibility, the time course of disease development and the predominant microbiology of the pneumonic lung tissues following experimental introduction of *M. ovipneumoniae* differed from that seen in previous bighorn sheep challenge experiments with other respiratory pathogens. Bighorn sheep directly challenged with leukotoxin positive *M. haemolytica* or *B. trehalosi* develop peracute bronchopneumonia and >90% die within a week of challenges with 10<sup>9</sup> cfu or more [16,27–30]. In contrast, disease following experimental *M. ovipneumoniae* exposures was considerably slower in onset (14–21 days post infection) and development (deaths occurring 34 to 109 days post infection); respiratory disease persisted up to 6 months post-infection); this slow time course closely resembles that documented previously in bighorn lamb pneumonia outbreaks [13]. After lethal *M. haemolytica* challenge, the agent is typically isolated from lung tissues in high numbers and pure cultures [15,25]; in contrast in naturally occurring pneumonia outbreaks *M. ovipneumoniae* may be predominant early in the disease course but 16S library analyses have been used to document its overgrowth by diverse other bacteria later in the disease course [14,23]. Although the numbers of animals in the experimental *M. ovipneumoniae* infection studies reported here are small, the results are consistent with the trend for early predominance of *M. ovipneumoniae* followed by overgrowth by diverse other bacterial later in the disease course (Tables 3 and 4) [13,14,23].

Our results also differ from our previous attempt to experimentally reproduce respiratory disease by challenge inoculation of 1-week-old bighorn lambs with *M. ovipneumoniae*, which produced minor lesions and seroconversion but no clinically significant respiratory disease [13]. However, laboratory passage of *M. ovipneumoniae* (as was performed in that experiment) has been reported to attenuate virulence in *M. ovipneumoniae* [31]. Challenge of bighorn sheep with un-passaged *M. ovipneumoniae* produced different results, as observed here in experiment #2. In another study [16], nasal washings from domestic sheep naturally colonized with *M. ovipneumoniae* or lung homogenates from a *M. ovipneumoniae*-infected bighorn sheep were used for challenge of bighorn sheep after ceftiofur treatment to eliminate detectable Pasteurellaceae. Consistent with increased virulence of un-passaged *M. ovipneumoniae*, infection and respiratory disease signs were observed in all four bighorn sheep, one of which died 19 days following challenge. The three surviving animals continued to exhibit respiratory disease signs for 42 days, at which time the experiment was terminated by challenge with *M. haemolytica* (using a dose documented to be rapidly fatal to bighorn sheep even in the absence of *M. ovipneumoniae*) [16]. As a result, the longer term effects of the mycoplasma infection were not determined in that study. Therefore, the experiments reported here are the first in which naïve bighorn sheep were exposed to un-passaged *M. ovipneumoniae* and then followed over a time period comparable with the naturally occurring disease course.

The possibility of viral agents contributing to the disease observed in this study cannot be completely ruled out, since the inoculum was derived from nasal washings from domestic sheep



and no virucidal treatments were applied. However, a previous study using ultrafiltrates of bighorn sheep pneumonic lung tissues or nasal washings from domestic sheep failed to reproduce any respiratory disease in inoculated susceptible bighorn sheep [16]. In addition, serologic monitoring for the predominant domestic sheep respiratory viruses did not demonstrate seroconversion of the experimental animals in this study, as described in the Results and in Table 2. Therefore, the most parsimonious interpretation of the data presented here is that the disease observed resulted from *M. ovipneumoniae* infection and the sequelae of that infection.

The transmission of *M. ovipneumoniae* from pen-to-pen in these experiments strongly suggests that direct contact is not necessary for epizootic spread of pneumonia in bighorn sheep. Feeding, watering and other procedures involving animal care or research staff were designed to minimize the risk of human or fomite-mediated transmission of the pathogen from pen to pen, although we recognize it is impossible to completely rule out this possibility. On the other hand, since aerosolized droplet transmission is recognized as a transmission route for the closely related bacterium, *Mycoplasma hyopneumoniae* (the cause of atypical pneumonia of swine) [32], it is plausible that a similar transmission mode occurs with *M. ovipneumoniae*. Infectious aerosols generated by coughing animals would likely contribute to the explosive nature of the pneumonia outbreaks observed following initial introduction of *M. ovipneumoniae* into naïve bighorn sheep populations.

In conclusion, we demonstrated that experimental *M. ovipneumoniae* infection of naïve bighorn sheep induces chronic, severe bronchopneumonia associated with multiple secondary bacterial infections and that this infection spread rapidly to animals both within the same pen and to animals in nearby pens. The significance of these findings would be clarified by parallel experiments specifically designed to determine transmissibility and associated disease outcomes in other agents associated with bighorn sheep pneumonia, particularly *M. haemolytica*, in the absence of *M. ovipneumoniae*. Furthermore, the case-fatality rates of *M. ovipneumoniae* infected animals described here contrasts

with the nearly 100% mortality that follows experimental commingling of bighorn sheep with presumptively or documented *M. ovipneumoniae*-positive domestic sheep and suggests an important role for polymicrobial secondary infections in determining mortality rates, which could be investigated in future studies. Finally, *M. ovipneumoniae* was still detected in nasal swab samples of several surviving bighorn sheep that were euthanized at the completion of these studies, suggesting that survivors of naturally occurring pneumonia outbreaks may continue to carry and shed this agent in nasal secretions. Such carriage may provide a mechanism for the post-invasion disease epizootics in lambs described in free-ranging populations. If so, this presumptive carrier state requires further study to characterize the factors that determine its occurrence and persistence, as these may be critical for the development of effective management control measures for this devastating disease.

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## Author Contributions

Conceived and designed the experiments: TEB EFC JLO S. Srikumaran WJF. Performed the experiments: TEB EFC JLO KAP KL S. Shanthalingam. Analyzed the data: TEB EFC KAP KL. Contributed reagents/materials/analysis tools: TEB EFC KAP KL S. Shanthalingam S. Srikumaran. Contributed to the writing of the manuscript: TEB EFC KAP S. Shanthalingam S. Srikumaran WJF.

## References

- Festa-Bianchet M (2008) *Ovis canadensis*. The IUCN Red List of Threatened Species. Available: <http://www.iucnredlist.org/details/summary/15735/0>. Accessed 2014 Jul 24.
- Cassirer EF, Plowright RK, Manlove KR, Cross PC, Dobson AP, et al. (2012) Spatio-temporal dynamics of pneumonia in bighorn sheep (*Ovis canadensis*). *J Animal Ecol* 82: 518–528.
- Marsh H (1938) Pneumonia in Rocky Mountain bighorn sheep. *J Mammal* 19: 214–219.
- Buechner HK (1960) The bighorn sheep in the United States, its past, present, and future. *Wildl Monog* 4: 3–174.
- Forrester DJ (1971) Bighorn sheep lungworm-pneumonia complex. In: Davis JW, Anderson RC, editors. *Parasitic Diseases of Wild Mammals*. Ames, IA: Iowa State University Press. 158–173.
- Demartini JC, Davies RB (1977) An epizootic of pneumonia in captive bighorn sheep infected with *Muellerius* sp. *J Wildl Dis* 13: 117–124.
- Miller MW (2001) Pasteurellosis. In: Williams ES, Barker, I K., editor. *Infectious diseases of wild mammals*. Ames IA USA: Iowa State University Press. 558.
- Foreyt WJ, Snipes KP, Kasten RW (1994) Fatal pneumonia following inoculation of healthy bighorn sheep with *Pasteurella haemolytica* from healthy domestic sheep. *J Wildl Dis* 30: 137–145.
- Kraabel BJ, Miller MW, Conlon JA, McNeil HJ (1998) Evaluation of a multivalent *Pasteurella haemolytica* vaccine in bighorn sheep: Protection from experimental challenge. *J Wildl Dis* 34: 325–333.
- Rudolph KM, Hunter DL, Foreyt WJ, Cassirer EF, Rimler RB, et al. (2003) Sharing of *Pasteurella* spp. between free-ranging bighorn sheep and feral goats. *J Wildl Dis* 39: 897–903.
- Rudolph KM, Hunter DL, Rimler RB, Cassirer EF, Foreyt WJ, et al. (2007) Microorganisms associated with a pneumonic epizootic in Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*). *J Zoo Wildl Med* 38: 548–558.
- Weiser GC, DeLong WJ, Paz JL, Shafii B, Price WJ, et al. (2003) Characterization of *Pasteurella multocida* associated with pneumonia in bighorn sheep. *J Wildl Dis* 39: 536–544.
- Besser TE, Cassirer EF, Potter KA, VanderSchalie J, Fischer A, et al. (2008) Association of *Mycoplasma ovipneumoniae* infection with population-limiting respiratory disease in free-ranging rocky mountain bighorn sheep (*Ovis canadensis canadensis*). *J Clin Microbiol* 46: 423–430.
- Besser TE, EF Cassirer, MA Highland, P Wolff, A Justice-Allen, et al. (2012) Bighorn sheep pneumonia: Sorting out the cause of a polymicrobial disease. *Prev Vet Med* 108: 85–93.
- Besser TE, Cassirer EF, Yamada C, Potter KA, Herndon C, et al. (2012) Survival of Bighorn Sheep (*Ovis canadensis*) Commingling with Domestic Sheep (*Ovis aries*) in the Absence of *Mycoplasma ovipneumoniae*. *J Wildl Dis* 48: 168–172.
- Dassanayake RP, Shanthalingam S, Herndon CN, Subramaniam R, Lawrence PK, et al. (2010) *Mycoplasma ovipneumoniae* can predispose bighorn sheep to fatal *Mannheimia haemolytica* pneumonia. *Vet Microbiol* 145: 354–359.
- Blodgett R (2010) Bacteriologic Analytical Manual Appendix 2: Most Probable Number from Serial Dilutions. Washington DC. Available: <http://www.fda.gov/Food/FoodScienceResearch/LaboratoryMethods/ucm109656.htm>. Accessed 2014 Jul 24.
- Ziegler JC, Lahmers KK, Barrington GM, Parish SM, Kilzer K, et al. (2014) Safety and Immunogenicity of a *Mycoplasma ovipneumoniae* Bacterin for Domestic Sheep (*Ovis aries*). *PLoS One* 9(4): e95698.
- Herrmann LM, Cheevers WP, Marshall KL, McGuire TC, Hutton MM, et al. (2003) Detection of serum antibodies to ovine progressive pneumonia virus in sheep by using a caprine arthritis-encephalitis virus competitive-inhibition enzyme-linked immunosorbent assay. *Clin Diag Lab Immunol* 10: 862–865.
- Lawrence PK, Shanthalingam S, Dassanayake RP, Subramaniam R, Herndon CN, et al. (2010) Transmission of *Mannheimia haemolytica* from domestic sheep (*Ovis aries*) to bighorn sheep (*Ovis canadensis*): unequivocal demonstration with green fluorescent protein-tagged organisms. *J Wildl Dis* 46: 706–717; erratum, *J Wildl Dis* 46: 1346.



21. McAuliffe L, Hatchell FM, Ayling RD, King AI, Nicholas RA (2003) Detection of *Mycoplasma ovipneumoniae* in *Pasteurella*-vaccinated sheep flocks with respiratory disease in England. *Vet Rec* 153: 687–688.
22. Gentry MJ, Srikumaran S. (1991) Neutralizing monoclonal antibodies to *Pasteurella haemolytica* leukotoxin affinity purify the toxin from crude culture supernatants. *Microb Pathog* 10: 411–417.
23. Besser TE, Highland M, Baker K, Anderson NJ, Ramsey JM (2012) Causes of pneumonia epizootics among bighorn sheep, western United States, 2008–2010. *Emerg Infect Dis* 18: 406–414.
24. Petti CA (2007) Detection and identification of microorganisms by gene amplification and sequencing. *Clin Infect Dis* 44: 1108–1114.
25. Foreyt WJ, Jenkins EJ, Appleyard GD (2009) Transmission of lungworms (*Muellerius capillaris*) from domestic goats to bighorn sheep on common pasture. *J Wildl Dis* 45: 272–278.
26. Foreyt WJ, Lagerquist JE (1996) Experimental contact of bighorn sheep (*Ovis canadensis*) with horses and cattle, and comparison of neutrophil sensitivity to *Pasteurella haemolytica* cytotoxins. *J Wildl Dis* 32: 594–602.
27. Onderka DK, Rawluk SA, Wishart WD (1988) Susceptibility of Rocky Mountain bighorn sheep and domestic sheep to pneumonia induced by bighorn and domestic livestock strains of *Pasteurella haemolytica*. *Can J Vet Res* 52: 439–444.
28. Dassanayake RP, Shanthalingam S, Herndon CN, Lawrence PK, Cassirer EF, et al. (2009) *Mannheimia haemolytica* serotype A1 exhibits differential pathogenicity in two related species, *Ovis canadensis* and *Ovis aries*. *Vet Microbiol* 133: 366–371.
29. Subramaniam R, Shanthalingam S, Bavananthasivam J, Kugadas A, Potter KA, et al. (2011) A multivalent *Mannheimia-Bibersteinia* vaccine protects bighorn sheep against *Mannheimia haemolytica* challenge. *Clin Vaccine Immunol* 18: 1689–1694.
30. Foreyt WJ, Snipes KP, Kasten RW (1994) Fatal pneumonia following inoculation of healthy bighorn sheep with *Pasteurella haemolytica* from healthy domestic sheep. *J Wildl Dis* 30: 137–145.
31. Alley MR, Ionas G, Clarke JK (1999) Chronic non-progressive pneumonia of sheep in New Zealand - a review of the role of *Mycoplasma ovipneumoniae*. *N Z Vet J* 47: 155–160.
32. Desrosiers R (2011) Transmission of swine pathogens: different means, different needs. *Anim Health Res Rev* 12: 1–13.
33. Dassanayake RP, Call DR, Sawant AA, Casavant NC, Weiser GC, et al. (2010) *Bibersteinia trehalosi* inhibits the growth of *Mannheimia haemolytica* by a proximity-dependent mechanism. *Appl Environ Microbiol* 76: 1008–1013.
34. Shanthalingam S, Goldy A, Bavananthasivam J, Subramaniam R, Batra SA, et al. (2014) PCR assay detects *Mannheimia haemolytica* in culture-negative pneumonic lung tissues of bighorn sheep (*Ovis canadensis*) from outbreaks in the Western USA, 2009–2010. *J Wildl Dis* 50: 1–10.
35. Townsend KM, Frost AJ, Lec CW, Papadimitriou JM, Dawkins HJ (1998) Development of PCR assays for species- and type-specific identification of *Pasteurella multocida* isolates. *J Clin Microbiol* 36: 1096–1100.
36. Fisher MA, Weiser GC, Hunter DL, Ward ACS (1999) Use of a polymerase chain reaction method to detect the leukotoxin gene IktA in biogroup and biovariant isolates of *Pasteurella haemolytica* and *P. trehalosi*. *Am J Vet Res* 60: 1402–1406.
37. Rossi CR, Kiesel GK (1971) Microtiter tests for detecting antibody in bovine serum to parainfluenza 3 virus, infectious bovine rhinotracheitis virus, and bovine virus diarrhea virus. *Appl Microbiol* 22: 32–36.



## Phylogeographic and population genetic structure of bighorn sheep (*Ovis canadensis*) in North American deserts

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Fossil data are ambiguous regarding the evolutionary origin of contemporary desert bighorn sheep (*Ovis canadensis* subspecies). To address this uncertainty, we conducted phylogeographic and population genetic analyses on bighorn sheep subspecies found in southwestern North America. We analyzed 515 base pairs of mtDNA control region sequence and 39 microsatellites in 804 individuals from 58 locations. Phylogenetic analyses revealed 2 highly divergent clades concordant with Sierra Nevada (*O. c. sierrae*) and Rocky Mountain (*O. c. canadensis*) bighorn and showed that these 2 subspecies both diverged from desert bighorn prior to or during the Illinoian glaciation (~315–94 thousand years ago [kya]). Desert bighorn comprised several more recently diverged haplogroups concordant with the putative Nelson (*O. c. nelsoni*), Mexican (*O. c. mexicana*), and Peninsular (*O. c. cremnobates*) subspecies. Corresponding estimates of effective splitting times (~17–3 kya), and haplogroup ages (~85–72 kya) placed the most likely timeframe for divergence among desert bighorn subspecies somewhere within the last glacial maximum. Median-joining haplotype network and Bayesian skyline analyses both indicated that desert bighorn collectively comprised a historically large and haplotype-diverse population, which subsequently lost much of its diversity through demographic decline. Using microsatellite data, discriminant analysis of principle components (DAPC) and Bayesian clustering analyses both indicated genetic structure concordant with the geographic distribution of 3 desert subspecies. Likewise, microsatellite and mitochondrial-based  $F_{ST}$  comparisons revealed significant fixation indices among the desert bighorn genetic clusters. We conclude these desert subspecies represent ancient lineages likely descended from separate Pleistocene refugial populations and should therefore be managed as distinct taxa to preserve maximal biodiversity.

Los datos de fósiles sobre el origen evolutivo de las ovejas del desierto (*Ovis canadensis* subspecies) contemporáneas son ambiguos. Para dilucidar esta incertidumbre, llevamos a cabo análisis filogeográficos y de genética de poblaciones entre cinco subspecies de ovejas del suroccidente de Norteamérica. Analizamos 515 pb de secuencia de la región control del ADN mitocondrial y 39 microsatélites en 804 ovejas de 58 localidades. Los análisis filogenéticos revelaron 2 clados altamente divergentes concordantes con ovejas de la Sierra Nevada (*O. c. sierrae*) y de las Montañas Rocosas (*O. c. canadensis*), y demostraron que estas dos subspecies divergieron antes o durante la glaciación de Illinois (315,000–94,000 años). Las ovejas del desierto formaron varios haplogrupos recientemente derivados concordantes con las subspecies de Nelson (*O. c. nelsoni*), México (*O. c. mexicana*) y peninsular (*O. c. cremnobates*). Las estimaciones correspondientes al tiempo de separación efectiva (17,000–3,000 años) y edades de haplogrupos (85,000–72,000 años) son los plazos más probables para las divergencias entre subspecies de ovejas del desierto dentro de la última glaciación máxima. Análisis de redes de haplotipos de unión de medias y análisis bayesianos de líneas de horizonte indicaron que las ovejas del desierto formaron una población históricamente grande y diversa en términos de haplotipos, que luego perdieron gran parte de su diversidad a través

de un descenso demográfico. Utilizando datos de microsatélites los análisis DAPC y TESS indicaron agrupamiento genético concordante con la distribución geográfica actual de las tres subespecies. Asimismo, comparaciones de  $F_{ST}$  con datos de microsatélites y mitocondriales revelaron índices de fijación significativos entre los grupos genéticos de ovejas del desierto. Concluimos que estas subespecies de ovejas del desierto representan linajes antiguos que probablemente descienden de poblaciones de distintos refugios del Pleistoceno, y que por lo tanto deben ser manejadas como taxones distintos para preservar su biodiversidad máxima.

Key words: desert bighorn sheep, desert southwest, divergence date, glacial refugia, haplotype, microsatellites, mtDNA, *Ovis canadensis*, phylogeography, subspecies

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Bighorn sheep (*Ovis canadensis* Shaw, 1804) are native to the deserts of southwestern North America (hereafter, desert southwest), as well as the adjacent and climatically distinct alpine zones of the Sierra Nevada and Rocky Mountain ranges. Once abundant, bighorn sheep suffered widespread local extinction following European settlement as a result of overharvest, livestock-transmitted disease, and habitat loss and fragmentation (Seton 1929; Buechner 1960; Valdez and Krausman 1999). Ongoing efforts to restore bighorn sheep throughout their native range, particularly in the desert southwest, have relied heavily on translocations (Rowland and Schmidt 1981; Bleich et al. 1990; Singer et al. 2000; Boyce et al. 2011). However, such actions require thorough understanding of both the taxonomy and phylogeographic structure among populations (Weeks et al. 2011).

Significant taxonomic revision of *O. canadensis* at the sub-specific level has occurred during the past several decades, yet phylogenetic relationships have not been adequately tested with modern molecular methods. Currently recognized subspecies include California (*O. c. californiana*; not considered in this study), Rocky Mountain (*O. c. canadensis*), and Sierra Nevada (*O. c. sierrae*) bighorn, as well as disputed subspecies designations among desert populations. Reference texts (Wilson and Reader 2005) continue to use the morphology-based designations of Cowan (1940), recognizing 4 desert subspecies: Nelson (*O. c. nelsoni*), Mexican (*O. c. mexicana*), Peninsular (*O. c. cremnobates*), and Weems (*O. c. weemsi*) bighorn. However, subsequent morphometric studies questioned these subspecies as artifacts of small sample size and age-related size differences (Bradley and Baker 1967; Wehausen and Ramey 1993). Further, a restriction fragment length polymorphism (RFLP) study of mitochondrial DNA (mtDNA) failed to resolve these subspecies (Ramey 1995). As a result, Wehausen and Ramey (1993) proposed desert bighorn be synonymized to a single taxon (*O. c. nelsoni*).

Lack of a consistent taxonomy has created confusion among managers and conservation biologists. For instance, Peninsular bighorn sheep were designated threatened by the State of California in 1984 as *O. c. cremnobates*. Since then, Peninsular bighorn have been provisionally synonymized with *O. c. nelsoni* (Wehausen and Ramey 1993) and were listed under the Endangered Species Act in 1999 (63 FR 13134), yet are

protected as a distinct population segment. Ultimately, subspecies designations are valuable to conservation if they serve as commonly understood indicators of significant genetic variation and potential local adaptation that could be lost if mismanaged (i.e., translocated) as a single taxon. An updated genetic characterization of bighorn sheep occupying the desert southwest should therefore help inform taxonomy and management by examining how patterns of genetic variation compare with competing hypotheses regarding subspecies.

Achieving clarity regarding the phylogenetic history, and ultimately taxonomy, of desert bighorn sheep requires a basic understanding of the evolutionary history of the taxon. Unfortunately, the fossil record is somewhat ambiguous regarding the origin of contemporary desert bighorn in the desert southwest. Fossil evidence indicates *Ovis* continuously occupied at least 2 late Pleistocene glacial refugia in southern North America: 1 in the current Mojave Desert, established ~300 thousand years ago (kya), prior to the Illinoian glaciation (Jefferson 1991), and another in the north near Natural Trap Cave, Wyoming (Martin and Gilbert 1978; Wang 1988), established during the Sangamon interglacial (~100 kya). However, competing hypotheses regarding the origins of desert bighorn sheep relative to these refugial populations cannot be eliminated based on fossil geochronology (Geist 1985). The 1st hypothesis proposes that *Ovis* from the northern refugium spread south, ultimately joining or displacing sheep from the Mojave refugium to give rise to contemporary desert populations. The 2nd hypothesis proposes that the northern colonizers were out-competed and replaced by *Ovis* expanding from the Mojave refugium. These hypotheses provide clear alternatives that are testable using phylogenetic methods. Predictions following from the 1st hypothesis include: 1) contemporary desert bighorn populations should exhibit haplotypes recently diverged from contemporary Rocky Mountain bighorn haplotypes—i.e., since the last glacial maximum (LGM); 2) these derived desert haplotypes should represent only a subset of the lineages (i.e., founder effect) reflected in the Rocky Mountain population, and 3) these northern-derived desert haplotypes potentially occur in association with more deeply divergent (pre-Illinoian) haplotypes originating from the Mojave refugium. Predictions following from

the 2nd hypothesis include: 1) all haplotypes in contemporary desert bighorn populations belong to 1 or more lineages that are deeply divergent (pre-Illinoian) from those occurring in Rocky Mountain bighorn populations, and 2) the existence of more than 1 such lineage would provide evidence that multiple southern refugia contributed to colonization of the desert southwest.

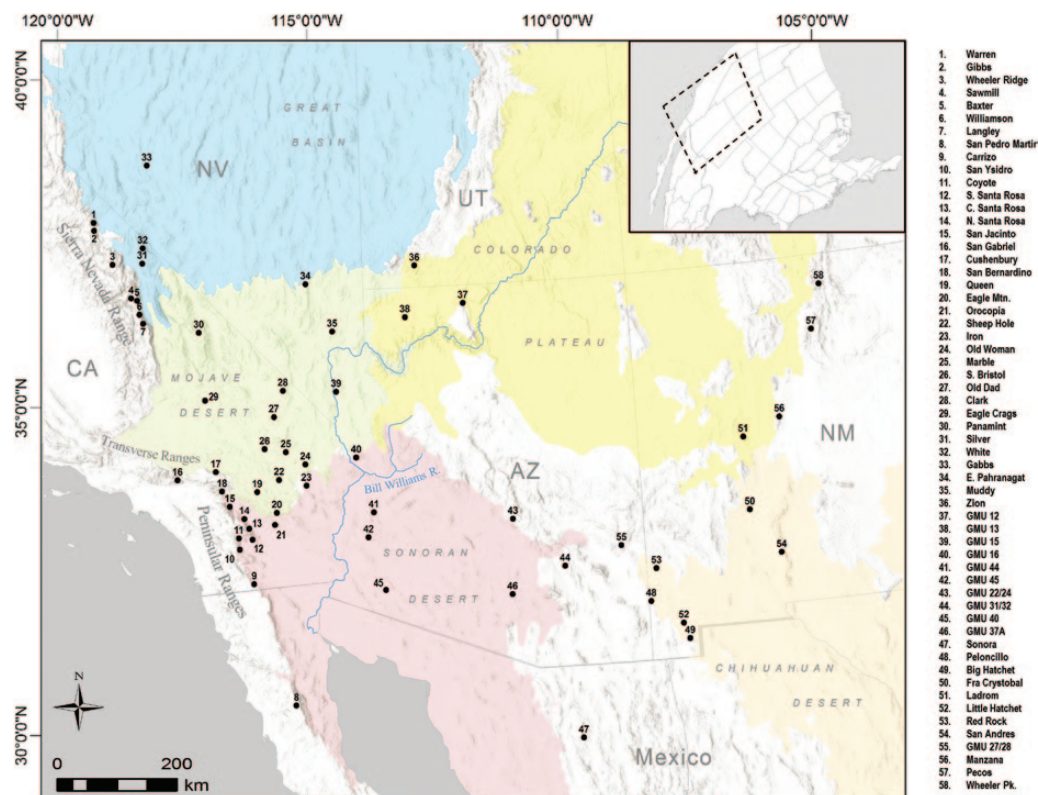
In this study, we characterized the phylogeographic and genetic structure of bighorn sheep occupying the desert southwest. We utilized a large number of samples from previously under represented areas of the native range of desert bighorn sheep. For clarity, we utilized the disputed desert subspecies designations of Cowan (1940), as this taxonomy recognizes the greatest number of taxonomic units among which genetic variation could be compared. Our objectives were to 1) use mtDNA control region sequences and nuclear microsatellites to characterize phylogeographic and population genetic variation both within desert bighorn and in relation to the Sierra Nevada and Rocky Mountain subspecies, 2) estimate splitting times among subspecies to test fossil record-based hypotheses regarding colonization of the desert southwest, 3) reconstruct historical demography to estimate the timeframe of population declines, and 4) use these results to evaluate genetic support for competing desert subspecies designations.

## MATERIALS AND METHODS

**Sample collection.**—We used a total of 804 adult bighorn sheep ( $n = 437$  F, 353 M, 14 unknown sex) captured by

biologists from state agencies or harvested by hunters from 58 locations across the southwestern United States and northern Mexico, as well as 2 locations in Canada, during 1992–2013 (Fig. 1; Supporting Information S1). Desert bighorn samples ( $n = 655$ ) were assigned to their geographic regions of origin, including the Peninsular Ranges, Transverse Ranges, Mojave, Sonoran, and Chihuahuan Deserts, Great Basin, and Colorado Plateau. This scheme allowed us to test the genetic evidence for competing subspecies designations within desert bighorn sheep without a priori assumptions regarding group membership. In addition to the desert bighorn sheep composing the core of our sample, we also included 52 endemic Sierra Nevada bighorn sheep, as well as 97 Rocky Mountain bighorn sheep from either Canada or (re)introduced populations in northern New Mexico and eastern Arizona (Fig. 1; Supporting Information S1). No samples of California or Weems bighorn sheep were available for inclusion in this study.

**Laboratory methods.**—Total genomic DNA was extracted from blood, muscle, or skin tissue using Qiagen DNeasy Blood and Tissue kits (Qiagen Inc., Valencia, California) following the manufacturer's protocol. Each sample was genotyped at 39 microsatellite loci described in Buchalski et al. (2015). Sex was confirmed via amplification of the Amelogenin marker described in Weikard et al. (2006). To estimate genotyping error, we randomly selected 30 samples, along with positive and negative controls, to blindly re-genotype. We estimated the average error rate per locus as the ratio between the number of



**Fig. 1.**—Study area within the southwestern United States and northern Mexico, including 58 locations from which bighorn sheep (*Ovis canadensis*) subspecies were sampled. Significant geographic features are depicted as they relate to subspecies ranges. For locations, GMU refers to game management units as defined by the Arizona Game and Fish Department.



single-locus genotypes including at least 1 allelic mismatch and the number of replicated single-locus genotypes (Pompanon et al. 2005).

A fragment of the mitochondrial control region was amplified following the protocol described by Epps et al. (2005). Cycle sequencing was performed bidirectionally using BigDye 3.1 and an ABI 3730 Genetic Analyzer (Applied Biosystems, Foster City, California). Forward sequences were verified with the sequence of the reverse strand using Sequencher 5.1 (Gene Codes Corp.) and incomplete sequences, or those with discrepancies, were reamplified and resequenced. We aligned the sequences in MEGA 6 (Tamura et al. 2013) using the ClustalW algorithm (Thompson et al. 1994) under default settings, at which time we discovered a 75 base pair (bp) repetitive sequence (RS) localized in the left domain near the tRNA<sup>Pro</sup> gene. All individuals examined had at least 2 copies of the RS, with a limited number (~5%) displaying 3 copies. We normalized the sequences by manually removing the extra RS from those haplotypes that had it and limited our analyses to the 515bp fragment common to all individuals (see Supporting Information S2 for a full description). Sequences for each novel haplotype were deposited into GenBank (accession nos. KU363638–KU363690).

We used a basic local alignment search tool (BLAST—Altschul et al. 1997) to search the nucleotide database in GenBank for all unique haplotypes present in our data, finding 35 homologous sequences for desert bighorn sheep, including accession nos. AF076911–AF076917 (Boyce et al. 1999), AY903993–AY904017 (Epps et al. 2005), KP688366–KP688368 (Buchalski et al. 2015), and AY116621–AY116623 (unpublished sequences for 2 Mexican and 1 Weems bighorn). We downloaded the archived sequences, preserving the original haplotype names, for inclusion in our phylogenetic analyses.

*Range-wide population genetic structure.*—We used discriminant analysis of principle components (DAPC—Jombart et al. 2010) to identify population structure among microsatellite genotypes. This method entails no assumptions regarding the cause of structure (i.e., island model versus isolation-by-distance [IBD]) and, in contrast to other clustering approaches (i.e., Pritchard et al. 2000), does not assume Hardy–Weinberg or gametic equilibrium. Analysis was implemented in R 3.0.2 (R Development Core Team 2015) using the package adegenet 1.4-2 (Jombart 2008). The optimal number of genetic clusters ( $K$ ), was estimated by conducting 10 independent runs of the *find.clusters* function with the *diffNgroup* option selected. The number of principal components as predictors for the discriminant analysis was set to 7 following alpha-score optimization (i.e., trade-off between power of discrimination and overfitting; Supporting Information S3). Scatterplots of microsatellite genotypes in relation to discriminant functions were created in adegenet.

We then used TESS 2.3.1 (Chen et al. 2007) to evaluate structure among microsatellite genotypes in a spatially explicit context. Program TESS accounts for spatial autocorrelation in allele frequencies due to IBD by treating sample location coordinates as prior information during estimation of admixture

proportions. This allows for differentiation between clinal transitions and abrupt breaks (i.e., contact zones versus barriers) between discrete genetic groups or clusters (Durand et al. 2009; Francois and Durand 2010). We first ran the no-admixture model with 200,000 iterations, of which the initial 100,000 were excluded as burn-in, to test the number of clusters ( $K$ ) from 2 to 10, with 10 replicates each. A plot of the deviance information criterion (DIC) against  $K$  was used to identify the most likely number of clusters. This value was then used in 100 replicate runs of the admixture model, using the same number of iterations as above. Individual cluster memberships from the 10 runs having the highest likelihoods were averaged using CLUMPP 1.1.2 (Jakobsson and Rosenberg 2007) and visualized using DISTRUCT 1.1 (Rosenberg 2004). Predictive maps of each genetic cluster were generated using custom R scripts provided with the TESS software download ([http://www-timc.imag.fr/Olivier.Francois/TESS\\_Plot.html](http://www-timc.imag.fr/Olivier.Francois/TESS_Plot.html)).

We used nested hierarchical analysis of molecular variance (AMOVA—Excoffier et al. 1992) to examine the distribution of genetic variation associated with competing desert subspecies designations. In our 1st set of analyses, the Sierra Nevada and Rocky Mountain subspecies were compared to a varying number of groups within desert bighorn sheep. Desert bighorn grouping schemes included 1) the Peninsular, Nelson, and Mexican subspecies of Cowan (1940;  $K = 5$ ), 2) Peninsular and Nelson bighorn pooled together as suggested by Wehausen and Ramey (1993;  $K = 4$ ), and 3) all desert bighorn pooled together as implied by Ramey (1995;  $K = 3$ ). To allow for lesser divergence within desert bighorn sheep in relation to the Sierra Nevada and Rocky Mountain subspecies, we conducted a 2nd set of analyses using desert bighorn only. We tested grouping schemes 1 and 2 based on the rationale above. This analytical design was applied to both microsatellite allele and control region haplotype frequency data in Arlequin 3.5.1.2 (Excoffier and Lischer 2010). Significance was determined from 10,000 permutations of the data.

We then evaluated pairwise differentiation between each genetic cluster identified above. Pairwise  $F_{ST}$  values based on microsatellite allele and control region haplotype frequencies were estimated following Weir and Cockerham (1984), as implemented in Arlequin. Ten thousand random permutations were used to test significance, and  $\alpha$  for each test was adjusted for multiple comparisons using the modified false discovery rate (FDR) method (Benjamini and Yekutieli 2001).

We wished to quantify the spatial scale of IBD among desert bighorn sheep herds, while avoiding potential biases resulting from past translocations. Therefore, we identified native herds within our sample ( $n = 23$ ) as those with no history of translocation (i.e., according to Bleich et al. 1990; Cox and Cummings 2005). Geographic distances among native herd locations were calculated in ArcGIS (ESRI, Redlands, California),  $\ln$  transformed, and converted to a matrix. We then estimated group genetic distances as  $F_{ST}/(1 - F_{ST})$  according to Slatkin (1995) for both microsatellite allele and control region haplotype frequencies in Arlequin. Correlations between genetic and geographic distances were determined using Mantel tests in the R

package Ecodist (Goslee and Urban 2007). To better visualize the scale over which genetic marker frequencies were spatially autocorrelated, we created Mantel correlograms using distance class sizes of 20 km and the Vegan package (Oksanen et al. 2015). For all tests, correlations were determined using permutation tests with 1,000 randomizations.

*Genetic diversity indices.*—Indices of population genetic diversity were estimated for each genetic cluster identified above. We used Fisher's exact test (Guo and Thompson 1992) as implemented in Genepop 4.2 (Rousset 2008) to test for departures from Hardy–Weinberg proportions and genotypic linkage equilibrium using 10,000 dememorization steps, 20 batches, and 5,000 iterations per batch. Test results were adjusted for multiple pairwise comparisons using FDR correction. Estimates of the number of alleles per locus ( $N_A$ ), expected ( $H_E$ ) and observed ( $H_O$ ) heterozygosity, and the inbreeding coefficient ( $F_{IS}$ ) were generated in GenAlex (Peakall and Smouse 2012). Allelic richness ( $A_r$ ) was calculated using the methods of Mousadik and Petit (1996) as implemented in the PopGenReport package (Adamack and Gruber 2014) for R. The number of polymorphic sites, nucleotide diversity ( $\pi$ ), number of haplotypes ( $H_n$ ), and haplotype diversity ( $H_d$ ) were calculated for mtDNA control region sequences using DNAsp 5.10 (Librado and Rozas 2009).

*Phylogeographic analyses.*—We constructed a phylogenetic tree of unique haplotype sequences in MEGA 6 using the maximum likelihood (ML) algorithm, with support at the nodes calculated from 1,000 bootstrap replicates. Evolutionary distances (i.e., branch lengths) were computed under the Hasegawa–Kishino–Yano (HKY) model of nucleotide substitution (Hasegawa et al. 1985), proportion of invariable sites, and gamma distribution shape (HKY+I+ $\Gamma$  model), as this was determined to be the best-fitting model according to the Bayesian information criteria (BIC) in MEGA 6. All positions containing alignment gaps and missing data were eliminated from the data set for tree construction (complete deletion option). We used the Snow sheep (*Ovis nivicola*; GenBank accession no. DQ249894) indigenous to Asia as the outgroup.

Phylogenetic relationships among haplotypes were also inferred using median-joining network analysis in Network 4.6.1.3 (Bandelt et al. 1999). Within Network, we used the average number of mutations ( $\rho$ ) separating ancestral and descendent haplotypes (Forster et al. 1996; Saillard et al. 2000) to estimate haplogroup ages within desert bighorn, as well as the time to most recent common ancestor (TMRCA) between desert bighorn and both the Sierra Nevada and Rocky Mountain lineages.

To estimate effective splitting times between subspecies, we modeled the demographic history of bighorn by coalescent simulation in IMA2 (Hey 2010a, 2010b). We computed estimates and associated 95% highest posterior density (HPD) intervals, in terms of mutational accumulation under the HKY mutation model. We estimated only “effective” splitting times (i.e., as if no postdivergence gene flow occurred), rather than testing models that incorporated gene flow, because of the large number of pairwise comparisons and computational time that would

have been required. Therefore, if our assumptions regarding gene flow were incorrect, the resulting estimates would be conservative (i.e., erring toward more recent divergence). We performed replicate runs with different random number seeds for all comparisons to confirm consistency. Validity of results was evaluated based on unimodality of posterior distributions and their tendency to approach zero on both ends, stationarity of parameter estimates and model likelihoods, and the cumulative consistency of numerical estimates with one another and in relation to empirical estimates of net sequence divergence (Nei and Li 1979), which provided an intuitive qualitative check on simulation results.

We also constructed Bayesian skyline plots to infer changes in population size through time for each desert subspecies using BEAST 1.8.2 (Drummond et al. 2005; Drummond and Rambaut 2007). We used a HKY+ $\Gamma$  model of nucleotide substitution with default (constant) settings and 10 skyline groups. Because our focus was on the intraspecific (evolutionarily recent) divergence among bighorn, we assumed a strict clock throughout (Brown and Yang 2011).

We translated mutation-scaled estimates of time into absolute estimates by multiplying by the expected number of years per mutation event. Previous estimates of mitochondrial mutation rates for *Ovis* spp. have varied due to different assumptions underlying the external calibrations. The divergence of bighorn sheep from other *Ovis* spp. was initially assumed to be 5.63 million years ago (My—Hiendleder et al. 1998), yet more recently was estimated to be as recent as 2.42 My (Rezaei et al. 2010), resulting in a 2.33-fold difference in the mutation rate implied for mtDNA. Although we used the control region in this study, cytochrome *b* (*Cytb*) has been found to mutate close to 2% per million years (Ma) for a range of large-bodied terrestrial mammals, including bovids (Nabholz et al. 2008). We reviewed the *Cytb* data available for *Ovis* spp. (Bunch et al. 2006; Rezaei et al. 2010), which suggested the more recent calibration resulted in a rate close to the expected 2% per Ma. The corresponding mutation rate if recalibrated to the more ancient date would be < 1% per Ma, which we found unrealistic. Therefore, we adopted the more recent date and recalibrated the control region estimates from Hiendleder et al. (1998). Specifically, we estimated the mutation rate and associated variance by averaging (and computing a confidence interval for) the 4 most recent *Ovis* nodes provided by Hiendleder et al. (2002,  $n = 4$  from table 2, therein). These calculations resulted in an estimate of 6.1%, 95% CI 4.2–7.9% per Ma. Our use of this more recent calibration resulted in more conservative (recent) divergence estimates. All estimates and confidence limits presented here can be recalibrated to the lower (less conservative) rate by multiplying by 2.33 (the ratio of the 2 external calibration points, 5.63Ma/2.42 Ma).

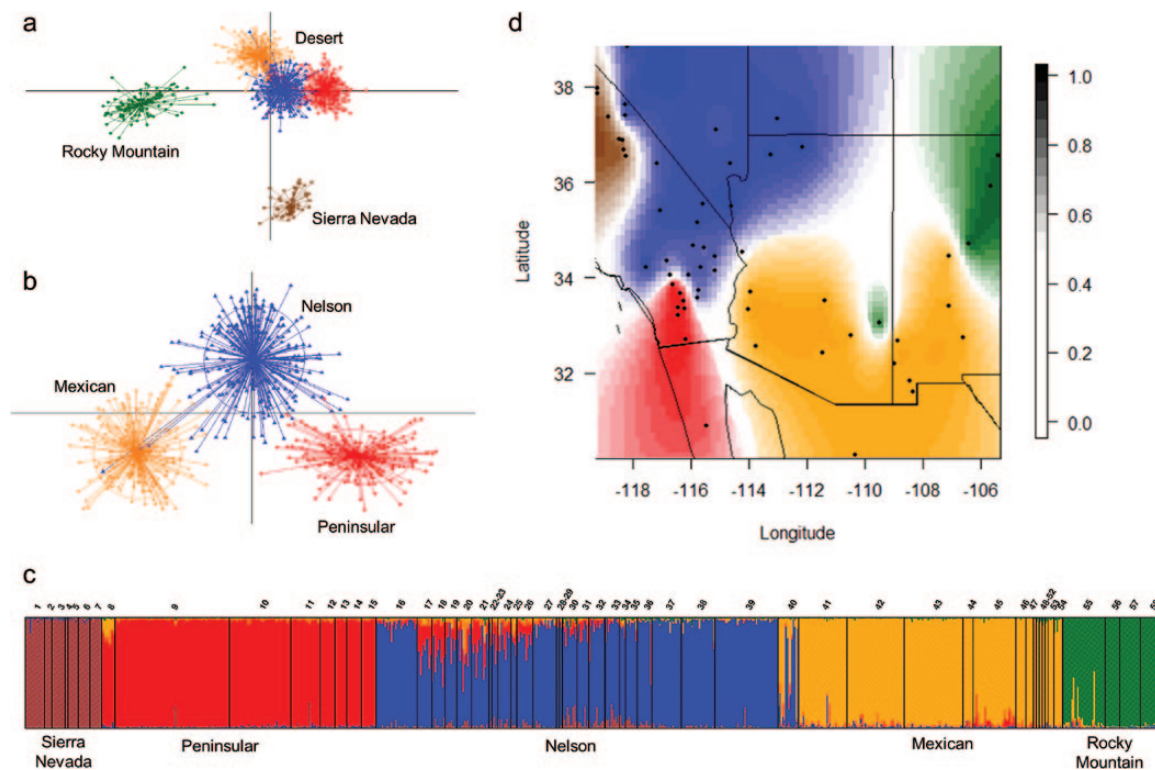
## RESULTS

*Population genetic structure.*—We obtained unique multilocus microsatellite genotypes for 804 individuals and observed agreement between 1,135 of the 1,170 single-locus genotypes

analyzed twice, indicating a genotyping error rate of 3%. The *diffNgroups* option for the DAPC differentiated microsatellite genotypes into 5 genetic clusters ( $K = 5$ ) in 8 out of 10 runs. The scatterplot of individual genotypes using 4 discriminant functions indicated the Sierra Nevada and Rocky Mountain subspecies were highly discriminated from desert bighorn and one another, with strong separation visible along the first 2 principle component axes (Fig. 2a). The scatter plot also suggested the presence of hierarchical structure, with apparent substructure among desert bighorn. To further investigate this substructure, we conducted a 2nd DAPC using only desert bighorn genotypes ( $n = 655$ ). The 3 clusters identified in the 1st DAPC were well discriminated along both axes with no overlap of 95% inertia ellipses (Fig. 2b). The TESS analysis further supported the results of DAPC. Mean DIC values indicated  $K = 5$  as the best clustering option for our data (i.e., piecewise change in function shape at this value; Supporting Information S3). Individual admixture proportions (Fig. 2c) for each cluster indicated clear geographic structure among Sierra Nevada and Rocky Mountain bighorn, as well as desert clusters concordant with the subspecies designations of Cowan (1940), including 1) Peninsular bighorn from the Peninsular Ranges ( $n = 288$ ), 2) Nelson bighorn from the Transverse Ranges, Mojave Desert, southern Great Basin, and Colorado Plateau ( $n = 180$ ), and 3) Mexican bighorn from the Sonoran and Chihuahuan Deserts ( $n = 187$ ; Fig. 2d).

Both TESS and DAPC indicated intermingled Nelson and Mexican bighorn genotypes associated with the northern Sonora Desert, north of the Bill Williams River in Arizona (i.e., location 40; Figs. 1 and 2). The TESS analysis also indicated low-level admixture between the Peninsular and Nelson genetic clusters in the southern Mojave Desert in California (locations 17–26; Fig. 2c). Interestingly, admixture proportions indicated an absence of introgression between Sierra Nevada genotypes and desert bighorn immediately to the east. As expected, Rocky Mountain genotypes occurred at sites of known (re)introduction for this subspecies, both within (eastern Arizona) and adjacent to (northern New Mexico) the native range of desert bighorn sheep (Figs. 2c and d). Admixture proportions indicated introgression of desert bighorn into the Rocky Mountain population in eastern Arizona (location 55), with no evidence of the reverse in adjacent desert bighorn herds (Fig. 2c).

The AMOVAs produced results similar to the DAPC, indicating significant variance among Sierra Nevada, Rocky Mountain, and desert bighorn, with substructure apparent in the latter. For the AMOVA including all samples, outcomes were similar for both mtDNA and microsatellite data (Table 1). Among-group variance was maximized at  $K = 3$ , with groups consisting of 1) Sierra Nevada, 2) Peninsular, Nelson, and Mexican, and 3) Rocky Mountain bighorn sheep—with significant ( $P < 0.001$ ) among-group fixation indices ( $F_{CT}$ ) of 0.22 for



**Fig. 2.**—(a) Scatterplot of the first 2 principal components of the DAPC suggests microsatellite genotypes form 5 genetic clusters, as well as hierarchical structure among bighorn sheep (*Ovis canadensis*) within the study area. Each point represents 1 individual and ellipses around clusters represent 95% confidence. (b) Scatterplot of the first 2 principal components of the DAPC used to identify genetic structure within desert bighorn only. (c) Posterior estimates of individual admixture proportions among genetic clusters ( $K = 5$ ) as determined by TESS. Each bar represents an individual, and the height of the bar represents the relative probability of belonging to a given cluster. Sample locations are indicated above the chart, subspecies below. (d) Sample locations overlaid with predictive boundaries for each genetic cluster identified by TESS. Boundaries are based on simple kriging of the posterior probability of cluster membership at each location.



mtDNA and 0.16 for microsatellites. However, significant  $F_{CT}$  estimates for the alternative formulations of population structure ( $K = 4$  pooling Peninsular and Nelson bighorn, and  $K = 5$  considering each desert subspecies separately) suggested the presence of substructure. The desert bighorn only AMOVAs also supported the presence of substructure, with  $F_{CT}$  estimates significant ( $P < 0.001$ ) and of similar magnitude at  $K = 2$  and  $K = 3$  for microsatellite and mtDNA data sets (Table 1).

Pairwise  $F_{ST}$  estimates based on mtDNA data indicated significant differentiation among all clusters (Table 2). We found the lowest estimates among the desert clusters (0.11–0.18), which is consistent with low discrimination as indicated by the DAPC scatterplot (Fig. 2a). Comparisons between the desert clusters and the Sierra Nevada (0.43–0.50) and Rocky Mountain subspecies (0.17–0.25) indicated higher genetic differentiation. This pattern was also reflected in the microsatellite data. Pairwise  $F_{ST}$  values among the desert clusters were lower (0.08–0.14; Table 2) than those comparisons to the

Sierra Nevada (0.19–0.26) or Rocky Mountain (0.15–0.25) subspecies.

The Mantel test based on microsatellite data found a strong positive correlation between ( $\ln$ ) geographic distance and genetic distance ( $r = 0.51$ ;  $P < 0.001$ ; Supporting Information S4), while the Mantel correlogram suggested genotype frequencies were spatially autocorrelated, with significant positive  $r$ -values between 0 and 60 km. The Mantel test using mtDNA data resulted in a lower correlation between geographic and genetic distance ( $r = 0.26$ ;  $P = 0.034$ ), and the correlogram indicated spatial autocorrelation in haplotype frequencies between 0 and 40 km.

*Genetic diversity.*—We observed substantial genetic diversity within each cluster identified (Table 3), with all 39 microsatellite loci polymorphic in each cluster. Average allelic richness ranged from 2.7 to 8.2 and observed heterozygosity was generally high, ranging from 0.37 to 0.58. We observed statistically significant deviations from HWE in all clusters except for the

**Table 1.**—Analysis of molecular variance results for different configurations of population genetic structure among 1) all bighorn samples and 2) desert bighorn samples only, using mtDNA and microsatellite data sets. The number of inferred genetic populations for each test is indicated by  $K$ . Letters (A–E) indicate membership of a subspecies to a genetic population under a specific test.

Subspecies	All samples						Desert samples			
	mtDNA			Microsatellites			mtDNA		Microsatellites	
	$K = 3$	$K = 4$	$K = 5$	$K = 3$	$K = 4$	$K = 5$	$K = 2$	$K = 3$	$K = 2$	$K = 3$
Sierra Nevada	A	A	A	A	A	A				
Peninsular	B	B	B	B	B	B	B	B	B	B
Nelson	B	B	C	B	B	C	B	C	B	C
Mexican	B	C	D	B	C	D	C	D	C	D
Rocky Mountain	C	D	E	C	D	E				
$F_{CT}^a$	0.22	0.15	0.16	0.16	0.12	0.13	0.11	0.08	0.06	0.08

<sup>a</sup> All estimates were statistically significant at  $P < 0.001$ .

**Table 2.**—Pairwise  $F_{ST}$  estimates based on 39 microsatellite loci (below diagonal) and 515 base pairs of mtDNA control region sequence (above diagonal) for bighorn sheep (*Ovis canadensis*) genetic clusters, approximating subspecies. All estimates were statistically significant following false detection rate (FDR) correction.

Genetic cluster	Sierra Nevada	Peninsular	Nelson	Mexican	Rocky Mountain
Sierra Nevada		0.50	0.43	0.43	0.57
Peninsular	0.26		0.18	0.16	0.25
Nelson	0.19	0.09		0.11	0.19
Mexican	0.26	0.14	0.08		0.17
Rocky Mountain	0.33	0.25	0.15	0.20	

**Table 3.**—Indices of genetic diversity (averages) for bighorn sheep (*Ovis canadensis*) genetic clusters, approximating subspecies, for both microsatellites (left) and mitochondrial DNA (right). The diversity indices used are as follows:  $A$ , alleles per locus;  $A_R$ , allelic richness;  $H_E$ , expected heterozygosity;  $H_O$ , observed heterozygosity;  $F_{IS}$ , inbreeding coefficient;  $H_n$ , number of haplotypes;  $H_d$ , haplotype diversity;  $\pi$ , nucleotide diversity.

Genetic cluster	Microsatellites						mtDNA			
	$N$	$A$	$A_R$	$H_E$	$H_O$	$F_{IS}$	$n$	$H_n$	$H_d$	$\pi$
Sierra Nevada	52	2.4	2.7	0.39	0.37	0.03	47	1	0	0
Peninsular	187	4.7	4.9	0.54	0.50	0.09 <sup>a</sup>	175	10	0.76	0.0128
Nelson	288	8.4	8.2	0.68	0.53	0.21 <sup>a</sup>	279	30	0.87	0.0126
Mexican	180	6.2	6.3	0.60	0.53	0.13 <sup>a</sup>	170	25	0.91	0.0119
Rocky Mountain	97	6.4	6.8	0.64	0.58	0.10 <sup>a</sup>	87	10	0.73	0.0073

<sup>a</sup> Deviation from Hardy–Weinberg equilibrium (homozygote excess) indicated by  $P \leq 0.001$ .



Sierra Nevada subspecies, suggesting the presence of substructure in the remaining 4. This finding is not surprising given the spatial scale of our sampling, existing evidence of regional genetic structure among desert bighorn herds (Epps et al. 2010; Buchalski et al. 2015), and our results for IBD tests.

Normalization of the control region sequence data required the removal of RS 2 from 36% of Rocky Mountain, < 1% of desert, and 0% of Sierra Nevada samples. Thus, RS 2 was relatively common in Rocky Mountain bighorn as compared to the other subspecies. Data normalization resulted in 515 bp sequences with minimal missing data from 758 samples. Of the aligned nucleotide positions, 81 sites (16%) were variable and 70 sites (14%) were parsimony-informative. We discovered 74 distinct haplotypes, of which 24 were previously described in GenBank. We also identified 12 haplotypes in GenBank that were not present in our data and retained these for phylogenetic analyses. Accession numbers of all haplotypes analyzed are listed in Supporting Information S1. Haplotypes were frequently restricted to a single location or had localized distributions limited to neighboring mountain ranges. The number of mtDNA haplotypes corresponding to each genetic cluster ranged from 1 to 25 (Table 3). The Sierra Nevada sample exhibited only a single haplotype. Excluding this population, haplotype and nucleotide diversity were high ( $H_d = 0.73\text{--}0.91$ ,  $\pi = 0.0073\text{--}0.0128$ ).

*Phylogeographic analyses.*—Phylogenetic inference by building a ML tree indicated the presence of 3 distinct clades, 2 of which exhibited bootstrap support > 90% (Fig. 3a). The 3 clades corresponded approximately to Sierra Nevada, Rocky Mountain, and desert bighorn and composed a polytomy indicating no support for any specific divergence pattern. The ML tree also represented desert bighorn as a polyphyletic group. Clade 1 consisted of the single Sierra Nevada haplotype and desert bighorn haplotype MG3 (Fig. 3a, #1). Haplotype MG3 was found in 8 individuals from the Panamint Range and 1 individual from Eagle Crags, both in the northern Mojave Desert in California (Fig. 1; Supporting Information S1). Clade 2 consisted of Rocky Mountain haplotypes, both from within the native range for that subspecies (i.e., Alberta and British Columbia) and (re)introduced populations in Arizona and New Mexico. Clade 3 was not well supported statistically, but represented the most basal portion of the tree and consisted entirely of desert bighorn. Within Clade 3, subclades

were largely concordant with the desert subspecies designations of Cowan (1940) and only occasionally polyphyletic. Finally, the haplotype for Weems bighorn sheep obtained from GenBank did not cluster with haplotypes from Peninsular bighorn sheep (Fig. 3a, #2), even though both are endemic to Baja California.

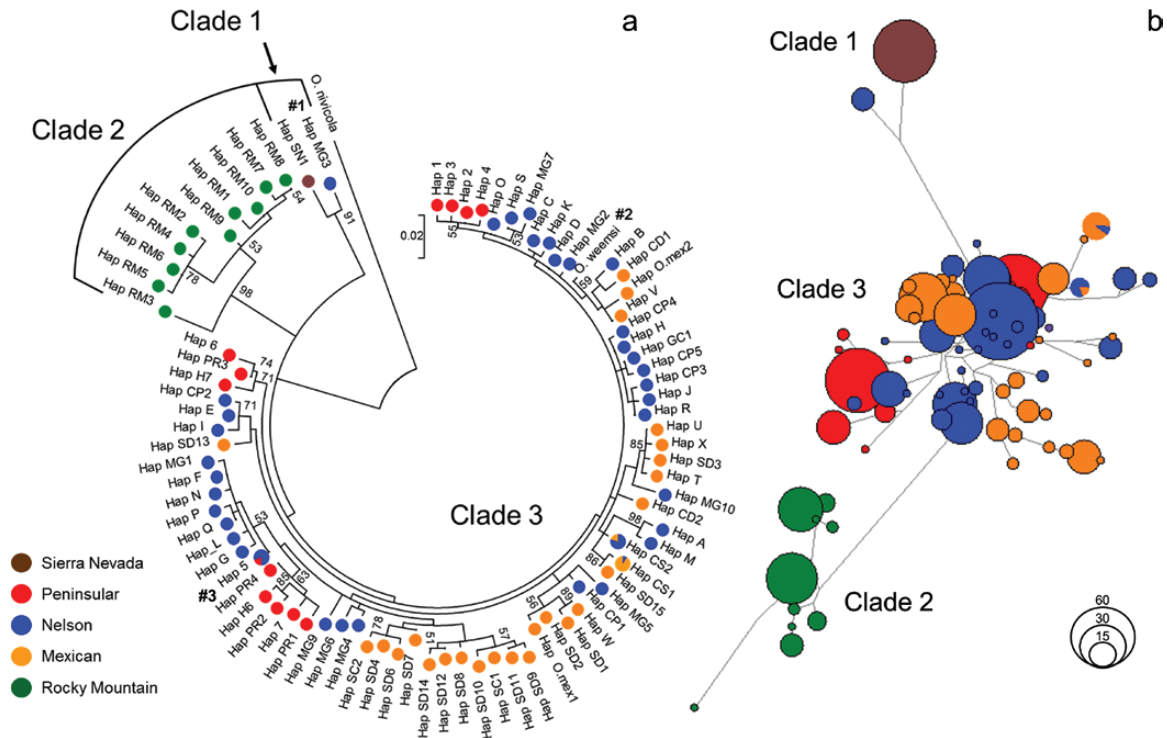
The unrooted, median-joining haplotype network also recognized 3 clades corresponding to Sierra Nevada, Rocky Mountain, and desert bighorn (Fig. 3b). We estimated TMRCA for the Rocky Mountain clade and desert bighorn at  $680 \pm 130$  kya, and the Sierra Nevada clade and desert bighorn at  $640 \pm 120$  kya. In addition, we estimated TMRCA between the single Sierra Nevada haplotype and haplotype MG3 at  $150 \pm 60$  kya. Within the desert clade (Supporting Information S5), the network was sparse with a center consisting of several inferred but unsampled haplotypes. There was little haplotype sharing among subspecies, and the geographic areas where haplotype sharing was observed (Fig. 4) coincided with zones of subspecies intergradation originally identified by Cowan (1940: 574), including the northern Sonoran Desert (locations 40 and 41), as well as the northern Peninsular Ranges (location 15). The network also indicated several endemic haplogroups within the Peninsular and Mexican subspecies with ages predating the LGM—103 to 56 kya for Peninsular bighorn and 160 to 9 kya for Mexican bighorn sheep (Supporting Information S5).

The IMA2 analyses estimated pairwise effective splitting times for Sierra Nevada, Rocky Mountain, and desert bighorn at the mid- to late Pleistocene (315–94 kya), although our pairwise estimates were incomplete (Table 4). Due to the presence of only a single haplotype in contemporary Sierra Nevada bighorn, and its close relationship to a desert bighorn haplotype, we did not estimate splitting times between these taxa (Table 4). Pairwise estimates among desert bighorn were considerably more recent (9–6 kya) than those with Rocky Mountain bighorn, with the exception of the Peninsular and Mexican populations (122 kya). Further, splitting time estimates from IMA2 generally increased with net sequence divergence following a saturating curve (Supporting Information S6), except for a single outlier representing the Mexican versus Peninsular bighorn comparison. One of the assumptions of IMA2 is that no intervening populations are missing from the analysis, which was clearly violated in this case and potentially responsible

**Table 4.**—IMA2 estimates of splitting times ( $\times 1,000$  years) based on control region sequences (above diagonal). The 95% highest posterior density of the estimates are indicated in parentheses. Average pairwise sequence divergence (Dxy) is indicated below the diagonal. Diagonal contains average sequence divergence within a taxon. Net sequence divergence (Da) is calculated by subtracting average within taxon sequence divergence from Dxy.

	Sierra Nevada	Peninsular	Nelson	Mexican	Rocky Mountain	Snow sheep
Sierra Nevada	0.0000				315 (114–532)	
Peninsular	0.0370	0.0127			273 (67–442)	
Nelson	0.0350	0.0160	0.0141		94 (9–185)	
Mexican	0.0370	0.0160	0.0150	0.0119	299 (116–484)	
Rocky Mountain	0.0440	0.0360	0.0330	0.0370	0.0073	
Snow sheep	0.0580	0.0640	0.0630	0.0610	0.0710	

<sup>a</sup> Inconsistency between the splitting time estimate and net sequence divergence.



**Fig. 3.**—(a) Rooted maximum likelihood tree based on 515 base pairs of the mtDNA control region illustrating 3 main bighorn sheep lineages. Branch lengths are scaled to evolutionary distances and bootstrap values > 50, based on 1,000 replicates, are shown next to the branches. Haplotype names correspond to those in [Supporting Information S1](#) and colors to genetic clusters indicated in [Fig. 2](#). #1—Desert haplotype representing ancient gene flow event or incomplete lineage sorting with Sierra Nevada bighorn. #2—Position of Weems bighorn haplotype obtained from GenBank. #3—For the purpose of illustration, frequencies for Hap 5 include the findings of [Boyce et al. \(1999\)](#) and [Epps et al. \(2010\)](#), to depict all published evidence of haplotype sharing between Peninsular and Nelson bighorn. (b) Unrooted median-joining network illustrating the 3 lineages. Branch lengths are proportional to the number of substitutions, and node sizes to the number of individuals represented.

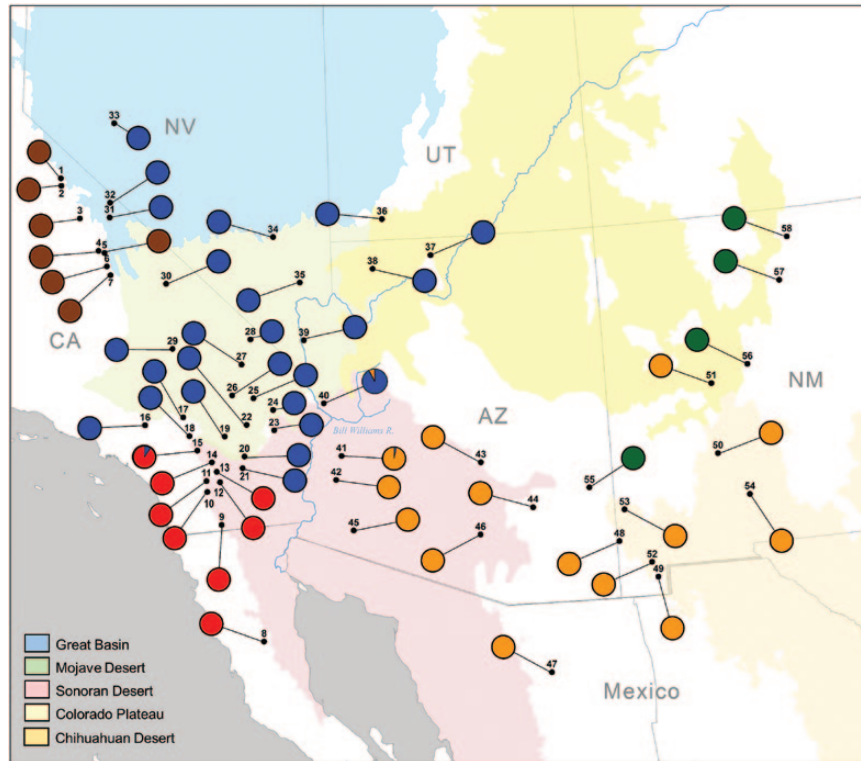
for the unreasonably high estimate. We therefore conducted a 3 population analysis in IMA2, which constrained the splitting times among these 3 populations to be tree like (rooted to *O. nivicola* as an outgroup). These results estimated that Mexican bighorn split from Nelson and Peninsular bighorn 17 kya (95% HPD: 37–3 kya) and that the latter 2 populations separated 3 kya (95% HPD: 8–0.5 kya). Because our analyses assumed no gene flow since divergence, the effect of any subsequent gene flow would be to render our splitting time estimates too recent. Therefore, these estimates were conservative, particularly for desert subspecies where historical gene flow was most likely.

Estimates of historical demography via Bayesian skyline plots suggested Nelson bighorn had the largest historical population size, followed by Mexican bighorn, with Peninsular bighorn having the smallest historical size ([Fig. 5](#)). The Bayesian skyline plots were generally parallel for all 3 populations suggesting expansion during the Sangamon interglacial period, followed by large declines following the LGM. However, 95% highest posterior density intervals were insufficiently narrow to distinguish whether declines occurred during the late Pleistocene or Holocene ([Supporting Information S7](#)). Population decline apparently began the earliest and was the most pronounced (~5×) in Nelson bighorn, whereas the Peninsular population appears to have declined more recently.

## DISCUSSION

*Genetic divergence among Sierra Nevada, Rocky Mountain, and desert bighorn sheep.*—This study provides the most extensive characterization to date of genetic differentiation and structure among bighorn populations in the desert southwest. Phylogenetic analyses of mtDNA identified 2 well-supported clades associated with Sierra Nevada and Rocky Mountain bighorn. Desert bighorn haplotypes were basal to these clades, but were shallowly differentiated from one another. Population genetic analyses were consistent with this phylogenetic structure. The DAPC showed strong discrimination among all 3 major lineages (i.e., the 2 clades and desert bighorn) and the AMOVAs indicated among-group variance was maximized at  $K = 3$ .

The deep divergence among geographically endemic bighorn clades implied long-term isolation ([Avisé 2000](#)). Rho estimates suggested that TMRCA of desert bighorn and both the Rocky Mountain and Sierra Nevada lineages dates prior to the Illinoian Glaciation. Further, our estimates of splitting times among these lineages suggest divergence during the late Pleistocene and appear comparable to other phylogenetic data for the subgenus *Pachyceros* (i.e., North American wild sheep, including *O. canadensis* and Dall sheep [*O. dalli*], as well as their Asian counterpart *O. nivicola*). [Loehr et al. \(2006\)](#) estimated divergence between Nelson and Rocky Mountain



**Fig. 4.**—Geographic distribution of mtDNA control region haplogroups among sampled herds of *Ovis canadensis* subspecies, shown as pie diagrams. Locations are numbered as in Fig. 1. For the purpose of illustration, haplotype frequencies for the San Jacinto population (15) include our results and the findings of Boyce et al. (1999), demonstrating a shared haplotype between the northern Peninsular Ranges and southern Mojave Desert.

bighorn at ~380 kya, which is generally consistent with our IMA2 estimates recalibrated to the 2.6% per Ma mutation rate (see “Materials and Methods”). Studies using *Cytb* and nuclear sequences estimated the divergence between *O. nivicola* and North American Pachyceriforms at 2.3–1.6 My, and the divergence between *O. canadensis* and *O. dalli* at 1.4–0.95 My (Bunch et al. 2006; Rezaei et al. 2010).

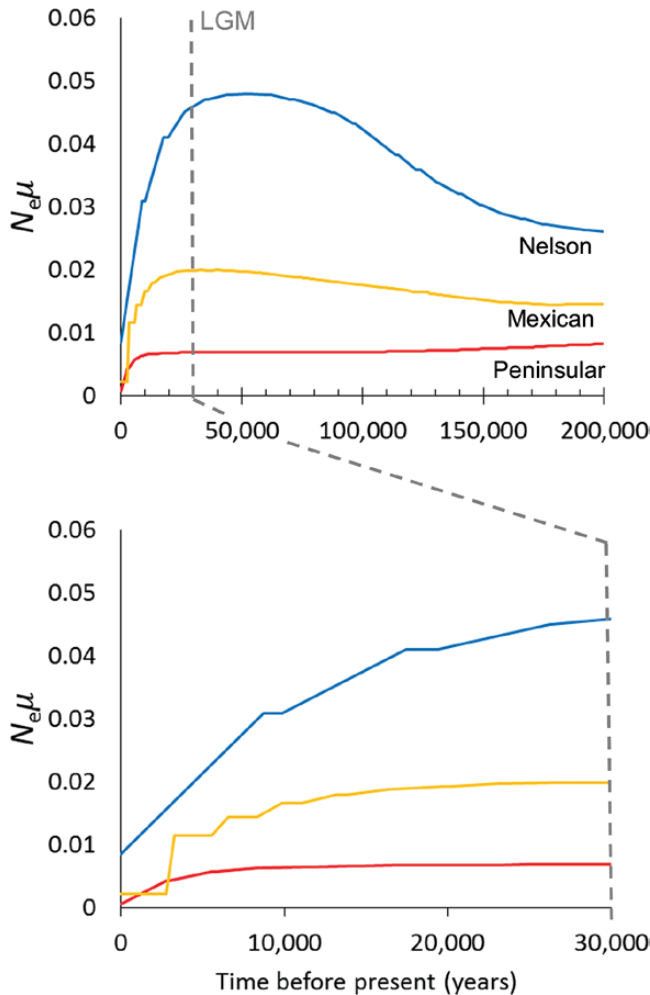
Our divergence estimates help to further resolve the origins of desert bighorn, as well as colonization of the desert southwest. The fossil record indicates *Ovis* continuously inhabited the Mojave region since ~300 kya (Jefferson 1991), as well as a more recent refugium located further north in Wyoming, with a fossil record of continuous *Ovis* presence since ~100 kya (Martin and Gilbert 1978; Wang 1988). Our data suggest these refugia were the result of separate colonization events from a Beringian source predating the Illinoian glaciation (i.e., on the order of 300 kya) during periods when ice-free corridors between Laurentide and Cordilleran ice sheets were present. Such a deep divergence between the Wyoming and Mojave refugial populations elevates the evolutionary significance of their relationships to contemporary desert bighorn. The geochronology of fossils suggests that bighorn first expanded from Wyoming into Nevada (beginning ~18 kya) and progressively further south, followed by later expansions from the Mojave refugium (~12 kya), rendering the fossil record somewhat ambiguous with respect to the origins of contemporary desert bighorn (Geist 1985). On the basis of phylogenetic positioning,

our data clearly support a scenario where colonists from the Mojave refugium displaced the earlier northern colonists and strongly refute the possibility of northern colonists partially giving rise to contemporary desert bighorn.

Geist (1985) proposed that northern expansion from the Mojave refugium during the early Holocene (~12 kya) resulted in establishment of the Sierra Nevada subspecies (synonymous with California bighorn at the time of Geist’s writing). Based on our findings, this seems unlikely. Net sequence divergence between the single Sierra Nevada haplotype and all 3 desert subspecies (~2.3%) corresponds to an estimated splitting time of approximately 125 kya (Supporting Information S6). Further, the Nelson bighorn haplotype that formed a clade with the single Sierra Nevada haplotype was sufficiently divergent to suggest the last contact between these 2 lineages predated the LGM (150 ± 60 kya). The polyphyletic nature of desert bighorn relative to Sierra Nevada bighorn could reflect either secondary contact between the lineages or incomplete lineage sorting. Despite the possibility of ancient gene flow, we found no evidence of contemporary gene flow between desert and Sierra Nevada bighorn based on microsatellite genotypes. Given that the Sierra Nevada Range is separated from desert bighorn occupied ranges by as little as 10 km in some areas, this finding suggests the possibility of nongeographic behavioral barriers or other forms of reproductive isolation between these subspecies.

*Genetic relationships within desert bighorn sheep.*—Our results indicated the desert subspecies defined by Cowan (1940;





**Fig. 5.**—Estimated changes in size ( $N_e \mu$ ) through time for 3 desert bighorn sheep populations based on Bayesian skyline reconstruction from mtDNA control region sequences. Plots illustrate recent declines in all populations ranging from the last glacial maximum (LGM) to the late Holocene (assuming 6.1% per Ma substitution rate). Estimates indicate that Nelson bighorn sheep, followed by Mexican bighorn sheep, had the historically largest population sizes, whereas Peninsular bighorn sheep had the smallest population which declined most recently.

excluding Weems bighorn sheep) diverged from one another more recently (Fig. 3a). Estimated splitting times based on the 3 population coalescent simulation suggested Mexican bighorn may have diverged as early as the late Pleistocene (37–3 kya), with the 2 other populations separating in the Holocene (8–0.5 kya). However, 2 observations suggest the possibility that splits among these subspecies could be considerably older. First, our assumption of no genetic exchange among desert subspecies since they diverged is conservative, and any actual gene flow would put estimates further back in time. Second, the haplotype network revealed several endemic haplogroups with ages significantly predating the LGM (Supporting Information S5). For Peninsular bighorn, all but 1 of its 13 haplotypes occurred in 3 endemic haplogroups, estimated on average to reflect derivation from their ancestral haplotypes ~85 kya (Fig. 3a). Mexican bighorn also showed isolation from Nelson bighorn

populations, as the majority of its 25 haplotypes occurred in endemic haplogroups dating to a similar timeframe (~72 kya). All shared haplotypes occurred in areas recognized by Cowan (1940) as zones of intergradation between desert subspecies (i.e., the northern Peninsular Ranges and the northern Sonora Desert in the vicinity of the Bill Williams River; Fig. 4). Regardless of whether these shared haplotypes reflected ancient shared ancestry or recent gene flow, the matrilineal diversity of Peninsular and Mexican bighorn was significantly divergent from the Nelson subspecies.

Both the Bayesian skyline plots and haplotype network suggested that modern desert bighorn reflect a small fragmented subset of a once massive population. The network was sparse, with a large number of missing intermediate haplotypes. The Bayesian skyline analyses also suggested a large ancestral desert bighorn population that expanded during the Sangamon interglacial, followed by demographic decline since the LGM. Ramey's (1995) study using a much more slowly mutating mtDNA marker found a widespread desert haplotype, which sat at the center of a star-like phylogeny, consistent with a population expansion. Putting our findings and his findings together suggests an expansion across the southwest dating well before the Pleistocene–Holocene boundary as proposed by Geist (1985). Based on the estimated ages for several of the endemic desert haplogroups, we suggest *Ovis* persisted in multiple southern refugia during the LGM, as originally proposed by Ramey (1995), rather than a single Mojave refugium. Following deglaciation, changes in the distribution of habitat may have allowed for secondary contact among these populations, resulting in the more recent splitting time estimates we observed. Ultimately, all refugial populations experienced fragmentation and demographic decline during the Holocene.

Analyses of population genetic structure based on microsatellite and mtDNA also supported significant differentiation among desert subspecies. Both the DAPC and TESS analyses indicated genetic clustering concordant with Cowan's subspecies distributions. Likewise, AMOVA among desert subspecies produced significant fixation index estimates among groups ( $F_{CT}$ ), regardless of the underlying model of population structure. Microsatellite and mitochondrial DNA-based  $F_{ST}$  comparisons among the desert bighorn genetic clusters were statistically significant and indicated that desert bighorn do not form a single genetic population.

The TESS analysis indicated low-level admixture between the Peninsular and Nelson subspecies in the southern Mojave Desert (locations 17–26; Fig. 2c). This pattern of admixture was inconsistent with clinal variation indicative of an active contact zone (Durand et al. 2009), but rather appears to represent relict gene flow between the 2 lineages. We interpret this as evidence of secondary contact following postglacial expansion of the Peninsular and Nelson refugial populations. However, the degraded nature of the contact (i.e., low-level admixture versus a clinal transition) suggests a subsequent disruption of gene flow, possibly by contemporary anthropogenic barriers or range contraction of the Peninsular population during the last century. Quite importantly, the geographic location of these

admixed genotypes matches the findings of previous morphometric analyses. Wehausen and Ramey (1993) used univariate and PC analyses to demonstrate major overlap in skull morphology characters between Peninsular and southern Mojave herds, both of which differed significantly from herds in the northern Mojave and Great Basin. This overlap was used to justify synonymizing Peninsular bighorn (*O. c. cremnobates*) with Nelson bighorn (*O. c. nelsoni*). Our genetic data suggest these morphological similarities may actually be the result of a relatively recent (i.e., Holocene) contact between the lineages. Further, TESS analyses showed no evidence of clinal variation between Nelson and Mexican bighorn, but rather intermingled genotypes in the northern Sonora Desert (i.e., location 40; Fig. 2). These findings suggest the Nelson and Mexican lineages may have only recently come into contact in eastern Arizona, possibly as a result of successful recovery and expansion. Additional sampling at a finer spatial scale would be necessary to precisely delineate the boundary between these 2 populations.

Mantel test and correlogram results indicated IBD was also a source of genetic structure among bighorn herds within desert subspecies. Lower correlation between genetic and geographic distances and the smaller spatial scale of genetic autocorrelation for the mtDNA relative to the nuclear markers was consistent with ewe philopatry (Krausman et al. 1999). This pattern of IBD indicates dispersal is negatively correlated with geographic distance between neighboring habitat patches (i.e., mountain ranges), reaching an asymptote at a distance beyond which dispersal is unlikely to occur (> 60 km). These findings agree with previous landscape genetics models for bighorn in the Mojave Desert that estimated the maximum effective dispersal distance of rams at 16.4 km-cost-units (corresponding to 16.4 km of flat terrain or 164 km of sloped terrain—Epps et al. 2007) and ewes at 10.0 km-cost-units (Crech et al. 2014). The scale of spatial autocorrelation we observed is reasonable for each marker type, considering that the distance between our sampling locations often covered both flat and mountainous terrain. Our results provide additional support for metapopulation structure in desert bighorn (Bleich et al. 1996), with genetic connectivity among mountain ranges occurring via a stepping-stone model of gene flow.

*Genetic diversity of bighorn sheep populations.*—Using the numerically largest and geographically broadest set of desert bighorn sheep samples analyzed to date, we found substantial genetic diversity throughout the native range. Observed heterozygosity and allelic richness were comparable or higher than other studies (Gutierrez-Espeleta et al. 2001; Epps et al. 2005, 2006; Buchalski et al. 2015) and suggest desert bighorn retained substantial range-wide genetic diversity despite demographic declines and loss of population connectivity. The federally endangered Sierra Nevada population had low genetic diversity, consistent with recent bottlenecks and small size. Low allelic richness and expected heterozygosity were comparable to the finding of Johnson et al. (2011), while mtDNA haplotype diversity (the presence of a single haplotype) had not previously been published for this population. Genetic diversity indices for the San Gabriel population in the Transverse

Ranges (Fig. 1, location 16;  $A_R = 3.3$ ,  $H_E = 0.40$ ,  $H_d = 0$ ) were considerably lower than averages for Nelson bighorn ( $A_R = 8.2$ ,  $H_E = 0.68$ ,  $H_d = 0.87$ ) and were comparable to the Sierra Nevada population. Highway infrastructure associated with Los Angeles separates the San Gabriel population from others within the Transverse Ranges, suggesting that this population is largely isolated and may continue to lose genetic diversity via drift. Additional sampling to better characterize genetic diversity is necessary to fully evaluate the status of this population.

*Conservation of desert bighorn sheep genetic diversity.*—In this study, we provide evidence of genetic structure highly concordant with the desert subspecies proposed by Cowan (1940). However, full characterization of the phylogenetic history of desert bighorn would require additional analyses utilizing more conserved regions of the mitochondrial genome and potentially nuclear sequence data to more accurately estimate divergence dates. Ultimately, conflicts between subspecies designations based on morphological versus genetic data may prove difficult to resolve and are somewhat peripheral to the more practical challenge of identifying and conserving important biological diversity.

The 3 desert bighorn sheep lineages identified in this study occupy desert biomes that vary significantly in climate (Laity 2009), suggesting exposure to different selection regimes. Hence, local adaptation is expected to have shaped some of the genomic diversity among desert bighorn sheep. Functional differences among herds have been documented, which are assumed to have a genetic basis—including horn size and lambing period (Wehausen 1991, 2005). Identifying conservation units that recognize adaptive differences may prove essential for continued recovery, especially in response to increasing threats from disease outbreak and prolonged drought resulting from climate change. For example, evolutionary significant units (ESUs) place an emphasis on adaptive variation and evolutionary potential (Ryder 1986; Waples 1991; Moritz 1994; Crandall et al. 2000), with precedence for granting ESUs legal protection under the Endangered Species Act. We recommend the delineation of conservation units be guided by a landscape genomics approach (*sensu*—Funk et al. 2012), utilizing neutral loci and loci under selection to characterize adaptive differences among herds.

Translocations and reintroductions have been critical in helping bighorn sheep populations recover across western North America (Krausman 2000). While largely conducted to increase abundance and distribution, successful genetic management of bighorn sheep may also require translocations that increase heterozygosity and facilitate genetic rescue. Reintroduced herds typically have low genetic diversity resulting from founder events and subsequent drift (Hedrick et al. 2001; Whittaker et al. 2004; Hedrick 2014). While herd supplementation with unrelated animals can result in genetic rescue, both in terms of increased genetic diversity and higher fitness among hybrids (Hogg et al. 2006; Miller et al. 2012; Olson et al. 2012), outbreeding depression can also occur in crosses between populations within a species (i.e., between subspecies—Edmands 2007). Our data indicate desert subspecies became isolated

during the LGM, or potentially earlier, in some cases with minimal secondary contact. For this reason, we feel translocations among Peninsular, Nelson, and Mexican bighorn are not advised. Our data suggest the maintenance of viable levels of genetic diversity should be attainable through translocations among herds within each of the 3 desert lineages. Whenever genetic rescue is contemplated, guidelines such as those proposed by Hedrick and Fredrickson (2010) should be consulted to evaluate the costs and benefits. In the absence of adequate data, managers should adopt the “local is best” translocation strategy, as proposed by Ramey (1995), as the most reliable means for preserving local adaptation.

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### SUPPORTING INFORMATION

The Supporting Information documents are linked to this manuscript and are available at Journal of Mammalogy online ([j mammal.oxfordjournals.org](http://j mammal.oxfordjournals.org)). The materials consist of data provided by the author that are published to benefit the reader. The posted materials are not copyedited. The contents of all supporting data are the sole responsibility of the authors. Questions or messages regarding errors should be addressed to the author.

**Supporting Information S1.**—Bighorn sheep (*Ovis canadensis*) samples used in this study organized by location.

**Supporting Information S2.**—Methods and rationale for alignment of mtDNA control region sequences.

**Supporting Information S3.**—(a) Spline interpolation of the optimal a-score (i.e., proportion of successful reassignments corrected for the number of retained PCs from the DAPC). (b) Mean values of the DIC, averaged over 10 runs, estimated by TESS for models with the number of genetic clusters ( $K$ ) ranging from 2 to 10. Dashed lines were inserted to indicate a piecewise change in the function at  $K = 5$ . (c) Bayesian information criteria (BIC) for different numbers of genetic clusters. The chosen number of clusters ( $K = 5$ ), based on 8 out of 10 independent runs of the *diffNgroups* algorithm in the package *adegenet*, is the minimum number after which the decrease in BIC becomes negligible.

**Supporting Information S4.**—Results of isolation-by-distance (IBD) tests among native herds ( $n = 23$ ) of desert bighorn

sheep. Graphs are shown for microsatellites (top row) and mtDNA haplotypes (bottom row). Scatter plots of genetic distance ( $F_{ST}/(1 - F_{ST})$ ) plotted against  $\ln$  geographic distance (left) and Mantel correlograms illustrating the scale of spatial autocorrelation in allele/haplotype frequencies (right). For correlograms, closed squares indicate a significant Mantel correlation coefficient based on 1,000 permutations.

**Supporting Information S5.**—Unrooted median-joining network illustrating the phylogenetic relationships of mtDNA haplotypes within desert bighorn sheep. Haplotype names correspond to those in **Supporting Information S1** and colors to genetic clusters indicated in **Fig. 2**. Node sizes scale to indicate the number of individuals within each haplotype. Shaded areas denote distinct haplogroups and dates represent estimated haplogroup ages ( $\rho \pm SD$ ). For the purpose of illustration, frequencies for haplotype 5 include our results and the findings of Boyce et al. (1999) and Epps et al. (2010), to depict all published evidence of haplotype sharing between Peninsular and Nelson bighorn.

**Supporting Information S6.**—Relationship between pairwise net sequence divergence ( $D_a$ ) and IMA2 estimates of divergence (in years before present), illustrating the outlier estimate for Peninsular versus Mexican bighorn (open circle).

**Supporting Information S7.**—Bayesian skyline plots generated from mtDNA control region sequences showing the historical demographic trends of Nelson (a), Mexican (b), and Peninsular (c) bighorn sheep in the desert southwest (assuming 6.1% per Ma substitution rate). The black line is the median size ( $N_e \mu$ ) estimate, and the gray lines represent the upper and lower 95% highest posterior density interval.

### LITERATURE CITED

- ADAMACK, A. T., AND B. GRUBER. 2014. PopGenReport: simplifying basic population genetic analyses in R. *Methods in Ecology and Evolution* 5:384–387.
- ALTSCHUL, S. F., ET AL. 1997. Gapped BLAST and PSI-BLAST: a new generation of protein database search programs. *Nucleic Acids Research* 25:3389–3402.
- AVISE, J. C. 2000. *Phylogeography: the history and formation of species*. Harvard University Press, Cambridge, Massachusetts.
- BANDELT, H. J., P. FORSTER, AND A. ROHL. 1999. Median-joining networks for inferring intraspecific phylogenies. *Molecular Biology and Evolution* 16:37–48.
- BENJAMINI, Y., AND D. YEKUTIELI. 2001. The control of the false discovery rate in multiple testing under dependency. *Annals of Statistics* 29:1165–1188.
- BLEICH, V. C., J. D. WEHAUSEN, K. R. JONES, AND R. A. WEAVER. 1990. Status of bighorn sheep in California, 1989 and translocations from 1971 through 1989. *Desert Bighorn Council Transactions* 34:24–26.
- BLEICH, V. C., J. D. WEHAUSEN, R. R. RAMEY, AND J. L. RECHEL. 1996. Metapopulation theory and mountain sheep: implications for conservation. Pp. 353–373 in *Metapopulations and Wildlife Conservation* (D. R. McCullough, ed.). Island Press, Washington, D.C.
- BOYCE, W. M., R. R. RAMEY, T. C. RODWELL, E. S. RUBIN, AND R. S. SINGER. 1999. Population subdivision among desert bighorn



- sheep (*Ovis canadensis*) ewes revealed by mitochondrial DNA analysis. *Molecular Ecology* 8:99–106.
- BOYCE, W. M., M. E. WEISENBERGER, M. C. PENEDO, AND C. K. JOHNSON. 2011. Wildlife translocation: the conservation implications of pathogen exposure and genetic heterozygosity. *BMC Ecology* 11:5.
- BRADLEY, W. G., AND L. R. BAKER. 1967. Range of variation in Nelson bighorn sheep from the Desert Game Range and its taxonomic significance. *Desert Bighorn Council Transactions* 11:114–140.
- BROWN, R. P., AND Z. YANG. 2011. Rate variation and estimation of divergence times using strict and relaxed clocks. *BMC Evolutionary Biology* 11:271.
- BUCHALSKI, M. R., ET AL. 2015. Genetic population structure of Peninsular bighorn sheep (*Ovis canadensis nelsoni*) indicates substantial gene flow across US-Mexico border. *Biological Conservation* 184:218–228.
- BUECHNER, H. K. 1960. The bighorn sheep in the United States, its past, present, and future. *Wildlife Monographs* 4:1–174.
- BUNCH, T. D., C. WU, Y. P. ZHANG, AND S. WANG. 2006. Phylogenetic analysis of snow sheep (*Ovis nivicola*) and closely related taxa. *Journal of Heredity* 97:21–30.
- CHEN, C., E. DURAND, F. FORBES, AND O. FRANCOIS. 2007. Bayesian clustering algorithms ascertaining spatial population structure: a new computer program and a comparison study. *Molecular Ecology Notes* 7:747–756.
- COWAN, I. M. 1940. Distribution and variation in the native sheep of North America. *American Midland Naturalist* 24:505–580.
- COX, M., AND P. CUMMINGS. 2005. Status of desert bighorn sheep in Nevada, 2004–2005. *Desert Bighorn Council Transactions* 48:53–57.
- CRANDALL, K. A., O. R. P. BININDA-EMONDS, G. M. MACE, AND R. K. WAYNE. 2000. Considering evolutionary processes in conservation biology. *Trends in Ecology & Evolution* 15:290–295.
- CREECH, T. G., C. W. EPPS, R. J. MONELLO, AND J. D. WEHAUSEN. 2014. Using network theory to prioritize management in a desert bighorn sheep metapopulation. *Landscape Ecology* 29:605–619.
- DRUMMOND, A. J., AND A. RAMBAUT. 2007. BEAST: Bayesian evolutionary analysis by sampling trees. *BMC Evolutionary Biology* 7:8.
- DRUMMOND, A. J., A. RAMBAUT, B. SHAPIRO, AND O. G. PYBUS. 2005. Bayesian coalescent inference of past population dynamics from molecular sequences. *Molecular Biology and Evolution* 22:1185–1192.
- DURAND, E., F. JAY, O. E. GAGGIOTTI, AND O. FRANCOIS. 2009. Spatial inference of admixture proportions and secondary contact zones. *Molecular Biology and Evolution* 26:1963–1973.
- EDMANDS, S. 2007. Between a rock and a hard place: evaluating the relative risks of inbreeding and outbreeding for conservation and management. *Molecular Ecology* 16:463–475.
- EPPS, C. W., P. J. PALSBOILL, J. D. WEHAUSEN, G. K. RODERICK, AND D. R. MCCULLOUGH. 2006. Elevation and connectivity define genetic refugia for mountain sheep as climate warms. *Molecular Ecology* 15:4295–4302.
- EPPS, C. W., P. J. PALSBOILL, J. D. WEHAUSEN, G. K. RODERICK, R. R. RAMEY, AND D. R. MCCULLOUGH. 2005. Highways block gene flow and cause a rapid decline in genetic diversity of desert bighorn sheep. *Ecology Letters* 8:1029–1038.
- EPPS, C. W., J. D. WEHAUSEN, V. C. BLEICH, S. G. TORRES, AND J. S. BRASHARES. 2007. Optimizing dispersal and corridor models using landscape genetics. *Journal of Applied Ecology* 44:714–724.
- EPPS, C. W., J. D. WEHAUSEN, P. J. PALSBOILL, AND D. R. MCCULLOUGH. 2010. Using genetic tools to track desert bighorn sheep colonizations. *Journal of Wildlife Management* 74:522–531.
- EXCOFFIER, L., AND H. E. L. LISCHER. 2010. Arlequin suite ver 3.5: a new series of programs to perform population genetics analyses under Linux and Windows. *Molecular Ecology Resources* 10:564–567.
- EXCOFFIER, L., P. E. SMOUSE, AND J. M. QUATTRO. 1992. Analysis of molecular variance inferred from metric distances among DNA haplotypes: application to human mitochondrial DNA restriction data. *Genetics* 131:479–491.
- FORSTER, P., R. HARDING, A. TORRONI, AND H. J. BANDELT. 1996. Origin and evolution of Native American mtDNA variation: a reappraisal. *American Journal of Human Genetics* 59:935–945.
- FRANCOIS, O., AND E. DURAND. 2010. Spatially explicit Bayesian clustering models in population genetics. *Molecular Ecology Resources* 10:773–784.
- FUNK, W. C., J. K. MCKAY, P. A. HOHENLOHE, AND F. W. ALLENDORF. 2012. Harnessing genomics for delineating conservation units. *Trends in Ecology & Evolution* 27:489–496.
- GEIST, V. 1985. On Pleistocene bighorn sheep: some problems of adaptation, and relevance to today's American megafauna. *Wildlife Society Bulletin* 13:351–359.
- GOSLEE, S. C., AND D. L. URBAN. 2007. The ecodist package for dissimilarity-based analysis of ecological data. *Journal of Statistical Software* 22:1–19.
- GUO, S. W., AND E. A. THOMPSON. 1992. Performing the exact test of Hardy-Weinberg proportion for multiple alleles. *Biometrics* 48:361–372.
- GUTIERREZ-ESPELETA, G. A., P. W. HEDRICK, S. T. KALINOWSKI, D. GARRIGAN, AND W. M. BOYCE. 2001. Is the decline of desert bighorn sheep from infectious disease the result of low MHC variation? *Heredity* 86:439–450.
- HASEGAWA, M., H. KISHINO, AND T. A. YANO. 1985. Dating of the human-ape splitting by a molecular clock of mitochondrial DNA. *Journal of Molecular Evolution* 22:160–174.
- HEDRICK, P. W. 2014. Conservation genetics and the persistence and translocation of small populations: bighorn sheep populations as examples. *Animal Conservation* 17:106–114.
- HEDRICK, P. W., AND R. FREDRICKSON. 2010. Genetic rescue guidelines with examples from Mexican wolves and Florida panthers. *Conservation Genetics* 11:615–626.
- HEDRICK, P. W., G. A. GUTIERREZ-ESPELETA, AND R. N. LEE. 2001. Founder effect in an island population of bighorn sheep. *Molecular Ecology* 10:851–857.
- HEY, J. 2010a. The divergence of chimpanzee species and subspecies as revealed in multipopulation isolation-with-migration analyses. *Molecular Biology and Evolution* 27:921–933.
- HEY, J. 2010b. Isolation with migration models for more than two populations. *Molecular Biology and Evolution* 27:905–920.
- HIENDLEDER, S., B. KAUPPE, R. WASSMUTH, AND A. JANKE. 2002. Molecular analysis of wild and domestic sheep questions current nomenclature and provides evidence for domestication from two different subspecies. *Proceedings of the Royal Society B-Biological Sciences* 269:893–904.
- HIENDLEDER, S., H. LEWALSKI, R. WASSMUTH, AND A. JANKE. 1998. The complete mitochondrial DNA sequence of the domestic sheep (*Ovis aries*) and comparison with the other major ovine haplotype. *Journal of Molecular Evolution* 47:441–448.
- HOGG, J. T., S. H. FORBES, B. M. STEELE, AND G. LUIKART. 2006. Genetic rescue of an insular population of large mammals. *Proceedings of the Royal Society of London, B. Biological Sciences* 273:1491–1499.
- JAKOBSSON, M., AND N. A. ROSENBERG. 2007. CLUMPP: a cluster matching and permutation program for dealing with label

- switching and multimodality in analysis of population structure. *Bioinformatics* 23:1801–1806.
- JEFFERSON, G. T. 1991. Rancholabrean age vertebrates from the south-eastern Mojave Desert, California. Pp. 27–40 in *Crossing the borders: Quaternary studies in eastern California and southwestern Nevada* (R. E. Reynolds, ed.). Mojave Desert Quaternary Research Center, San Bernardino County Museum Association, Redlands, California.
- JOHNSON, H. E., L. S. MILLS, J. D. WEHAUSEN, T. R. STEPHENSON, AND G. LUIKART. 2011. Translating effects of inbreeding depression on component vital rates to overall population growth in endangered bighorn sheep. *Conservation Biology* 25:1240–1249.
- JOMBART, T. 2008. adegenet: a R package for the multivariate analysis of genetic markers. *Bioinformatics* 24:1403–1405.
- JOMBART, T., S. DEVILLARD, AND F. BALLOUX. 2010. Discriminant analysis of principal components: a new method for the analysis of genetically structured populations. *BMC Genetics* 11:15.
- KRAUSMAN, P. R. 2000. An introduction to the restoration of bighorn sheep. *Restoration Ecology* 8:3–5.
- KRAUSMAN, P. R., A. V. SANDOVAL, AND R. C. ETCHBERGER. 1999. Natural history of desert bighorn sheep. Pp. 139–191 in *Mountain Sheep of North America* (R. Valdez and P. R. Krausman, eds.). University of Arizona Press, Tucson.
- LAITY, J. J. 2009. *Deserts and desert environments*. John Wiley & Sons, Hoboken, New Jersey, 360.
- LIBRADO, P., AND J. ROZAS. 2009. DnaSP v5: a software for comprehensive analysis of DNA polymorphism data. *Bioinformatics* 25:1451–1452.
- LOEHR, J., K. WORLEY, A. GRAPPUTO, A. CAREY, J. VEITCH, AND D. W. COLTMAN. 2006. Evidence for cryptic glacial refugia from North American mountain sheep mitochondrial DNA (vol 19, pg 19, 2006). *Journal of Evolutionary Biology* 19:2071–2071.
- MARTIN, L. D., AND B. M. GILBERT. 1978. Excavations at Natural Trap Cave. *Transactions of the Nebraska Academy of Sciences and Affiliated Societies*, Lincoln, Nebraska, 336.
- MILLER, J. M., J. POISSANT, J. T. HOGG, AND D. W. COLTMAN. 2012. Genomic consequences of genetic rescue in an insular population of bighorn sheep (*Ovis canadensis*). *Molecular Ecology* 21:1583–1596.
- MORITZ, C. 1994. Defining evolutionarily significant units for conservation. *Trends in Ecology & Evolution* 9:373–375.
- MOUSADIK, A., AND R. J. PETIT. 1996. High level of genetic differentiation for allelic richness among populations of the argan tree *Argania spinosa* (L) Skeels endemic to Morocco. *Theoretical and Applied Genetics* 92:832–839.
- NABHOLZ, B., S. GLEMIN, AND N. GALTIER. 2008. Strong variations of mitochondrial mutation rate across mammals - the longevity hypothesis. *Molecular Biology and Evolution* 25:120–130.
- NEI, M., AND W. H. LI. 1979. Mathematical model for studying genetic variation in terms of restriction endonucleases. *Proceedings of the National Academy of Sciences of the United States of America* 76:5269–5273.
- OKSANEN, J., ET AL. 2015. Vegan: community ecology package. R package v.2.2.1 <http://CRAN.R-project.org/package=vegan>. Accessed 15 March 2015.
- OLSON, Z. H., D. G. WHITTAKER, AND O. E. RHODES. 2012. Evaluation of experimental genetic management in reintroduced bighorn sheep. *Ecology and Evolution* 2:429–443.
- PEAKALL, R., AND P. E. SMOUSE. 2012. GenAlEx 6.5: genetic analysis in Excel. Population genetic software for teaching and research—an update. *Bioinformatics* 28:2537–2539.
- POMPANON, F., A. BONIN, E. BELLEMMAIN, AND P. TABERLET. 2005. Genotyping errors: causes, consequences and solutions. *Nature Reviews Genetics* 6:847–859.
- PRITCHARD, J. K., M. STEPHENS, AND P. DONNELLY. 2000. Inference of population structure using multilocus genotype data. *Genetics* 155:945–959.
- R DEVELOPMENT CORE TEAM. 2015. R: a language and environment for statistical computing, 2.13. R Foundation for Statistical Computing, Vienna, Austria.
- RAMEY, R. R. 1995. Mitochondrial DNA variation, population structure, and evolution of mountain sheep in the south-western United States and Mexico. *Molecular Ecology* 4:429–440.
- REZAEI, H. R., ET AL. 2010. Evolution and taxonomy of the wild species of the genus *Ovis* (Mammalia, Artiodactyla, Bovidae). *Molecular Phylogenetics and Evolution* 54:315–326.
- ROSENBERG, N. A. 2004. DISTRUCT: a program for the graphical display of population structure. *Molecular Ecology Notes* 4:137–138.
- ROUSSET, F. 2008. genepop'007: a complete re-implementation of the genepop software for Windows and Linux. *Molecular Ecology Resources* 8:103–106.
- ROWLAND, M. M., AND J. L. SCHMIDT. 1981. Transplanting desert bighorn sheep: a review. *Desert Bighorn Council Transactions* 25:21–28.
- RYDER, O. A. 1986. Species conservation and systematics: the dilemma of subspecies. *Trends in Ecology & Evolution* 1:9–10.
- SAILLARD, J., P. FORSTER, N. LYNNERUP, H. J. BANDEL, AND S. NORBY. 2000. mtDNA variation among Greenland Eskimos: the edge of the Beringian expansion. *American Journal of Human Genetics* 67:718–726.
- SETON, E. T. 1929. The bighorn. Pp. 519–573 in *Lives of the game animals* (E. T. Seton, ed.). Doubleday, Garden City, New York.
- SINGER, F. J., C. M. PAPOUCHIS, AND K. K. SYMONDS. 2000. Translocations as a tool for restoring populations of bighorn sheep. *Restoration Ecology* 8:6–13.
- SLATKIN, M. 1995. A measure of population subdivision based on microsatellite allele frequencies. *Genetics* 139:457–462.
- TAMURA, K., G. STECHER, D. PETERSON, A. FILIPSKI, AND S. KUMAR. 2013. MEGA6: molecular evolutionary genetics analysis version 6.0. *Molecular Biology and Evolution* 30:2725–2729.
- THOMPSON, J. D., D. G. HIGGINS, AND T. J. GIBSON. 1994. CLUSTAL W: improving the sensitivity of progressive multiple sequence alignment through sequence weighting, position-specific gap penalties and weight matrix choice. *Nucleic Acids Research* 22:4673–4680.
- VALDEZ, R., AND P. R. KRAUSMAN. 1999. Description, distribution, and abundance of mountain sheep in North America. Pp. 1–21 in *Mountain Sheep of North America* (R. Valdez and P. R. Krausman, eds.). University of Arizona Press, Tucson.
- WANG, X. 1988. Systematics and population ecology of late Pleistocene bighorn sheep (*Ovis canadensis*) of Natural Trap Cave, Wyoming. *Transactions of the Nebraska Academy of Sciences and Affiliated Societies*, Lincoln, Nebraska, 194.
- WAPLES, R. S. 1991. Pacific salmon, *Oncorhynchus* spp., and the definition of “Species” under the Endangered Species Act. *Marine Fisheries Review* 53:11–22.
- WEEKS, A. R., ET AL. 2011. Assessing the benefits and risks of translocations in changing environments: a genetic perspective. *Evolutionary Applications* 4:709–725.
- WEHAUSEN, J. D. 1991. Some potentially adaptive characters of mountain sheep populations in the Owens Valley region. Pp. 209–230 in *Natural history of eastern California and high-altitude research* (C. A. Hall, V. Doyle-Jones, and B. Widawski, eds.). White Mountain Research Station, Los Angeles, California.



- WEHAUSEN, J. D. 2005. Nutrient predictability, birthing seasons, and lamb recruitment for desert bighorn sheep. Pp. 37–50 in Sweeney Granite Mountains Desert Research Center 1978–2003: a quarter century of research and teaching (J. Goerriksen and J. M. Andre, eds.). University of California Natural Reserve Program, Riverside.
- WEHAUSEN, J. D., AND R. R. RAMEY. 1993. A morphometric reevaluation of the Peninsular bighorn sheep subspecies. *Desert Bighorn Council Transactions* 37:1–10.
- WEIKARD, R., C. PITRA, AND C. KUHN. 2006. Amelogenin cross-amplification in the family bovidae and its application for sex determination. *Molecular Reproduction and Development* 73:1333–1337.
- WEIR, B. S., AND C. C. COCKERHAM. 1984. Estimating F-statistics for the analysis of population structure. *Evolution* 38:1358–1370.
- WHITTAKER, D. G., S. D. OSTERMANN, AND W. M. BOYCE. 2004. Genetic variability of reintroduced California bighorn sheep in Oregon. *Journal of Wildlife Management* 68:850–859.
- WILSON, D. E., AND D. M. READER. 2005. *Mammal Species of the world. A taxonomic and geographic reference*. 3rd ed. Johns Hopkins University Press, Baltimore, Maryland.

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## **Domestic sheep, bighorn sheep, and respiratory disease: a review of the experimental evidence**

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Introduced infectious diseases pose a significant threat to wildlife populations and are exceptional conservation challenges, in part because they can precipitate much more rapid and devastating population declines than habitat encroachment. Pneumonia epizootics have played a major role in the dynamics and conservation challenges of bighorn sheep (*Ovis canadensis*) populations. A large proportion of native bighorn sheep populations south of Canada went extinct beginning in the second half of the 19th century. It has long been postulated, based on temporal and spatial correlations, that diseases transferred from domestic sheep (*Ovis aries*) played a major role in those losses. Although experimental research has repeatedly tested the hypothesis that domestic sheep carry strains of respiratory tract pathogens potentially fatal to bighorn sheep, debate continues over the role of domestic sheep in this disease process. In the context of a hierarchical set of hypotheses we review this experimental research that includes (1) contact trials involving bighorn sheep penned with domestic sheep and a variety of other native and domestic animal species; (2) inoculation experiments with no animal contact; (3) attempts to isolate and identify specific organisms responsible for pneumonia in bighorn sheep; and (4) vaccination experiments. Our review reveals that (1) experiments have repeatedly corroborated the hypothesis that bighorn sheep have a high probability of contracting fatal pneumonia following contact with domestic sheep; (2) low disease and mortality rates in numerous co-pasturing pen studies involving bighorn sheep and animals other than domestic sheep do not support the alternative explanation that the results of the co-pasturing studies involving domestic sheep were an artifact of captivity; (3) the identification of which organism(s) cause pneumonia in bighorn sheep following contact with domestic sheep remains unresolved, possibly because of disease complexity (multiple pathogens) and limitations of

research tools applied; and (4) vaccination trials largely have failed to mitigate the spread of respiratory disease and appear to be an unrealistic solution to the problem. We discuss these findings relative to a variety of questions, misinterpretations, and implications for management decisions concerning bighorn sheep conservation.

**Key words:** Bighorn sheep, domestic sheep, *Ovis aries*, *Ovis canadensis*, *Ovis dalli*, pneumonia, respiratory disease, *Pasteurella*, *Mannheimia*

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Introduced infectious diseases pose a tremendous threat to wildlife. This threat increases as animal population sizes decrease, thereby reducing the gene pool of potentially resistant individuals, further increasing the likelihood of endangerment and extinction. Examples of the devastating effects of introduced diseases on wildlife are legion (Daszak et al. 2000), and the history of bighorn sheep (*Ovis canadensis*) provides a well-studied example that includes conservation actions taken to protect populations and reverse declining population trends through reintroductions. The tremendous amount of money and effort spent to repatriate bighorn sheep and the intense policy disputes over conservation strategies make this species an excellent case study of wildlife conservation in the face of disease. In this paper we review the scientific evidence for the most widely-cited hypothesis concerning the cause of many pneumonia epizootics in bighorn sheep — that bighorn sheep have a high probability of contracting fatal respiratory disease after contact with domestic sheep (*Ovis aries*), hereafter referred to as the “contact hypothesis”. The implications of this hypothesis relative to bighorn sheep conservation and related decisions by governmental agencies that permit domestic sheep grazing on their lands has made this a contentious issue. Decision makers cannot be expected to study the diverse literature on this subject, yet have to make informed decisions in the face of pressure from both sides of this issue. A detailed review of this literature is clearly needed to help decision makers assess the scientific merit of various claims, as well as to synthesize existing information. Given that the introduction of domesticated animals has been connected with emerging infectious diseases in other wildlife (Daszak et al. 2000), the lessons learned from disease research on bighorn sheep also may have broader applications.

The original distribution of the two native sheep species in western North America, bighorn sheep and Dall’s sheep (*O. dalli*), included suitable habitat north to the Brooks Range in Alaska, south to Baja California and the northern reaches of mainland Mexico, and east as far as west Texas and badland and river break habitats immediately east of the Rocky Mountains in North and South Dakota and western Nebraska (Buechner 1960, Valdez and Krausman 1999). In a large portion of this habitat in Alaska and Canada, the distribution of native sheep remains essentially unchanged (Valdez and Krausman 1999). In contrast, across much of the southern range of bighorn sheep, many populations were extirpated, including all native populations in the states of Washington, Oregon, and neighboring regions of southwestern Idaho, northeastern California, and northwestern Nevada (Buechner 1960). The states of California and Nevada together lost an estimated total of 110 native populations (McQuivey 1978, Wehausen et al. 1987). Restoration efforts were initiated during the 20th century to counter continuing population losses,

and by 1990 more than 8,000 bighorn sheep had been moved in 592 translocation efforts, primarily to restock vacant habitat (Ramey 1993).

The large region where bighorn sheep extirpations have been so widespread coincides spatially with where domestic sheep have been grazed in North America, and temporally with the beginning of that grazing. While one cannot infer cause and effect from spatial and temporal correlations alone, it has long been hypothesized that diseases transferred from domestic sheep were a key factor in the widespread loss of bighorn sheep populations. For example, the principal cause of the first large-scale population losses in the 19th century was attributed to scabies introduced by domestic sheep, based largely on clinical evidence of scabies in bighorn sheep during die-offs, and the temporal association of these scabies outbreaks with the introduction of domestic sheep (Honest and Frost 1942, Jones 1950, Smith 1954, Buechner 1960). Further negative correlations between the presence of domestic sheep and the health of bighorn sheep populations have emerged in the 20th century. In Nevada McQuivey (1978) noted a negative correlation between past domestic sheep grazing and the persistence of native bighorn sheep populations, and considerable circumstantial evidence has accumulated suggesting the hypothesis that die-offs of bighorn sheep frequently follow contact with domestic sheep (Goodson 1982, Martin et al. 1996, Singer et al. 2001, Coggins 2002, George et al. 2008). Where clinical evidence has been collected, pneumonia has been cited as the cause of death in those die-offs (Goodson 1982, Martin et al. 1996).

## METHODS

During the past three decades various aspects of the potential role of domestic sheep in respiratory disease of bighorn sheep have been researched. Because scientific progress is limited in part by how problems are analyzed to formulate hypotheses and deduce testable (falsifiable) predictions, in this review of those research results we attempt to isolate separate questions and hypotheses concerning disease transmission between domestic and wild sheep. In so doing, we formulate a hierarchical series of hypotheses that are refinements of the contact hypothesis. We also approach this review from the standpoint of opportunities for hypothesis falsification. Popper (1959) identified falsifiability of hypotheses as the fundamental criterion of valid scientific inquiry of questions of cause and effect. He also argued that “proof” falls outside of the realm of science; instead, acceptance of hypotheses and the strength of such corroboration is a function of the attempts at and opportunities for falsification. We consider these concepts as fundamental to the disease questions that we review.

## RESULTS

Our separation of this review into different questions and hypotheses lead us to partition the findings into six categories that facilitate the discussion of these different topics.

*Unplanned pen experiments.*—The contact hypothesis has been tested numerous times in captive situations. One set of tests has been accidental in nature and, therefore, lacked experimental design. However, the information garnered from those captivity situations still served as tests of the contact hypothesis. One unplanned experiment

occurred at Lava Beds National Monument, where in 1971 a population of bighorn sheep was established in a 5.4-km<sup>2</sup> enclosure (Blaisdell 1972). In 1980, nose-to-nose contact was observed through the enclosure fence between bighorn sheep and domestic sheep grazed on adjacent National Forest lands. Bighorn sheep began dying of pneumonia 2-3 weeks later and all 43 bighorn subsequently died (Foreyt and Jessup 1982). A second unplanned experiment involved bighorn sheep in Washington that had been in a 2.5-ha enclosure for 10 months when domestic sheep were added to the pen. Thirteen of 14 bighorn sheep subsequently died of pneumonia between 3 and 12 weeks after the introduction of the domestic sheep (Foreyt and Jessup 1982).

*Planned pen experiments.*—Following those unplanned experiments, 10 planned experiments specifically designed to test the contact hypothesis were carried out by three independent research groups using 1-6 captive bighorn sheep per trial. Four of those experiments used only domestic sheep (Onderka and Wishart 1988; Foreyt 1989, 1990, 1994), while contact in one (Foreyt 1994) involved mouflon sheep (*Ovis musimon*) and another five involved a mixed flock of domestic sheep and hybrids of argali (*Ovis ammon*) and mouflon sheep (Callan et al. 1991), the latter of which is the closest ancestor of domestic sheep (Ramey 2000, Hiendleder et al. 2002). The five trials involving hybrid sheep also included experimental treatments that attempted to control the resulting pneumonia in the bighorn sheep. Of the 23 bighorn sheep tested in those 10 trials, all died of respiratory disease following contact with domestic sheep, or were euthanized when close to death (Table 1). All domestic, mouflon, and hybrid sheep remained healthy.

*Planned pen experiments with other species.*—A couple of hypotheses might explain the planned pen results: (1) contact results in transmission of pathogens from domestic sheep to bighorn sheep that directly or indirectly lead to fatal pneumonia in the bighorn sheep (pathogen transmission hypothesis); or (2) the introduction of another species into the pen creates a negative psychological effect on the bighorn sheep, resulting in a compromised immune system leading to respiratory disease unrelated to the transmission of potential disease agents (stress hypothesis). Stress of behavioral origin similarly has frequently been hypothesized as an important factor in the livestock respiratory disease syndrome known as shipping fever (Hoerlein 1980, Yates 1982).

**TABLE 1.**—Summary of data from contact trials of bighorn sheep co-pastured with other species and inoculation trials of bighorn sheep and Dall's sheep (planned inoculation trials only) that used *M. haemolytica* cultured from domestic sheep.

	Number of trials	Wild sheep tested	Wild sheep dying	Domestic sheep and other species used	Domestic sheep and other species dying
Unplanned Pen Trials with domestic sheep	2	57	56		
Planned Pen Trials with domestic sheep	10	23	23	167	0
Planned Pen Trials with other species	9	55	4	32	0
Unplanned Inoculation Trials	1	13	6		
Planned Inoculation Trials	6	15	14	9	0

Nine independent contact experiments by Foreyt (1992a, 1994), Foreyt and Lagerquist (1996), and Foreyt et al. (2009) involving bighorn sheep penned with (1) elk (*Cervus elephus*), white-tailed deer (*Odocoileus virginianus*), and mule deer (*Odocoileus hemionus*); (2) elk alone; (3) domestic goats (*Capra hircus*); (4) mountain goats (*Oreamnos americanus*); (5) llamas (*Lama glama*); (6) cattle (*Bos taurus*); and (7) horses (*Equus caballus*) serve as a test of the stress hypothesis (Table 2). Of 55 bighorn sheep tested in those experiments, only four died (Table 1). One was an old female whose death most likely was due to a tooth anomaly that adversely affected her feeding ability. The other deaths were a bighorn sheep in the experiment with steers that died of pneumonia (Foreyt and Lagerquist 1996) and two of seven bighorn co-pastured in one trial with domestic goats that died of pneumonia caused by *Mannheimia haemolytica* (Angen et al. 1999) biotype A, serotype 2 (Foreyt et al. 2009; Table 2). The significantly ( $P < 0.001$ ; chi square test) lower proportion of bighorn sheep dying in pen trials that put bighorn sheep in contact with other species compared with experiments involving contact with sheep of Old World origin (Table 1) does not support the stress hypothesis. Instead, these findings suggest that the presence of other species in pens itself is unlikely to lead to bighorn sheep deaths and, furthermore, that species other than domestic sheep and their relatives are considerably less likely to transmit pathogens potentially fatal to bighorn sheep. This conclusion is consistent with a lack of circumstantial data linking most of these other species to bighorn sheep die-offs. Domestic goats appear to be the exception (Rudolph et al. 2003), and recent findings indicate that they also can carry other disease organisms with serious consequences for bighorn sheep (Jansen et al. 2006). However, the lack of disease transmission to bighorn sheep by the other species tested does not imply that they lack respiratory tract organisms pathogenic to bighorn sheep; instead, lack of disease may result from interspecific behavioral patterns that largely preclude contact and pathogen transmission.

**TABLE 2.**—Details from contact experiments involving bighorn sheep co-pastured with domestic sheep (Dom. sheep), mouflon sheep, domestic goats (Dom. goats), white-tailed deer (W-T deer), mule deer, elk, mountain goats (Mt. Goats), llamas, horses, and cattle.

Bighorn used	Bighorn dead	Co-pastured with:										reference
		Dom. sheep	Mouflon sheep	Dom. goats	W-T deer	Mule deer	Elk	Mt. goats	Llamas	Horses	Cattle	
2	2	2	-	-	-	-	-	-	-	-	-	Onderka and Wishart 1988
6	6	6	-	-	-	-	-	-	-	-	-	Foreyt 1989
2	2	2	-	-	-	-	-	-	-	-	-	Foreyt 1990
6	6	-	5	-	-	-	-	-	-	-	-	Foreyt 1994
2	2	2	-	-	-	-	-	-	-	-	-	Foreyt 1994
1	1	30 <sup>a</sup>	-	-	-	-	-	-	-	-	-	Callan et al. 1991
1	1	30 <sup>a</sup>	-	-	-	-	-	-	-	-	-	Callan et al. 1991
1	1	30 <sup>a</sup>	-	-	-	-	-	-	-	-	-	Callan et al. 1991
1	1	30 <sup>a</sup>	-	-	-	-	-	-	-	-	-	Callan et al. 1991
1	1	30 <sup>a</sup>	-	-	-	-	-	-	-	-	-	Callan et al. 1991
10	0	-	-	-	2	1	4	-	-	-	-	Foreyt 1992a
3	0	-	-	-	-	-	4	-	-	-	-	Foreyt 1992a
9	0	-	-	-	-	-	-	2	-	-	-	Foreyt 1994
9	0	-	-	-	-	-	-	-	3	-	-	Foreyt 1994
4	0	-	-	-	-	-	-	-	-	-	3	Foreyt 1994
5	1	-	-	-	-	-	-	-	-	-	3	Foreyt and Lagerquist 1996
6	1 <sup>b</sup>	-	-	-	-	-	-	-	-	3	-	Foreyt and Lagerquist 1996
2	0	-	-	3	-	-	-	-	-	-	-	Foreyt 1994
7	2	-	-	4	-	-	-	-	-	-	-	Foreyt et al. 2009

<sup>a</sup> mixture of domestic sheep and mouflon-argali hybrids

<sup>b</sup> animal in poor condition at beginning of experiment; death likely caused by tooth anomalies and feeding difficulty.

*Inoculation experiments.*—The pathogen transmission hypothesis can be further refined to the fatal strains hypothesis (Goodson 1982): that specific species, microbial strains, or viruses frequently carried by healthy domestic sheep are the cause of fatal pneumonia in bighorn sheep following contact between these species. This hypothesis has been tested by experiments in which captive bighorn sheep have been inoculated with bacteria cultured from the respiratory tracts of domestic sheep. Similar to the contact experiments, this has involved both accidental and planned experiments. The accidental experiment occurred when a lavage tube used to sample lung cells of domestic sheep was not fully sterilized before being used to obtain lung cultures from three captive bighorn sheep. All 10 bighorn sheep in this herd developed pneumonia, of which three died, as did three additional bighorn sheep added to the herd (Foreyt 1990).

The planned inoculation experiments comprise six independent trials carried out by two different research groups using *M. haemolytica* cultured from domestic sheep (Onderka et al. 1988, Foreyt et al. 1994, Foreyt and Silflow 1996). Of 13 bighorn sheep that were inoculated with those bacteria, 12 died of acute bronchopneumonia. Two groups of control bighorn sheep (five total) remained healthy, as did two groups of domestic sheep (nine total) that received the same inoculation doses as the bighorn sheep (Table 1). Two of these inoculation trials (Onderka et al. 1988, Foreyt and Silflow 1996) also included experiments in which the source of the *M. haemolytica* inoculum was cultured from healthy bighorn sheep. The three bighorn sheep used in those two trials showed no clinical signs of disease after the inoculations, and neither did seven domestic sheep similarly inoculated.

Foreyt et al. (1996) also carried out an inoculation trial of three Dall's sheep (*Ovis dalli dalli*). Two of these sheep received a *M. haemolytica* strain (A2) from domestic sheep that by inoculation trials was fatal to bighorn sheep, while the other received a strain not considered to be pathogenic. The sheep receiving the non-pathogenic strain remained healthy; the other two developed bronchopneumonia, from which one died, and one was euthanized prior to death.

Dassanayake et al. (2009) used 10 bighorn and 12 domestic sheep to test two forms of the *M. haemolytica* A1 strain in inoculation trials. Two bighorn and two domestic sheep were controls, while four of each species received the wild type A1 strain, and the other four received a mutant A1 form that lacked the leukotoxin gene (Murphy et al. 1995). One control domestic sheep died of causes unrelated to the experimental treatment. All other sheep survived without clinical pneumonia except the four bighorn sheep that received the wild type A1 strain, all of which died of acute bilateral pneumonia within 48 hours. These results appear to expand the list of strains fatal to bighorn sheep. However, the *M. haemolytica* A1 strain used was identified only as wild type with no information on its source (Dassanayake et al. 2009, Murphy et al. 1995).

Besser et al. (2008) tested the role of *Mycoplasma ovipneumoniae* alone in this disease process by inoculating two young bighorn lambs. Neither showed signs of clinical pneumonia.

*Research to identify bacterial strains causing fatal pneumonia in bighorn sheep.*—The results of the various contact and inoculation trials corroborate the pathogen transmission and fatal strains hypotheses. With sufficient diagnostic tools, it should theoretically be possible to identify the specific strain(s) of bacteria or other pathogens that cause fatal pneumonia in bighorn sheep. However, the goal of identifying all specific pathogens has proven elusive. Multiple bacterial species have been implicated as causing



disease in bighorn sheep. While *M. haemolytica* has been cultured from many bighorn sheep dying of pneumonia following experimental contact with domestic sheep, especially the A2 strain, one set of experiments attributed the deaths instead to *Pasteurella multocida* (Callan et al. 1991). Additionally, some forms of *M. haemolytica* are now recognized as a separate species, *P. trehalosi* (Sneath and Stevens 1990). Traditional methods used to differentiate strains of *M. haemolytica* by biotypes and serotypes (Dunbar et al. 1990a, 1990b; Queen et al. 1994) have lacked adequate resolution. Previously unknown serotypes have been found in bighorn sheep (Dunbar et al. 1990a), while other strains could not be identified using these methods (Dunbar et al. 1990a, Silflow et al. 1994, Sweeney et al. 1994, Ward et al. 1997), rendering these classification methods unsatisfactory for epidemiological investigations of this phenomenon (Jaworski et al. 1993).

To overcome limitations of traditional methods, additional diagnostic tools have been applied to *M. haemolytica* and *P. trehalosi* in attempts to develop more refined classifications that might better identify strains responsible for bighorn sheep deaths. These measures have included (1) binary classification as hemolytic or non-hemolytic (Wild and Miller 1991, 1994; Ward et al. 2002); (2) variation in surface proteins (Ward et al. 1990); (3) assays of toxicity relative to peripheral neutrophils (Silflow and Foreyt 1994, Silflow et al. 1994, Sweeney et al. 1994); (4) DNA fingerprinting to identify different genetic forms (Snipes et al. 1992, Jaworski et al. 1993; Foreyt et al. 1994, Ward et al. 1997, Weiser et al. 2003); and, (5) culture-independent PCR-based methods and sequence-based phylogenetic analyses of multiple genetic loci (Safaei et al. 2006, Kelley et al. 2006, Besser et al. 2008).

Silflow et al. (1989) found no differences between bighorn sheep and domestic sheep in a number of immune system measures involving phagocytes. In contrast, Silflow et al. (1993) identified a mechanism involving lysis of neutrophils by a cytotoxin produced by some *M. haemolytica* strains that might explain the high susceptibility of bighorn sheep to specific strains of *M. haemolytica*. Comparisons of neutrophil sensitivity to this cytotoxin for five native North American ungulates and domestic sheep found bighorn sheep, and especially Dall's sheep, to be notably more susceptible to neutrophil destruction than the other species tested (Silflow and Foreyt 1994, Silflow et al. 1994). While strains of *M. haemolytica* fatal to bighorn and Dall's sheep consistently showed high toxicity in cytotoxicity assays (Foreyt and Silflow 1996, Foreyt et al. 1996), other cytotoxic strains have not caused significant respiratory disease in bighorn sheep (Foreyt and Silflow 1996); thus, this cytotoxicity classification alone lacks adequate predictive power relative to respiratory disease in bighorn sheep. The same can be said of the other diagnostic methods. While DNA fingerprinting has been useful for investigating transmission of bacterial strains between different species and individuals (Ward et al. 1997), these methods also appear to lack predictive power relative to identifying strains that can cause fatal pneumonia in bighorn sheep.

One possible explanation for the failure of these diagnostic methods to consistently identify bacterial strains fatal to bighorn sheep is that the culturing methods they depend on do not identify most members of the microbial community sampled. Results from culture-independent PCR-based methods indicate that culture-based methods typically miss about 99% of microbial diversity in any given biological sample (Amann et al. 1995, Hugenholtz and Pace 1996, Tanner et al. 1999, Eckburg et al. 2005), including sheep respiratory tracts (Safaei et al. 2006, Besser et al. 2008). Furthermore, several studies have found evidence that horizontal gene transfer of the leukotoxin gene has occurred



among *Mannheimia/Pasteurella* species sampled from different species and locales in both domestic (Davies et al. 2001, Davies et al. 2002) and wild sheep populations (Kelley et al. 2006). This same mechanism contributes to virulence in other bacteria, including shiga toxin, cholera toxin, and neurotoxins of *Clostridium botulinum* (Novick 2003). While Kelley et al. (2006) found that DNA sequences from *Mannheimia* and *Pasteurella* obtained from different host species and locales tend to form closely related clusters, horizontal gene transfer of leukotoxin and other virulence genes may explain a lack of correspondence between strains identified using traditional methods and their virulence. Evidence of extensive recombination of the toxin genes within *P. trehalosi* and *M. haemolytica* (Davies et al. 2001) suggests that presence of this gene in a population of *Mannheimia* or *Pasteurella* does not necessarily mean that it is virulent. Most recently, using culture-independent approaches, Besser et al. (2008) found evidence suggesting involvement of *Mycoplasma ovipneumoniae* in bighorn sheep respiratory disease.

*Vaccination trials.*—Vaccination of wild animals is logistically difficult at best in most situations and even more so for bighorn sheep because of the steep, craggy, relatively inaccessible habitat they often inhabit. Additionally, some vaccines require multiple doses to stimulate initial immune system response. Thus, vaccination is not a viable disease management option for most wild populations. Nevertheless, vaccination experiments have been carried out and might have applications to captive wild sheep and occasional free-ranging situations.

Ward et al. (1999) investigated immunologic responses of bighorn and domestic sheep to a vaccine against three strains of *M. haemolytica*. They found that the vaccine produced only a moderate and transient immunologic response. Miller et al. (1997) and Kraabel et al. (1998) tested a vaccine for three different *M. haemolytica* strains on captive bighorn sheep. The sheep were challenged with *P. trehalosi* cultured from lungs of free-ranging bighorn sheep during a pasteurellosis epizootic. Control and vaccinated bighorn both developed acute pneumonia, but vaccinated ones experienced lower mortality (30% vs. 80%).

For multiple years following pneumonia epizootics in bighorn sheep, it is common for most lambs of surviving females to die of pneumonia (Foreyt 1990, Coggins and Matthews 1992). Cassirer et al. (2001) conducted experiments with free-ranging and captive bighorn to test the efficacy of vaccines against *Mannheimia/Pasteurella* to reduce such lamb mortality, but vaccinated females had notably higher loss of lambs than non-vaccinated ewes.

Only two vaccination trials have used strains of *M. haemolytica* derived from domestic sheep as the post-vaccination challenge. Foreyt and Silflow (1996) inoculated two bighorn sheep twice with a non-lethal cytotoxic strain of *M. haemolytica* and six weeks later inoculated them with a lethal cytotoxic strain (A2) from domestic sheep. The non-lethal strain provided no significant protection, and both bighorn sheep died of bronchopneumonia. Foreyt (1992b) tested an experimental bacterin-toxoid vaccine for three *M. haemolytica* strains, using three treatment and three control bighorn sheep. After contact with domestic sheep, five of the six bighorn sheep, including the three vaccinated ones, died of pneumonia, with no evidence of any protection from the vaccine.

## DISCUSSION

A variety of field observations spanning many decades led to the hypothesis that bighorn sheep have a high probability of developing fatal pneumonia following contact with domestic sheep. Subsequently, numerous independent experiments have tested this contact hypothesis, and the results have repeatedly corroborated it (Table 1, Table 2). There have been numerous opportunities to falsify the contact hypothesis under controlled conditions and none has done so. Many bighorn sheep have died in those experiments, and it seems unlikely that more such experiments will add further knowledge to the contact hypothesis.

The stress and pathogen transmission hypotheses were proposed as two basic mechanisms to explain the results of contact experiments; but only the pathogen transmission hypothesis was consistent with the experimental data. The pathogen transmission hypothesis and the more refined fatal strains hypothesis have been tested and corroborated by *M. haemolytica* inoculation experiments. While the realistic nature of the inoculation doses might be questioned, domestic sheep similarly inoculated remained healthy, as did control bighorn sheep; and similar inoculation doses of *M. haemolytica* strains cultured from bighorn sheep produced no clinical effects in either sheep species. These results are consistent with expectations from the fatal strains hypothesis and provided opportunities for falsification.

The effort to identify organisms causing pneumonia in bighorn sheep following contact with domestic sheep has not yielded simple answers; instead, this situation appears complex with many potentially pathogenic bacteria of multiple species identified. In part, this may reflect limitations of the technology applied to this question. New culture-independent methods are greatly expanding knowledge of microbial communities inhabiting animals (Eckburg et al. 2005) and are beginning to shed new light on disease transmission (Tanner et al. 1999). However, the hunt to identify organisms causing pneumonia in bighorn sheep appears to have been limited by a traditional search for specific bacterial species or strains. The expanding understanding of potential mechanisms underlying pathogenicity in other diseases, e.g., horizontal gene transfer (Schubert et al. 2009), may explain why such a traditional approach has not been successful for bighorn sheep. Indeed, even criteria for defining bacterial species remain unclear (Fraser et al. 2009).

Definitive identification of pathogens causing fatal pneumonia in bighorn sheep is a question of scientific interest that may ultimately have practical applications. However, the inability to definitively and consistently identify pathogens responsible for all bighorn sheep deaths following contact with domestic sheep does not have bearing on the question of whether such contact has a high probability of leading to deaths of bighorn sheep. These are different questions that frequently have been inappropriately intertwined. Shipping fever is a similar respiratory disease problem that costs the U. S. livestock industry many millions of dollars annually (Rehmtulla and Thomson 1981); yet, it also has not yielded a single causative disease agent despite decades of intensive research (Storz et al. 2000).

A glance backwards to the early days of human public health shows that stalling epidemics has not required complete knowledge of the disease mechanism or identification of the pathogen. Without any knowledge of the microbial cause of cholera, John Snow hypothesized that the source of the 1849 London epidemic was water from one well. He

tested his hypothesis by removing the handle to the pump for that well, which provided corroboration when the epidemic ended abruptly (Glass 1986, Garrett 1994). His hypothesis was analogous to our contact hypothesis and his scientific conclusions did not require knowledge of the specific pathogen causing the disease. In fact, it was another three decades after Snow halted that particular epidemic before the cholera bacterium was established as the cause of that disease (Howard-Jones 1984). Because city planners refused to accept Snow's reasoning that water contaminated by sewage was the source of the epidemic, cholera outbreaks continued to plague London for decades (Garrett 1994). The resistance of some to the apparent role of domestic sheep in bighorn sheep pneumonia suggests a parallel situation.

One of the principal reasons some critics have cited for doubting the contact hypothesis is that Koch's postulates for establishing a causative relationship between a microbe and a disease have not been convincingly fulfilled. Among other things, Koch's postulates propose that to identify a microbial agent as the cause of a human disease, it is necessary to isolate the same organism from each case of the disease, and to produce that disease in an animal by inoculating it with that agent cultured from a diseased individual (Fredericks and Relman 1996). While the same postulates apply to animal diseases, Hanson (1988) concluded that the application of Koch's postulates to the study of wildlife diseases was a simplistic approach to a complex situation that had little meaning given current knowledge and technology, and this general concern has been echoed by others (Evans 1976, Fredericks and Relman 1996). Indeed, Koch himself later recognized that his postulates could not be satisfied in every case (Fredericks and Relman 1996). The respiratory disease relationship between domestic and bighorn sheep appears to epitomize that conclusion. By the definition of a disease implied by Koch's postulates, the disease phenomenon reviewed here may involve multiple disease processes involving multiple microbial species and strains. Additionally, a lesson from studies using culture-independent PCR methods is that Koch's postulates can be applied to only a small fraction of potential pathogens that can be cultured for inoculation.

This review examined only the experimental evidence concerning whether domestic sheep are a likely source of respiratory pathogens potentially fatal to bighorn sheep. How any situation of potential contact between these species in the wild will play out is a complex question that involves a series of probabilistic events. First is the probability of contact between the two species. Second is the probability that pathogenic strains are transferred. Third is the probability that pathogen transmission will lead to pneumonia, a probability possibly influenced by the status of the immune system of the bighorn(s) receiving pathogenic strains relative to the dose received. Fourth is the process of pathogen transfer within an infected bighorn sheep population. Fifth is the probability of death of infected individuals, which will likely vary among populations due to multiple variables, including genetic constitution of the herd, nutrition, environmental stressors, and the virulence of pathogen(s). Because post die-off population dynamics are often influenced by survivors of such pneumonia epizootics that carry and transmit respiratory tract pathogens to lambs for years (Foreyt 1990, Coggins and Matthews 1992), there are questions of yet longer term interactions between herd immunity and pathogens. Below we touch on a few questions of this larger disease question.

Sheep in general are susceptible to pneumonia, and bighorn sheep appear particularly susceptible to this disease, exhibiting periodic pneumonia die-offs in the Rocky Mountain region (Buechner 1960, Stelfox 1971). While some of these epizootics can be traced to

contact with domestic sheep and subsequent inter-population migration of pathogens within metapopulations (Goodson 1982, Onderka and Wishart 1984, George et al. 2008), there is a large literature that we do not review documenting pneumonia outbreaks and die-offs in bighorn sheep populations with no known recent prior contact with domestic sheep (Goodson 1982, Martin et al. 1996). Researchers typically have attributed these latter pneumonia outbreaks to various environmental conditions likely to predispose wild sheep to respiratory disease (Festa-Bianchet 1988, Monello et al. 2001), but Hobbs and Miller (1992) suggested that such conditions might not be necessary. However, the lack of any documented pneumonia epizootics in the large expanse of wild sheep range in Canada and Alaska, where there has been almost (Heimer et al. 1992) no opportunity for direct or indirect contact with domestic sheep (Hoefs and Cowan 1979, Hoefs and Bayer 1984, Monello et al. 2001, Jenkins et al. 2007) is a pattern needing explanation. Among potential hypotheses is that bighorn sheep populations that have survived past pneumonia epizootics resulting from contact with domestic sheep continue to carry respiratory microbes from domestic sheep that (1) are lacking in Alaska and most of Canada; and, (2) render these bighorn sheep more susceptible to pneumonia when various environmental conditions converge to compromise immune systems and/or there is an evolutionary change in pathogen virulence.

The role of predisposing factors in outcomes of pneumonia epizootics of wild bighorn sheep populations stemming from recent contact with domestic sheep also is unclear. Results from pen experiments suggest that the virulence of pathogens transferred in such contact can overpower the immune system of bighorn sheep regardless of prior physical condition and diet quality; but, the applicability of experimental results to wild situations has nevertheless been questioned, and such epizootics in the wild do vary considerably in the proportion of the herd that dies (ca. 50-100%; Goodson 1982, Martin et al. 1996). While extensive replicated experiments on wild populations would be desirable to help clarify cause and effect, it is doubtful that such research will occur. Statistically it would be appropriate to have at least three treatment and three control populations. Given the value of the bighorn sheep resource and the implications of the existing data reviewed here, it is unlikely that any agency with jurisdiction over bighorn sheep would be willing to subject multiple healthy populations of bighorn sheep to the risk of a severe pneumonia epizootic resulting from such an experiment. Ethical questions also might arise. As scientific experiments, the pen trials we reviewed were carried out specifically to control as many confounding variables operating in wild populations as possible in order to best measure the effects of the variable of interest. In that regard those pen trials potentially yield more important information than might be obtained from experiments involving wild populations. Contact between domestic and bighorn sheep in the wild may not always produce the same consistency of results seen in controlled pen studies because of variables outlined above; however, it is well known in epidemiology that probabilities of disease transmission to susceptible hosts increase with repeated exposure (Frerichs 1995). Consequently, greater variation in observations from wild situations might be expected relative to results from pen studies. A prediction from the results of pen studies reviewed here might be that repeated opportunities for contact between domestic sheep and bighorn sheep eventually will lead to a pneumonia epizootic in the bighorn sheep. Aune et al. (1998) documented this for one bighorn sheep population in Montana.

Relative to resource management decisions, the pertinent question is whether bighorn sheep have a high probability of developing fatal pneumonia following contact with domestic sheep. While desirable, it is not necessary to completely understand details of the disease process, or even identify responsible pathogens, to make appropriate management decisions. Relative to other judgments that must be made by resource management agencies, the potential effect on bighorn sheep of contact with domestic sheep appears remarkably clear cut. Where the health of any bighorn sheep populations is valued, the recommendation has been management actions that prevent contact with domestic sheep (Foreyt 1994, Foreyt et al. 1994). Such contact can occur in two ways: stray domestic sheep contacting bighorn sheep, or bighorn sheep contacting domestic sheep bands and spreading pathogenic microbes to other bighorn sheep. Keeping an adequate spatial buffer between bighorn sheep and domestic sheep has been considered the most reliable method to prevent contact between these species (Desert Bighorn Council Technical Staff 1990, Bureau of Land Management 1992, Schommer and Woolever 2001, Singer et al. 2001). However, this solution may not always be adequate because of distances bighorn sheep males sometimes travel, and politically is seldom simple to achieve. Depending on the situation, other approaches may be possible. Finding a management solution to this problem is dependent on the parties first agreeing that contact between domestic and bighorn sheep is a significant health threat for bighorn sheep. It is our hope that this review will help assure that such agreements will be based on a complete and critical review of pertinent scientific information that separates different falsifiable hypotheses, and thereby does not mix questions that should be addressed independently.

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#### LITERATURE CITED

- AMANN, R. I., W. LUDWIG, AND K. H. SCHLEIFER. 1995. Phylogenetic identification and *in situ* detection of microbial-cells without cultivation. *Microbiological Reviews* 59:143-169.
- ANGEN, O., R. MUTTERS, D. A. CAUGANT, J. E. OLSEN, AND M. BISGAARD. 1999. Taxonomic relationships of the [*Pasteurella*] *haemolytica* complex as evaluated by DNA-DNA hybridizations and 16s rRNA sequencing with proposal of *Mannheimia haemolytica* gen. nov., comb. nov., *Mannheimia granulomatis* comb. nov., *Mannheimia glucosida* sp. nov., *Mannheimia ruminalis* sp. nov. and *Mannheimia varigena* sp. nova. *International Journal of Systematic Bacteriology* 49:67-86.
- AUNE, K., N. ANDERSON, D. WORLEY, L. STACKHOUSE, J. HENDERSON, AND J. DANIEL. 1998. A comparison of population and health histories among seven Montana bighorn sheep populations. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 11:46-69.
- BESSER, T. E., E. F. CASSIRER, K. A. POTTER, J. VANDERSCHALIE, A. FISCHER, D. P. KNOWLES, D. R. HERNDON, F. R. RURANGIRWA, G. C. WEISER, AND S. SRIKUMARAN. 2008. Association of *Mycoplasma ovipneumoniae* infection with population-limiting

- respiratory disease in free-ranging Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*). *Journal of Clinical Microbiology* 46:423-230.
- BLAISDELL, J. A. 1972. Progress report—Lava Beds bighorn re-establishment. *Desert Bighorn Council Transactions* 16:84-87.
- BUECHNER, H. K. 1960. The bighorn sheep in the United States, its past, present, and future. *Wildlife Monographs* 4:1-174.
- BUREAU OF LAND MANAGEMENT. 1992. Guidelines for domestic sheep management in bighorn sheep habitat. Instruction Memorandum No. 92-264. U.S. Department of the Interior, Washington, D.C., USA.
- CALLAN, R. J., T. D. BUNCH, G. W. WORKMAN, AND R. E. MOCK. 1991. Development of pneumonia in desert bighorn sheep after exposure to a flock of exotic wild and domestic sheep. *Journal of the American Veterinary Medical Association* 198:1052-1056.
- CASSIRER, E. F., K. M. RUDOLPH, P. FOWLER, V. L. COGGINS, D. L. HUNTER, AND M. W. MILLER. 2001. Evaluation of ewe vaccination as a tool for increasing bighorn lamb survival following pasteurellosis epizootics. *Journal of Wildlife Diseases* 37:49-57.
- COGGINS, V. L. 2002. Rocky Mountain bighorn sheep/domestic sheep and domestic goat interactions: a management perspective. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 13:165-174.
- COGGINS, V. L., AND P. E. MATTHEWS. 1992. Lamb survival and herd status of the Lostine bighorn herd following a *Pasteurella* die-off. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 8:147-154.
- DASSANAYAKE, R. P., S. SHANTHALINGAM, C. N. HERNDON, P. K. LAWRENCE, E. F. CASSIRER, K. A. POTTER, W. J. FOREYT, K. D. CLINKENBEARD, AND S. SRIKUMARAN. 2009. *Mannheimia haemolytica* serotype A1 exhibits differential pathogenicity in two related species, *Ovis canadensis* and *Ovis aries*. *Veterinary Microbiology* 133:366-71.
- DASZAK, P., A. E. CUNNINGHAM, AND A. D. HYATT. 2000. Emerging infectious diseases of wildlife—threats to biodiversity and human health. *Science* 287:443-449.
- DAVIES, R. L., S. CAMPBELL, AND T. S. WHITTAM. 2002. Mosaic structure and molecular evolution of the leukotoxin operon (lktCABD) in *Mannheimia (Pasteurella) haemolytica*, *Mannheimia glucosida*, and *Pasteurella trehalosi*. *Journal of Bacteriology* 184:266-277.
- DAVIES, R. L., T. S. WHITTAM, AND R. K. SELANDER. 2001. Sequence diversity and molecular evolution of the leukotoxin (lktA) gene in bovine and ovine strains of *Mannheimia (Pasteurella) haemolytica*. *Journal of Bacteriology* 183:1394-1404.
- DESERT BIGHORN COUNCIL TECHNICAL STAFF. 1990. Guidelines for management of domestic sheep in the vicinity of desert bighorn habitat. *Desert Bighorn Council Transactions* 34:33-35.
- DUNBAR, M. R., A. C. S. WARD, K. G. EYRE, AND M. BULGIN. 1990a. Serotypes of *Pasteurella haemolytica* in free ranging Rocky Mountain bighorn sheep. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 7:102-108.
- DUNBAR, M. R., A. C. S. WARD, AND G. POWER. 1990b. Isolation of *Pasteurella haemolytica* from tonsillar biopsies of Rocky Mountain bighorn sheep. *Journal of Wildlife Diseases* 26:210-213.



- ECKBURG, P. B., E. M. BIK, C. N. BERNSTEIN, E. PURDOM, L. DETHLEFSEN, M. SARGENT, S. R. GILL, K. E. NELSON, AND D. A. RELMAN. 2005. Diversity of the human intestinal microbial flora. *Science* 308:1635-1638.
- EVANS, A. S. 1976. Causation and disease: the Henle-Koch postulates revisited. *Yale Journal of Biology and Medicine* 49:175-195.
- FESTA-BIANCHET, M. 1988. A pneumonia epizootic in bighorn sheep, with comments on preventive management. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 6:66-76.
- FOREYT, W. J. 1989. Fatal *Pasteurella haemolytica* pneumonia in bighorn sheep after direct contact with clinically normal domestic sheep. *American Journal of Veterinary Research* 50:341-344.
- FOREYT, W. J. 1990. Pneumonia in bighorn sheep: effects of *Pasteurella haemolytica* from domestic sheep and effects on survival and long-term reproduction. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 7:92-101.
- FOREYT, W. J. 1992a. Experimental contact association between sheep, elk, and deer with known *Pasteurella haemolytica* infections. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 8:213-218.
- FOREYT, W. J. 1992b. Failure of an experimental *Pasteurella haemolytica* vaccine to prevent respiratory disease and death in bighorn sheep after exposure to domestic sheep. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 8:155-163.
- FOREYT, W. J. 1994. Effects of controlled contact exposure between healthy bighorn sheep and llamas, domestic goats, mountain goats, cattle, domestic sheep, or mouflon sheep. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 9:7-14.
- FOREYT, W. J., AND D. A. JESSUP. 1982. Fatal pneumonia of bighorn sheep following association with domestic sheep. *Journal of Wildlife Diseases* 18:163-168.
- FOREYT, W. J., AND J. E. LAGERQUIST. 1996. Experimental contact of bighorn sheep (*Ovis canadensis*) with horses and cattle, and comparison of neutrophil sensitivity to *Pasteurella haemolytica* cytotoxins. *Journal of Wildlife Diseases* 32:594-602.
- FOREYT, W. J., AND R. M. SILFLOW. 1996. Attempted protection of bighorn sheep (*Ovis canadensis*) from pneumonia using a nonlethal cytotoxic strain of *Pasteurella haemolytica* Biotype A, Serotype<sup>11</sup>. *Journal of Wildlife Diseases* 32:315-321.
- FOREYT, W. J., E. J. JENKINS, AND G. D. APPLEYARD. 2009. Transmission of lungworms (*Muellerius capillaris*) from domestic goats to bighorn sheep on common pasture. *Journal of Wildlife Diseases* 45:272-278.
- FOREYT, W. J., R. M. SILFLOW, AND J. E. LAGERQUIST. 1996. Susceptibility of Dall sheep (*Ovis dalli dalli*) to pneumonia caused by *Pasteurella haemolytica*. *Journal of Wildlife Diseases* 32:586-593.
- FOREYT, W. J., K. P. SNIPES, AND R. W. KASTEN. 1994. Fatal pneumonia following inoculation of healthy bighorn sheep with *Pasteurella haemolytica* from healthy domestic sheep. *Journal of Wildlife Diseases* 30:137-145.
- FRASER, C., E. J. ALM, M. F. POLZ, B. G. SPRATT, AND W. P. HANAGE. 2009. The bacterial species challenge: making sense of genetic and ecological diversity. *Science* 323:741-746.

- FREDERICKS, D. N., AND D. A. RELMAN. 1996. Sequence-based identification of microbial pathogens: a reconsideration of Koch's postulates. *Clinical Microbiology Reviews* 9:18-33.
- FRERICHS, R. R. 1995. HIV winners and losers. *Epidemiology* 6:329-331.
- GARRETT, L. 1994. *The coming plague*. Penguin Books, New York, New York, USA.
- GEORGE, J. L., D. J. MARTIN, P. M. LUKACS, AND M. W. MILLER. 2008. Epidemic pasteurellosis in a bighorn sheep population coinciding with the appearance of a domestic sheep. *Journal of Wildlife Diseases* 44:388-403.
- GLASS, R. I. 1986. New prospects for epidemiologic investigations. *Science* 234:951-955.
- GOODSON, N. J. 1982. Effects of domestic sheep grazing on bighorn sheep populations: a review. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 3:287-313.
- HANSON, R. P. 1988. Koch is dead. *Journal of Wildlife Diseases* 24:193-200.
- HEIMER, W. E., R. L. ZARNKE, AND F. J. MAUER. 1992. Pharyngeal microflora of Dall and domestic sheep in Alaska: management implication? *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 8:193-201.
- HIENDLEDER, S., B. KAUPE, R. WASSMUTH, AND A. JANKE. 2002. Molecular analysis of wild and domestic sheep questions current nomenclature and provides evidence for domestication from two different subspecies. *Proceedings of the Royal Society London B* 269:893-904.
- HOBBS, N. T., AND M. W. MILLER. 1992. Interactions between pathogens and hosts: simulations of pasteurellosis epizootics in bighorn sheep populations. Pages 997-1007 in D. R. McCullough and R. H. Barrett, editors. *Wildlife 2001: populations*. Elsevier Applied Science, Essex, England.
- HOEFS, M., AND M. B. BAYER. 1984. Demographic characteristics of an un hunted Dall sheep (*Ovis dalli dalli*) population in southwest Yukon, Canada. *Canadian Journal of Zoology* 61:1346-1357.
- HOEFS, M., AND I. M. COWAN. 1979. Ecological investigations of a population of Dall sheep (*Ovis dalli dalli* Nelson). *Syesis* 12 (supplement 1):1-81.
- HOERLEIN, A. B. 1980. Shipping fever. Pages 99-106 in H. E. Amstutz, editor. *Bovine medicine and surgery*. American Veterinary Publications, Inc., Santa Barbara, California, USA.
- HONESS, R. F., AND N. M. FROST. 1942. A Wyoming bighorn sheep study. *Wyoming Game and Fish Department Bulletin* 1:1-127.
- HOWARD-JONES, N. 1984. Robert Koch and the cholera vibrio: a centenary. *British Medical Journal* 288:379-381.
- HUGENHOLTZ, P., AND N. P. PACE. 1996. Identifying microbial diversity in the natural environment: a molecular phylogenetic approach. *Trends in Biotechnology* 14:190-197.
- JANSEN, B. D., J. R. HEFFELFINGER, T. H. NOON, P. R. KRAUSMAN, AND J. C. DEVOS. 2006. Infectious keratoconjunctivitis in bighorn sheep, Silver Bell Mountains, Arizona, USA. *Journal of Wildlife Diseases* 42:407-411.
- JAWORSKI, M. D., A. C. S. WARD, D. L. HUNTER, AND I. V. WESLEY. 1993. Use of DNA analysis of *Pasteurella haemolytica* Biotype T isolates to monitor transmission in bighorn sheep (*Ovis canadensis canadensis*). *Journal of Clinical Microbiology* 31:831-835.



- JENKINS, E. J., A. M. VEITCH, S. L. KUTZ, T. K. BOLLINGER, T. M. CHIRINO-TREJO, B. T. ELKIN, K. H. WEST, E. P. HOBERG, AND L. POLLEY. 2007. Protostrongylid parasites and pneumonia in captive and wild thinhorn sheep (*Ovis dalli*). *Journal of Wildlife Diseases* 43:189-205.
- JONES, F. L. 1950. A survey of the Sierra Nevada bighorn. *Sierra Club Bulletin* 35:29-76.
- KELLEY, S. T., E. F. CASSIRER, G. C. WEISER, AND S. SAFAEE. 2006. Phylogenetic diversity of Pasteurellaceae and horizontal gene transfer of leukotoxin in wild and domestic sheep and domestic goats. *Infection, Genetics, and Evolution* 7:13-23.
- KRAABEL, B. J., M. W. MOLLER, J. A. CONLON, AND H. J. McNEIL. 1998. Evaluation of a multivalent *Pasteurella haemolytica* vaccine in bighorn sheep: protection from experimental challenge. *Journal of Wildlife Diseases* 34:325-333.
- MARTIN, K. D., T. SCHOMMER, AND V. L. COGGINS. 1996. Literature review regarding the compatibility between bighorn and domestic sheep. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 10:72-77.
- McQUIVEY, R. P. 1978. The bighorn sheep of Nevada. *Nevada Department of Fish and Game Biological Bulletin* 6:1-81.
- MILLER, M. W., J. A. CONLON, H. J. McNEIL, J. M. BULGIN, AND A. C. S. WARD. 1997. Evaluation of multivalent *Pasteurella haemolytica* vaccine in bighorn sheep: safety and serologic responses. *Journal of Wildlife Diseases* 33:738-748.
- MONELLO, R. J., D. L. MURRAY, AND E. F. CASSIRER. 2001. Ecological correlates of pneumonia epizootics in bighorn sheep herds. *Canadian Journal of Zoology* 79:1423-1432.
- MURPHY, G. L., L. C. WHITWORTH, K. D. CLINKENBEARD, AND P. A. CLINKENBEARD. 1995. Hemolytic activity of the *Pasteurella haemolytica* leukotoxin. *Infection and Immunology* 63:3209-3212.
- NOVICK, R. P. 2003. Mobile genetic elements and bacterial toxinoses: the superantigen-encoding pathogenicity islands of *Staphylococcus aureus*. *Plasmid* 49:93-105.
- ONDERKA, D. K., AND W. D. WISHART. 1984. A major bighorn sheep die-off from pneumonia in southern Alberta. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 4:356-363.
- ONDERKA, D. K., AND W. D. WISHART. 1988. Experimental contact transmission of *Pasteurella haemolytica* from clinically normal domestic sheep causing pneumonia in Rocky Mountain bighorn sheep. *Journal of Wildlife Diseases* 24:663-667.
- ONDERKA, D. K., S. A. RAWLUK, AND W. D. WISHART. 1988. Susceptibility of Rocky Mountain bighorn sheep and domestic sheep to pneumonia induced by bighorn and domestic livestock strains of *Pasteurella haemolytica*. *Canadian Journal of Veterinary Research* 52:439-444.
- POPPER, K. 1959. *The logic of scientific discovery*. Harper and Row, New York, USA.
- QUEEN, C., A. C. S. WARD, AND D. L. HUNTER. 1994. Bacteria isolated from nasal and tonsillar samples of clinically healthy Rocky Mountain bighorn and domestic sheep. *Journal of Wildlife Diseases* 30:1-7.
- RAMEY II, R. R. 1993. Evolutionary genetics and systematics of North American mountain sheep. Ph.D. Thesis, Cornell University, Ithaca, New York, USA.
- RAMEY II, R. R. 2000. New perspectives on the evolutionary origins, historic phylogeography, and population structure of North American mountain sheep. *Transactions of the North American Wild Sheep Conference* 2:9-16.

- REHMTULLA, A. J., AND R. G. THOMSON. 1981. A review of the lesions in shipping fever of cattle. *Canadian Veterinary Journal* 22:1-8.
- RUDOLPH, K. M., D. L. HUNTER, W. J. FOREYT, E. F. CASSIRER, R. B. RINDER, AND A. C. S. WARD. 2003. Sharing of *Pasteurella* spp. between free-ranging bighorn sheep and feral goats. *Journal of Wildlife Diseases* 39:897-903.
- SAFAEE, S., G. C. WEISER, E. F. CASSIRER, R. R. RAMEY, AND S. T. KELLEY. 2006. Molecular survey of host microbial diversity in bighorn sheep. *Journal of Wildlife Diseases* 42:545-555.
- SCHOMMER, T. J., AND M. M. WOOLEVER. 2001. A process for finding management solutions to the incompatibility between domestic and bighorn sheep. USDA Forest Service Publication. Wallowa-Whitman National Forest. Baker City, Oregon, USA.
- SCHUBERT, S., P. DARLU, O. CLERMONT, A. WEISER, G. MAGISTRI, C. HOFFMANN, K. WEINERT, O. TENAILLON, I. MATIC, AND E. DENAMUR. 2009. Role of intraspecies recombination in the spread of pathogenicity islands within *Escherichia coli* species. *PLoS Pathogens* 5(1): e1000257. doi:10.1371/journal.ppat.1000257.
- SILFLOW, R. M., AND W. J. FOREYT. 1994. Susceptibility of phagocytes from elk, deer, bighorn sheep, and domestic sheep to *Pasteurella haemolytica* cytotoxins. *Journal of Wildlife Diseases* 30:529-535.
- SILFLOW, R. M., W. J. FOREYT, AND J. E. LAGERQUIST. 1994. Evaluation of the cytotoxicity of various isolates of *Pasteurella haemolytica* from bighorn sheep and other ungulate populations. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 9:1-6.
- SILFLOW, R. M., W. J. FOREYT, AND R. W. LEID. 1993. *Pasteurella haemolytica* cytotoxin-dependent killing of neutrophils from bighorn and domestic sheep. *Journal of Wildlife Diseases* 29:30-35.
- SILFLOW, R. M., W. J. FOREYT, S. M. TAYLOR, W. W. LAEGREID, H. D. LIGGIT, AND R. W. LEID. 1989. Comparison of pulmonary defense mechanisms in Rocky Mountain bighorn (*Ovis canadensis canadensis*) and domestic sheep. *Journal of Wildlife Diseases* 25:514-520.
- SINGER, F. J., L. C. ZEIGENFUSS, AND L. SPICER. 2001. Role of patch size, disease, and movement in rapid extinction of bighorn sheep. *Conservation Biology* 15:1347-1354.
- SMITH, D. R. 1954. The bighorn sheep in Idaho. *Idaho Department of Fish and Game Wildlife Bulletin* 1:1-154.
- SNEATH, P. H. A., AND M. STEVENS. 1990. *Actinobacillus rossii* sp. nov., *Actinobacillus seminis* sp. nov., nom. rev., *Pasteurella bettii* sp. nov., *Pasteurella lymphangitidis* sp. nov., *Pasteurella mairi* sp. nov., and *Pasteurella trehalosi* sp. nov. *International Journal of Systematic Bacteriology* 40:148-153.
- SNIPES, K. P., R. W. KASTEN, M. A. WILD, M. W. MILLER, D. A. JESSUP, R. L. SILFLOW, W. J. FOREYT, AND T. E. MILLER. 1992. Using ribosomal RNA gene restriction patterns in distinguishing isolates of *Pasteurella haemolytica* from bighorn sheep (*Ovis canadensis*). *Journal of Wildlife Diseases* 28:347-354.
- STELFOX, J. G. 1971. Bighorn sheep in the Canadian Rockies. A history 1800-1970. *Canadian Field-Naturalist* 85:101-122.
- STORZ, J., X. LIN, C. W. PURDY, V. N. CHOULJENKO, K. G. KOUSOULAS, F. M. ENRIGHT, W. C. GILMORE, R. E. BRIGGS, AND R. W. LOAN. 2000. Coronavirus and *Pasteurella*

- infections in bovine shipping fever pneumonia and Evan's criteria for causation. *Journal of Clinical Microbiology* 38:3291-3298.
- SWEENEY, S. J., R. M. SILFLOW, AND W. J. FOREYT. 1994. Comparative leukotoxicities of *Pasteurella haemolytica* isolates from domestic sheep and free-ranging bighorn sheep (*Ovis canadensis*). *Journal of Wildlife Diseases* 30:523-528.
- TANNER M. A., D. SHOSKES, A. SHAHED, AND N. R. PACE. 1999. Prevalence of corynebacterial 16S rRNA sequences in patients with bacterial and "nonbacterial" prostatitis. *Journal of Clinical Microbiology* 37:1863-1870.
- VALDEZ, R., AND P. R. KRAUSMAN. 1999. Description, distribution, and abundance of mountain sheep in North America. Pages 1-22 in R. Valdez and P. R. Krausman, editors. *Mountain sheep of North America*. University of Arizona Press, Tucson, USA
- WARD, A. C. S., M. R. DUNDAR, D. L. HUNTER, R. H. HILLMAN, M. S. BULGIN, W. J. DELONG, AND E. R. SILVA. 1990. Pasteurellaceae from bighorn and domestic sheep. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 7:109-117.
- WARD, A. C. S., D. L. HUNTER, M. D. JAWORSKI, P. J. BENOLKIN, M. P. DOBEL, J. B. JEFFRESS, AND G. A. TANNER. 1997. *Pasteurella* spp. in sympatric bighorn and domestic sheep. *Journal of Wildlife Diseases* 33:544-557.
- WARD, A. C. S., D. L. HUNTER, K. M. RUDOLPH, W. J. DELONG, J. M. BULGIN, L. M. COWAN, H. J. MCNEIL, AND M. W. MILLER. 1999. Immunologic responses of domestic and bighorn sheep to a multivalent *Pasteurella haemolytica* vaccine. *Journal of Wildlife Diseases* 35:285-296.
- WARD, A. C. S., G. C. WEISER, W. J. DEJONG, AND G. H. FRANK. 2002. Characterization of *Pasteurella* spp. isolated from healthy domestic pack goats and evaluation of the effects of a commercial *Pasteurella* vaccine. *American Journal of Veterinary Research* 63:119-123.
- WEHAUSEN, J. D., V. C. BLEICH, AND R. A. WEAVER. 1987. Mountain sheep in California: a historical perspective on 108 years of full protection. *Transactions of the Western Section of the Wildlife Society* 23:65-74.
- WEISER, G. C., W. J. DELONG, J. L. PAZ, B. SHAFII, W. J. PRICE, AND A. C. S. WARD. 2003. Characterization of *Pasteurella multocida* associated with pneumonia in bighorn sheep. *Journal of Wildlife Diseases* 39:536-544.
- WILD, M. A., AND M. W. MILLER. 1991. Detecting nonhemolytic *Pasteurella haemolytica* infections in healthy Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*): influences of sample site and handling. *Journal of Wildlife Diseases* 27:53-60.
- WILD, M. A., AND M. W. MILLER. 1994. Effects of modified Cary and Blair medium on recovery of nonhemolytic *Pasteurella haemolytica* from Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) pharyngeal swabs. *Journal of Wildlife Diseases* 30:16-19.
- YATES, W. D. G. 1982. A review of infectious bovine rhinotracheitis, shipping fever pneumonia and viral-bacterial synergism in respiratory disease of cattle. *Canadian Journal of Comparative Medicine* 46:225-263.

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## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Monday, February 13, 2017 12:28 PM  
**To:** Fred Stump; John Peters; Bob Gardner; Larry Johnston  
**Cc:** Helen Nunn  
**Subject:** FW: Letter to the Mono County Board of Supervisors  
**Attachments:** 13L-ST-2017-TA-0206 Management of Conway & Mattly Ranches for Grazing-Outgoing.pdf; Besser et al\_2014.pdf; Cassaigne et al. 2010.pdf; Cassirer et al. 2013.pdf; Desert Bighorn Council\_1990.pdf; Lawrence et al. 2010.pdf; USFWS\_2014.pdf; USFWS\_2015.pdf; USFWS\_2016a.pdf; USFWS\_2016b.pdf

**Forwarded to you per request by Supervisor Corless. These materials will be included in the board agenda packet for 2/21.**

Thanks,  
Shannon

**From:** Theisen, Shawna [[mailto:shawna\\_theisen@fws.gov](mailto:shawna_theisen@fws.gov)]  
**Sent:** Monday, February 13, 2017 11:18 AM  
**To:** Stacy Corless <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>  
**Cc:** Lee Carranza <[lee\\_carranza@fws.gov](mailto:lee_carranza@fws.gov)>; Erin Nordin <[erin\\_nordin@fws.gov](mailto:erin_nordin@fws.gov)>; Marcy Haworth <[marcy\\_haworth@fws.gov](mailto:marcy_haworth@fws.gov)>  
**Subject:** Letter to the Mono County Board of Supervisors

Hello Stacy,

Thank you for facilitating our participation in the Mono County Board of Supervisors' meeting pertaining to the future management of the Conway and Mattley grazing allotments. Please see the attached letter and a file containing scientific literature supporting the U.S. Fish and Wildlife Services' recommendations in the letter. If it would help to supply the board with the references on a CD, please let me know and I will bring several copies for the February 21st meeting.

I look forward to meeting you,  
Shawna

Shawna Theisen  
Assistant Field Supervisor  
Reno Fish and Wildlife Office  
(775) 861-6378 (desk)  
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# United States Department of the Interior

## Pacific Southwest Region FISH AND WILDLIFE SERVICE

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February 13, 2017  
File No. 2017-TA-0206

Board of Supervisors  
Mono County  
P.O. Box 715  
Bridgeport, California 93517

Subject: Management of Conway and Mattly Ranches for Grazing

Dear Honorable Mono County Board of Supervisors:

Thank you for the opportunity to provide input to the Mono County Board of Supervisors as you consider the future management of Conway and Mattly Ranches. The U.S. Fish and Wildlife Service (Service) appreciates the amount of time and consideration Mono County (County) has devoted to this effort in order to try to accommodate all needs and interests on these County-leased properties. As we have expressed in previous letters, our primary concern is the continuation of domestic sheep grazing on the Conway and Mattly Ranches and the potential for disease transmission between domestic sheep (*Ovis aries*) and the state- and federally-listed endangered Sierra Nevada bighorn sheep (Sierra bighorn; *Ovis canadensis sierrae*) (Service 2014, 2015, 2016a, 2016b).

Bighorn sheep die-offs due to contact with domestic sheep have occurred across the western United States and British Columbia (Desert Bighorn Council 1990; Cassaigne *et al.* 2010). These events can have a long-term negative effect on population recovery due to declines from initial all-age die-offs, which can be followed by years of low recruitment from high lamb mortality (Cassirer *et al.* 2013). In some instances, it can be difficult to determine the exact cause of a die-off event. However, experiments conducted by Lawrence *et al.* (2010) and Besser *et al.* (2014) demonstrate that bacteria associated with fatal pneumonia in bighorn sheep can be transferred between domestic sheep and bighorn sheep. It is the Service's opinion that research on disease transmission between domestic sheep and bighorn sheep, and bighorn sheep die-offs that have resulted from contact between these two closely-related species, provides strong evidence that disease transmission between domestic sheep and bighorn sheep can and does occur and is often, if not always, fatal.

Sierra Nevada bighorn sheep are protected by the Endangered Species Act (ESA), 16 United States Code, Sections 1531-1544. The Service's responsibilities include administering the ESA. Section 1538, also known as Section 9, prohibits the taking of any endangered species. "Take" is defined in the statute, 16 USC 1532(19), as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct."

It is our opinion that disease transmission, and a resulting disease outbreak due to contact between Sierra bighorn and domestic sheep would represent take. Disease transmission between domestic sheep and Sierra bighorn could go undetected and ultimately, Sierra bighorn could transmit disease to their respective herd units and potentially throughout the entire population. Unauthorized take of Sierra bighorn as a result of disease transmission from domestic sheep grazed on County authorized lease(s) would be a violation of the ESA, Pursuant to 16 USC 1540, criminal penalties for such violations of the ESA can result in fines up to \$100,000 per individual, \$200,000 per organization and/or up to one year in prison. Civil penalties can result in fines up to \$25,000 for each violation.

We appreciate your staff reaching out to the Service and the California Department of Fish and Wildlife (CDFW) to discuss measures to protect both Sierra bighorn as well as the Bi-State population of Greater sage-grouse (*Centrocercus urophasianus*). However, current management practices combined with protective measures will not eliminate the risk of contact between domestic sheep and Sierra bighorn. Grazing domestic sheep on these properties will inevitably result in the transmission of disease to Sierra bighorn and thus put the leasee and lessor at risk of causing take under the ESA. For these reasons, the Service and CDFW are reluctant to augment the Mt. Warren herd unit, one of the herd units located in close proximity to these County-leased properties, due to the potential for contact between Sierra bighorn and domestic sheep. Consequently, the Service believes that domestic sheep grazing on these properties is not compatible with the recovery of Sierra bighorn.

The only way to eliminate the risk of disease transmission is to maintain spatial separation (*i.e.*, distance) between domestic sheep and Sierra bighorn. The Service appreciates the opportunity to work with the County to identify alternative management strategies for Conway and Mattly Ranches that do not perpetuate the risk of disease transmission. One such strategy is to graze livestock other than domestic sheep or goats (which can also transmit disease to bighorn sheep) that will not pose a risk of disease transmission to Sierra bighorn. Another option would be to consider managing the properties as wildlife areas.

Thank you for your commitment to maintaining the conservation values of these properties. We believe that we have a robust and productive partnership with Mono County, as evidenced by of our mutual efforts to protect and conserve the Bi-State population of the Greater sage-grouse. We are hopeful that we can extend our partnership to the recovery of the Sierra bighorn, and believe that eliminating the risk of disease transmission from County-leased properties is central to that objective. We are excited by a future in which Mono County, the Service, CDFW and

other partners in Sierra Nevada bighorn sheep conservation are actively working together to pursue, and achieve, recovery of this species such that it no longer requires the protections of the ESA. If you have any questions regarding this letter or would like to discuss this matter further, please contact me or Shawna Theisen, Assistant Field Supervisor, at (775) 861-6300.

Sincerely,



Carolyn Swed  
Field Supervisor

Attachments: References



**References**

- Besser, T.E., E. F. Cassirer, K.A. Potter, K. Lahmers, J.L. Oaks, S. Shanthalingam, S. Srikumaran, and W.J. Foreyt. 2014. Epizootic Pneumonia of bighorn sheep following experimental exposure to *Mycoplasma ovipneumoniae*. PLoS ONE 9(10): e110039.
- Cassaigne, I., R. A. Medellín, and J. A. Guasco. 2010. Mortality during epizootics in bighorn sheep: effects of initial population size and cause. *Journal of Wildlife Diseases* 46(3): 763-771.
- Cassirer, E. F., R. K. Plowright, K. R. Manlove, P. C. Cross, A.P. Dobson, K. A. Potter, and P. J. Hudson. Spatio-temporal dynamics of pneumonia in bighorn sheep. 2013. *Journal of Animal Ecology* 82: 518-528.
- Desert Bighorn Council. 1990. Guidelines for management of domestic sheep in the vicinity of desert bighorn habitat. *Desert Bighorn Council 1990 Transactions*. 3 pp.
- Lawrence, P.K., S. Shanthalingam, R.P. Dassanayake, R. Subramaniam, C.N. Herndon, D.P. Knowles, F.R. Rurangirwa, W.J. Foreyt, G. Wayman, A.M. Marciel, S.K. Highlander, and S. Srikumaran. 2010. Transmission of *Mannheimia haemolytica* from domestic sheep (*Ovis aries*) to bighorn sheep (*Ovis canadensis*): unequivocal demonstration with green fluorescent protein-tagged organisms. *Journal of Wildlife Disease* 46(3): 706-717.
- [Service] U.S. Fish and Wildlife Service. 2014. Letter to Mono County Board of Supervisors about the Mono County draft grant feed of conservation easement Conway and Mattly Ranches. Dated June 17, 2014. 27 pp.
- [Service] U.S. Fish and Wildlife Service. 2015. Letter to Mono County Community Development about Mono County General Plan Update and other associated documents. Dated October 16, 2015. 7 pp.
- [Service] U.S. Fish and Wildlife Service. 2016a. Letter to Mono County Board of Supervisors on the draft Conway Ranch Strategic Facility Plan. Dated June 17, 2016. 7 pp.
- [Service] U.S. Fish and Wildlife Service. 2016b. Letter to Mono County Board of Supervisors about the Conway/Mattly Ranch agenda item for the December 13, 2016 Board of Supervisors meeting. December 12, 2016.





# Epizootic Pneumonia of Bighorn Sheep following Experimental Exposure to *Mycoplasma ovipneumoniae*

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## Abstract

**Background:** Bronchopneumonia is a population limiting disease of bighorn sheep (*Ovis canadensis*). The cause of this disease has been a subject of debate. Leukotoxin expressing *Mannheimia haemolytica* and *Bibersteinia trehalosi* produce acute pneumonia after experimental challenge but are infrequently isolated from animals in natural outbreaks. *Mycoplasma ovipneumoniae*, epidemiologically implicated in naturally occurring outbreaks, has received little experimental evaluation as a primary agent of bighorn sheep pneumonia.

**Methodology/Principal Findings:** In two experiments, bighorn sheep housed in multiple pens 7.6 to 12 m apart were exposed to *M. ovipneumoniae* by introduction of a single infected or challenged animal to a single pen. Respiratory disease was monitored by observation of clinical signs and confirmed by necropsy. Bacterial involvement in the pneumonic lungs was evaluated by conventional aerobic bacteriology and by culture-independent methods. In both experiments the challenge strain of *M. ovipneumoniae* was transmitted to all animals both within and between pens and all infected bighorn sheep developed bronchopneumonia. In six bighorn sheep in which the disease was allowed to run its course, three died with bronchopneumonia 34, 65, and 109 days after *M. ovipneumoniae* introduction. Diverse bacterial populations, predominantly including multiple obligate anaerobic species, were present in pneumonic lung tissues at necropsy.

**Conclusions/Significance:** Exposure to a single *M. ovipneumoniae* infected animal resulted in transmission of infection to all bighorn sheep both within the pen and in adjacent pens, and all infected sheep developed bronchopneumonia. The epidemiologic, pathologic and microbiologic findings in these experimental animals resembled those seen in naturally occurring pneumonia outbreaks in free ranging bighorn sheep.

**Citation:** Besser TE, Cassirer EF, Potter KA, Lahmers K, Oaks JL, et al. (2014) Epizootic Pneumonia of Bighorn Sheep following Experimental Exposure to *Mycoplasma ovipneumoniae*. PLoS ONE 9(10): e110039. doi:10.1371/journal.pone.0110039

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**Data Availability:** The authors confirm that all data underlying the findings are fully available without restriction. All relevant data are within the paper.

**Funding:** These studies were funded by grants from the Wyoming Wildlife/Livestock Disease Partnership (T. E. Besser, S. Srikumaran), the Washington Department of Fish and Wildlife (T. E. Besser), the Idaho Domestic Wildlife Research Oversight Committee (E. F. Cassirer), and the Oregon chapter of the Foundation for North American Wild Sheep (T. E. Besser) or the grant support that made these studies possible. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

**Competing Interests:** The authors have declared that no competing interests exist.

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## Introduction

Bighorn sheep are a North American species that has failed to recover from steep declines at the turn of the 20<sup>th</sup> century despite strict protections and intensive management, and two populations (Sierra Nevada and Peninsular) are currently classified as endangered [1]. Epizootic pneumonia is limiting bighorn sheep population restoration and as such, the etiology is of considerable interest. The first appearance of the disease in a population is typically in the form of epizootics that affect animals of all ages and is sometimes accompanied by high (>50%) mortality rates. Subsequently, epizootics affecting primarily lambs may occur for decades [2]. Various causes have been proposed for this disease, including lungworms (*Protostrongylus* sp.) [3–6], Pasteurellaceae, especially *Mannheimia* (*Pasteurella*) *haemolytica*, [7–12] and more recently, *Mycoplasma ovipneumoniae* [13–16]. In a recent

comparative review of the evidence supporting each of these possible etiologies we concluded that *M. ovipneumoniae* was most strongly supported as the primary epizootic agent of bighorn sheep pneumonia [14]. However, the only two previous experimental challenge studies with *M. ovipneumoniae* either did not reproduce disease [13] or were confounded by challenges with other agents [16]. The objective of this study was to improve upon previous investigations to better assess the outcome of experimental introduction of *M. ovipneumoniae* to naive bighorn sheep.

## Methods

### Ethics statement

This study was carried out in accordance with the recommendations in the Guide for the Care and Use of Laboratory Animals of the National Institutes of Health and in conformance with

United States Department of Agriculture animal research guidelines, under protocols #03854 and #04482 approved by the Washington State University (WSU) Institutional Animal Care and Use Committee. As described in those protocols, euthanasia was performed by intravenous injection of sodium pentobarbital for animals observed to be in severe distress associated with pneumonia during the study and prior to necropsy examination for surviving animals at the end of each experiment.

### Experimental aims

Experiment 1 was conducted to investigate the transmission of *M. ovipneumoniae* to bighorn sheep and their subsequent development of disease, using an infected domestic sheep source. Experiment 2 was conducted to investigate experimental direct *M. ovipneumoniae* infection of a single bighorn sheep and the subsequent transmission of this agent to conspecifics. Both experiments were conducted in multiple pens separated by short distances, which allowed investigation of transmission to both commingled and non-commingled animals.

### Experimental animals

All experimental animals originated from herds and flocks unexposed to *M. ovipneumoniae* as determined by repeated testing with both serology on blood serum and PCR on enriched nasal swab cultures (using the methods described later in the ‘Microbiological testing’ section). In Experiment 1, three hand-reared bighorn sheep (yearling rams BHS #82 and #89 and yearling ewe BHS #07) that originated from a captive flock at WSU and three purchased domestic sheep (adult ewes DS #00 and #01 and yearling ewe DS #LA) were co-housed in three 46 m<sup>2</sup> pens, with one domestic and one bighorn sheep per pen. Pens were separated by 7.6–12 m. Experiment 1 animals had all been commingled in a single pen for 104 days immediately prior to the beginning of this experiment, as previously described [15]. One of the four bighorn sheep used in that prior study had died of *M. haemolytica* pneumonia, while the other three, which had demonstrated no signs of respiratory disease in that study, were used in experiment 1. In Experiment 2, wild bighorn sheep captured from the Asotin Creek population in Hells Canyon were housed in two 700 m<sup>2</sup> pens, 7.6 m apart, with three animals per pen (Pen #1: adult ewe BHS #40, yearling ewe BHS #38, and yearling ram BHS #39; Pen #2: adult ewes BHS #41 and #42 and adult ram BHS #C). The study pens had either never previously housed domestic or bighorn sheep (pen 1 in experiment 1; both pens in experiment 2) or had been rested for greater than one year since their previous occupancy by any *M. ovipneumoniae* infected sheep (pens 2 and 3 in experiment 1) prior to these experiments.

### Experimental design

**Experiment 1.** A domestic ewe (DS #00) was placed in isolation and experimentally infected with *M. ovipneumoniae*. The inoculum consisted of ceftiofur-treated (100 ug/ml, 2 hrs, 37°C; Pfizer, Florham Park, NJ) nasal wash fluids from a domestic sheep naturally colonized with *M. ovipneumoniae* [16]. Following ceftiofur treatment, no aerobic bacterial growth was observed from the nasal wash fluids cultured under conditions expected to permit growth of *M. haemolytica*, *B. trehalosi*, or *P. multocida* (Columbia blood agar with 5% sheep blood, 35°C, overnight, 5% CO<sub>2</sub>). DS #00 was then challenged with the treated nasal wash fluid by infusion of 15 ml in each nares, 10 ml orally and 5 ml into each conjunctival sac. Subsequent nasal swab samples obtained on days 1, 2, 4 and 7 post-challenge were all PCR positive for *M. ovipneumoniae* using the method described later in the ‘Microbiological testing’ section confirming that the experimental infection

had been successful. On post challenge day 7, DS #00 was introduced into pen #1 with BHS #82. Following commingling, DS #00 and BHS #82 were restrained for collection of nasal swab samples on days 1, 2, 4, 7, 14, 21, 28, and subsequently at 30 day intervals until the experiment was terminated. Rectal temperatures were recorded from both sheep approximately twice each week. Sheep in pens #2 (BHS #89 and DS #01) and #3 (BHS #07 and DS #LA) were restrained for rectal temperature determination and collection of nasal swabs for microbiology at approximately monthly intervals. All pens were observed daily for clinical signs of respiratory disease. The experiment was conducted October 2009–January 2010.

**Experiment 2.** BHS #39 was inoculated with *M. ovipneumoniae* just prior to its release into pen #1 with non-inoculated BHS #38 and #40. Non-inoculated BHS #C, #41, and #42 were housed in pen #2 on the same day. The inoculum for BHS #39 was prepared as described for that used in experiment 1 but originated from a different domestic sheep source. In lieu of computation of colony forming units, which is not possible for *M. ovipneumoniae* due to inconsistent growth on plated media, viable *M. ovipneumoniae* counts in the inoculum were determined using most probable number (MPN) using a custom 3×4 format: Triplicate enrichment broth tubes were inoculated at each of four decimal dilutions (10<sup>-2</sup>–10<sup>-5</sup>) of the treated nasal wash fluid [17], incubated (72 hrs, 35C) then PCR was used to detect growth of viable *M. ovipneumoniae*. The treated fluid was determined to contain 930 MPN/ml (95% confidence interval, 230 to 3800 MPN). Two of the bighorn sheep (BHS #38 and #39) in pen 1 were recaptured by drive net on day 21 of the experiment for nasal swab sampling to detect *M. ovipneumoniae* infection; otherwise, no live animal sampling was conducted in experiment #2 to reduce the risk of traumatic injury of the wild bighorn sheep involved. The experiment was conducted December 2011–June 2012.

**Biosecurity.** In both experiments, routine biosecurity measures included: 1) the pens containing the single *M. ovipneumoniae*-challenged animals (exposed pens) were located downwind of the prevailing wind direction from the pens containing no experimentally *M. ovipneumoniae* exposed animals (clean pens), 2) order of entry rules were established so that on any single day exposed pens were routinely entered by animal care staff for feeding and cleaning only after all work in clean pens had been completed, and 3) personal protective equipment (coveralls and boots) used in exposed pens were either not reused, or were sanitized prior to use in clean pens.

**Clinical scores.** Clinical score data were determined using the following cumulative point system: observed anorexia (1), nasal discharge (1), cough (2), dyspnea (1), head shaking (1), ear paresis (1) and weakness/incoordination (1).

**Microbiological testing.** Routine diagnostic testing performed by the Washington Animal Diagnostic Laboratory (fully accredited by the American Association of Veterinary Laboratory Diagnosticians) included detection of *M. ovipneumoniae*-specific and small ruminant lentivirus-specific antibodies in serum samples using competitive enzyme-linked immunosorbent assays (cELISA) [14,18,19], detection of *M. ovipneumoniae* colonization by broth enrichment of nasal swabs followed by *M. ovipneumoniae*-specific PCR testing of the broths [20,21], detection of Pasteurellaceae in pharyngeal swab samples by aerobic bacteriologic cultures, and detection of exposure to parainfluenza-3, border disease, and respiratory syncytial viruses by virus neutralization antibody assays applied to serum samples.

PCR tests specific for detection of *M. haemolytica*, *B. trehalosi*, and *P. multocida*, and *lktA* (the gene encoding the principal

virulence factor of *M. haemolytica* and *B. trehalosi*) were applied to DNA extracted from pneumonic lung tissues using previously described primers (Table 1) and methods with minor modifications. All reactions were conducted individually in 20 µL volumes containing 80–300 ng of template DNA. For *M. haemolytica*, *B. trehalosi*, *lktA* and *P. multocida*, reactions contained 0.5 units of HotStar Taq DNA polymerase (Qiagen), 2 µL 10x PCR buffer (Qiagen), 4 µL Q-solution (Qiagen), 40 µM of each dNTP (Invitrogen). The *M. ovipneumoniae* reaction used QIAGEN Multiplex PCR mix. Primers were used at final concentrations of 0.2 µM (*M. haemolytica*, *B. trehalosi*, *P. multocida*, and *M. ovipneumoniae*) or 0.5 µM (leukotoxin A). Each reaction included an initial activation and denaturation step (95°C, 15 min) and a final 72°C extension step (10 min for MhgcP-2, lktA, lktA set-1, and LM primers; 9 min for KMT primers; 5 min for Btsod and MhgcP primers). Cycling conditions were as follows: *M. ovipneumoniae*, 30 cycles of 95°C for 30 s, 58°C for 30 s, 72°C for 30 s; *B. trehalosi* and *M. haemolytica* (MhgcP and Btsod primers), 35 cycles of 95°C for 30 s, 55°C for 30 s, 72°C for 40 s; *P. multocida* and *lktA* (lktA primers), 30 cycles of 95°C for 60 s, 55°C for 60 s, 72°C for 60 s; *M. haemolytica* (MhgcP-2 primers), 40 cycles of 95°C for 30 s, 54°C for 30 s, 72°C for 30 s; *lktA* (lktA set-1 primers), 40 cycles of 95°C for 30 s, 52°C for 30 s, 72°C for 40 s. Leukotoxin expression was detected in Pasteurellaceae isolates by MTT dye reduction cytotoxicity assay as described previously [22].

The 16S–23S ribosomal operon intergenic spacer (IGS) regions of *M. ovipneumoniae* recovered from animals in these studies were PCR amplified (Table 1) and sequenced as previously described [23].

**16S rDNA analyses to identify the predominant bacterial flora in pneumonic lung tissues.** In previous studies, culture-independent evaluation of the microbial flora of lung tissues in naturally occurring bighorn sheep pneumonia revealed a polymicrobial flora late in the disease course [13,23]. For comparison, we applied the same methods to lung tissues of the experimentally challenged animals in this study. Note that more sensitive

detection of specific respiratory pathogens was provided by the PCR assays described earlier, whereas these 16S studies were designed instead to identify the numerically predominant bacteria in affected lungs. The library size used was based on the binary distribution to provide a 95% chance of detection of each taxon comprising 10% or more of the ribosomal operon frequency in the source tissue. Two 1 g samples of pneumonic lung tissues were aseptically collected from sites at least 10 cm apart, homogenized by stomaching, and DNA was extracted (DNeasy tissue kit; Qiagen, Valencia, CA) from 100 µL aliquots of each homogenate. 16S rDNA segments were PCR amplified and cloned as described [13]. Insert DNA was sequenced from 16 clones derived from each of the two homogenates from each animal, and each sequence was attributed to species (≥99% identity) or genus (≥97% identity) based on BLAST GenBank similarity [24].

**Results**

**Experiment 1**

*M. ovipneumoniae* infection of DS #00, introduced into pen 1 to start the experiment, was confirmed by positive nasal swab samples obtained on days 1, 4, and 7 after inoculation prior to its introduction into pen #1, and on days 1, 2, 4, 7, 14, 21, 28, 60 and 90 after its introduction into pen #1, confirming that the experimental colonization had been successful and maintained throughout experiment 1. *M. ovipneumoniae* was first detected in the bighorn sheep (BHS #82) commingled with DS #00 in pen #1 on day 28, and subsequent tests on days 60 and 90 were also positive. BHS #82 developed signs of respiratory disease including nasal discharge (onset day 37); coughing and fever (onset day 42); and lethargy and ear paresis (onset day 61) (Figure 1a). Signs of respiratory disease were observed in the bighorn sheep in pens #2 (BHS #89) and #3 (BHS #07) beginning on days 62 and 67, respectively; these signs also included fever, lethargy, paroxysmal coughing, nasal discharge, head shaking, and drooping ears. No signs of respiratory disease were observed in the commingled domestic sheep at any time during the experiment. *M.*

**Table 1.** Primers and PCR reaction targets used in these experiments.

Pathogen/Virulence gene	Target	Primer Name	Sequence (5' → 3')	Size (bp)	Reference
<i>M. haemolytica</i>	<i>gcp</i>	MhgcP	AGA GGC CAA TCT GCA AAC CTC G	267	[33]
		MhgcP	GTT CGT ATT GCC CAA CGC CG		
<i>M. haemolytica</i>	<i>gcp</i>	MhgcP2	TGG GCA ATA CGA ACT ACT CGG G	227	[34]
		MhgcP2	CTT TAA TCG TAT TCG CAG		
<i>B. trehalosi</i>	<i>sodA</i>	BtsodAF	GCC TGC GGA CAA ACG TGT TG	144	[33]
		BtsodAR	TTT CAA CAG AAC CAA AAT CAC GAA TG		
<i>P. multocida</i>	<i>kmt1</i>	KMT1T7	ATC CGC TAT TTA CCC AGT GG	460	[35]
		KMT1SP6	GCT GTA AAC GAA CTC GCC AC		
Pasteurellaceae leukotoxin	<i>lktA</i>	lktAF	TGT GGA TGC GTT TGA AGA AGG	1,145	[36]
		lktAR	ACT TGC TTT GAG GTG ATC CG		
<i>M. haemolytica</i> leukotoxin	<i>lktA</i>	lktAF set-1	CTT ACA TTT TAG CCC AAC GTG	497	[34]
		lktAR set-1	TAA ATT CGC AAG ATA ACG GG		
<i>Mycoplasma ovipneumoniae</i>	16s rDNA	LMF	TGA ACG GAA TAT GTT AGC TT	361	[20,21]
		LMR	GAC TTC ATC CTG CAC TCT GT		
<i>Mycoplasma ovipneumoniae</i>	16S–23S IGS	MolGSF	GGA ACA CCT CCT TTC TAC GG	Variable~490	[23]
		MolGSR	CCA AGG CAT CCA CCA AAT AC		

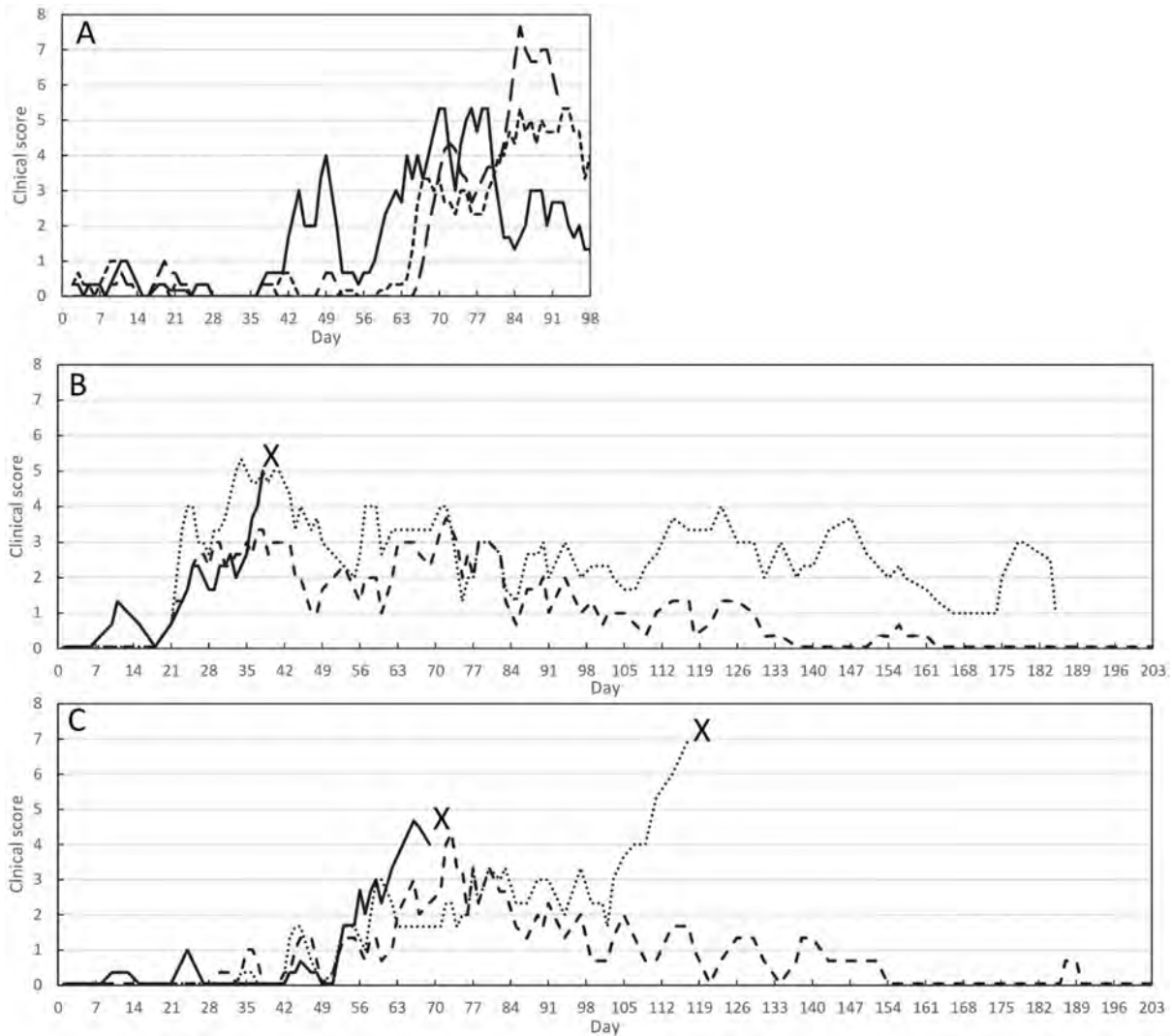
doi:10.1371/journal.pone.0110039.t001

*ovipneumoniae* was detected in nasal swab samples from all bighorn and domestic sheep in pens #2 and #3 when sampled on day 70. The bighorn sheep were euthanized for necropsy on days 93 (BHS #89) and 99 (BHS #82 and #07). At necropsy, significant abnormal findings were limited to the respiratory tract. Bronchopneumonia affecting 25–50% of the lung volume was observed in all three bighorn sheep (Figure 2). Histopathological examination revealed peribronchiolitis with large lymphoid cuffs, bronchiectasis with purulent exudates, pulmonary atelectasis, and hyperplastic bronchial epithelia lacking visible cilia (Figure 2).

**Experiment 2**

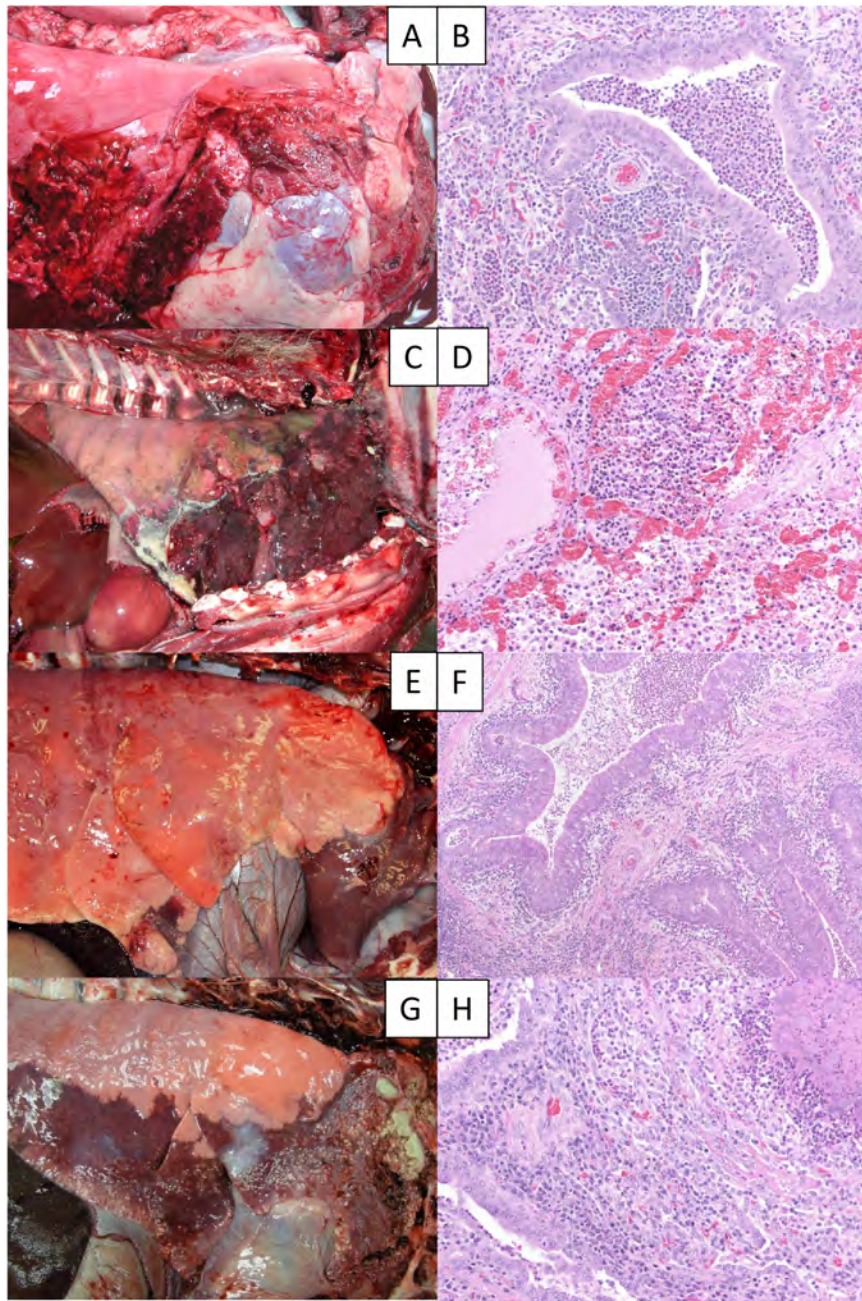
On day 21 following release of the inoculated bighorn into pen #1, *M. ovipneumoniae* was detected in the inoculated animal and one pen mate (BHS #38 and #39); the third animal (BHS #40) evaded capture and sampling on that day. The first signs of respiratory disease were observed in pen #1 animals on day 21 during drive net capture for sampling, apparently triggered by exertion (Figure 2a). On day 34, inoculated BHS #39 died in pen

#1. On day 49, signs of respiratory disease were first observed in the bighorn sheep in pen #2 (Figure 2b). On days 65 and 109, #41, and #42 in pen #2 died or were euthanized *in extremis*. The surviving three bighorn sheep exhibited varying degrees of respiratory disease: BHS #38 showed persistent respiratory disease, while BHS #40 and #C showed decreasing respiratory disease over time, which became minimal after days 161 and 154, respectively. On day 204, the three surviving bighorn sheep were euthanized for necropsy. At necropsy, significant abnormal findings were limited to the respiratory tract. All six bighorn sheep had bronchopneumonia, with consolidation of lung tissue volumes ranging from an estimated 5% (BHS #40) to 80–100% (BHS #41) (Figure 2). Histopathological examination revealed severe peribronchiolitis with large lymphoid cuffs as seen in experiment 1. Animals that died or were euthanized in extremis had an overlying necrotizing bronchiolitis (#39) or abscessing bronchiolitis with bronchiectasis (BHS #41, #42) (Figure 2).



**Figure 1. Clinical signs exhibited by *M. ovipneumoniae* infected bighorn sheep.** Clinical scores (3-day moving averages) of bighorn sheep following introduction of *M. ovipneumoniae*: A) Experiment 1, 3 separate pens; solid line, Pen 1, BHS #82; dashed line, Pen 2, BHS #89; dotted line, Pen 3, BHS #07; B) Experiment 2, Pen 1: solid line, BHS #39 (died day 34); dashed line, BHS #40; dotted line; BHS #38; C) Experiment 2, Pen 2: solid line, BHS #42 (euthanized day 109); dotted line, BHS #41 (died day 65); dashed line, BHS #C. doi:10.1371/journal.pone.0110039.g001





**Figure 2. Gross and histologic lesions in lungs of bighorn sheep experimentally infected with *M. ovipneumoniae*.** Images of BHS #82 (A, B), BHS #39 (C, D), BHS #C (E, F) and BHS #42 (G, H). Original magnification of histologic images was 200X (B, D, H) or 100X (F). doi:10.1371/journal.pone.0110039.g002

### Microbiology

All bighorn sheep in both experiments seroconverted to *M. ovipneumoniae* (Table 2). Most experimental animals had neutralizing antibody to parainfluenza-3 virus, but no significant changes in antibody titers were observed during the experimental period. Detectable antibody to other ovine respiratory viruses, including border disease virus, ovine progressive pneumonia virus, and respiratory syncytial virus was occasionally observed in single samples.

*M. ovipneumoniae* was detected at necropsy in both upper and lower respiratory tracts of all bighorn sheep except BHS #40 whose lung tissues were PCR negative and whose upper

respiratory samples were PCR indeterminate (Table 3). Aerobic cultures and/or PCR tests identified *B. trehalosi* from pneumonic lung tissues from all bighorn sheep in both experiments (Table 3). *B. trehalosi* isolates from BHS #82 and #07 carried *lktA* and expressed leukotoxin activity (Table 3). *P. multocida* and *M. haemolytica* were not detected in these animals by either aerobic culture or PCR.

### Culture independent survey of bacteria in pneumonic bighorn sheep lung tissues

DNA sequences of cloned 16S rDNA revealed that the predominant bacterial species in pneumonic sections of lung were

**Table 2.** Antibody responses to *M. ovipneumoniae* and parainfluenza-3 (PI-3) virus.

Experiment	ID	Pen	<i>M. ovipneumoniae</i> <sup>1</sup>		PI-3 virus <sup>2</sup>	
			Pre <sup>3</sup>	Post <sup>3</sup>	Pre <sup>3</sup>	Post <sup>3</sup>
1	82	1	-8%	93%	512	512
1	89	2	-7%	88%	128	128
1	07	3	-1%	92%	256	512
2	38	1	-6%	74%	Neg	64
2	39	1	-13%	67%	Neg	<32
2	40	1	-23%	75%	64	512
2	41	2	-19%	82%	512	NT
2	42	2	-11%	82%	256	NT
2	C	2	-4%	66%	256	512

<sup>1</sup>*M. ovipneumoniae* antibody detected by cELISA, expressed as percentage inhibition of the binding of an agent-specific monoclonal antibody [14,18].

<sup>2</sup>PI-3 virus neutralizing antibody detected by virus neutralization [37].

<sup>3</sup>Pre samples in experiment 1 were obtained on the day that the *M. ovipneumoniae* colonized domestic sheep was introduced to pen 1 and in experiment 2 were obtained on the day that BHS #39 was inoculated with *M. ovipneumoniae*. 'Post' samples in both experiments were obtained at necropsy. Neg = No titer detected. NT = Not tested, due to inadequate specimen volume.

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diverse (Table 4). In experiment 1, *M. ovipneumoniae* was detected in the lung tissues of all animals. *B. trehalosi* also comprised substantial proportions of the pneumonic lung flora in two animals (BHS #82 and #07), while obligate anaerobic species, primarily *Fusobacterium* spp., predominated in the third animal (BHS #89). The flora identified in the pneumonic lungs of the animals in experiment 2 was also substantially comprised of mixed obligate anaerobes especially *Fusobacterium* spp. (Table 4).

**Molecular epidemiology of respiratory pathogens.** Consistent with epidemic transmission, *M. ovipneumoniae* strains recovered from all experimental sheep within each experiment shared identical IGS DNA sequences with the respective challenge inoculum (GenBank HQ615162 in experiment 1; KJ551511 in experiment 2).

**Discussion**

The most striking finding of these experiments was the high transmissibility of *M. ovipneumoniae* and the consistent development of pneumonia that followed infection of bighorn sheep. The bacterium was naturally transmitted from single experimentally inoculated animals (a domestic sheep in experiment 1 and a bighorn sheep in experiment 2) to all animals within and between pens up to 12 m distant. Eight of nine bighorn sheep exposed to *M. ovipneumoniae* developed severe bronchopneumonia and three died, while all the domestic sheep remained healthy.

Previous experimental challenge studies conducted with *M. haemolytica* or *B. trehalosi* in the absence of *M. ovipneumoniae* have not documented transmission. For example, Foreyt et al. [8]

**Table 3.** Microbiologic findings from pneumonic lung tissues, based on aerobic culture and species specific PCR.

Expt.	ID	Bacterial pathogens identified in pneumonic lung tissues				
		<i>B. trehalosi</i>	<i>M. haemolytica</i>	<i>lktA</i>	<i>M. ovipneumoniae</i>	Other <sup>5</sup>
1	82	Cult, <i>sodA</i> <sup>1</sup>	Neg <sup>2</sup>	Pos <sup>3</sup>	16S <sup>4</sup>	None
1	89	Cult, <i>sodA</i>	Neg	Neg <sup>3</sup>	16S	<i>Pasteurella</i> sp. <sup>5</sup>
1	07	Cult, <i>sodA</i>	Neg	Pos	16S	<i>Pasteurella</i> sp.
2	38	Cult, <i>sodA</i>	Neg	Neg	16S	<i>Pasteurella</i> sp.
2	39	NT, <i>sodA</i>	NT, Neg <sup>2</sup>	Neg	16S	NT <sup>5</sup>
2	40	Cult	Neg	Neg	Neg <sup>4</sup>	<i>Trueperella pyogenes</i> <sup>5</sup>
2	41	Cult, <i>sodA</i>	Neg	Neg	16S	None
2	42	Cult	Neg	Neg	16S	None
2	C	Cult	Neg	Neg	16S	<i>Pasteurella</i> sp.

<sup>1</sup>Cult = *B. trehalosi* detected by bacterial culture; *sodA* = *B. trehalosi* detected by *sodA* species-specific PCR (Table 1); NT = Unable to test by bacterial culture (overgrowth by *Proteus* sp.).

<sup>2</sup>Neg = *M. haemolytica* not detected by either bacterial culture or by PCR with either *gcp* primer set (Table 1); NT = Unable to test by bacterial culture (overgrowth by *Proteus* sp.).

<sup>3</sup>Neg = Pasteurellaceae *lktA* not detected in DNA extracts from pneumonic lung tissues by two different *lktA* PCRs (Table 1) [34,36]. Pos = *lktA* detected in *B. trehalosi* isolates obtained from BHS #82 and #07 [36].

<sup>4</sup>16S = *M. ovipneumoniae* detected by PCR (Table 1) [20]; Neg = *M. ovipneumoniae* not detected by PCR.

<sup>5</sup>*Pasteurella* sp., *Trueperella pyogenes* = Bacteria isolated and identified by aerobic culture; *Pasteurella* sp. were determined not to be *B. trehalosi*, *M. haemolytica*, or *P. multocida*; NT = Unable to test by bacterial culture due to overgrowth by *Proteus* sp.

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**Table 4.** Microbiologic findings by 16S clone library (culture independent) method.

Expt.	ID	Bacterial species identified in pneumonic lung tissues					
		Btre <sup>1</sup>	Movi <sup>1</sup>	Fuso <sup>1</sup>	Prev <sup>1</sup>	Porphyro <sup>1</sup>	Other <sup>1</sup>
1	82	20 (62.5) <sup>2</sup>	8 (25)	0	3 (9.4)	0	1 (3.1)
1	89	1 (3.1)	7 (21.9)	21 (65.6)	1 (3.1)	0	2 (6.3)
1	07	16 (50.0)	12 (37.5)	0	0	0	4 (12.5)
2	38	4 (7.1)	2 (3.6)	8 (14.3)	20 (35.7)	9 (16.1)	13 (23.2)
2	C	0	0	17 (30.4)	5 (8.9)	19 (33.9)	15 (26.8)
2	39	2 (6.3)	0	24 (75.0)	0	0	6 (18.8)
2	40	0	0	0	0	0	56 (100.0)
2	41	1 (3.1)	0	21 (65.6)	5 (15.6)	0	5 (15.6)
2	42	0	0	31 (96.9)	0	0	1 (3.1)

<sup>1</sup>Btre = *B. trehalosi*; Movi = *M. ovipneumoniae*; Fuso = *Fusobacterium* sp.; Prev = *Prevotella* sp.; Porphyro = *Porphyromonas* sp.; Other = taxa other than those previously listed, each comprising <5% of sequenced clones.

<sup>2</sup>N (%) of the sequenced 16S clones from each animal whose DNA sequences were identical to those of the tabulated bacterial species in each column.

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reported a series of three experiments in which commingled bighorn sheep were either challenged with intra-tracheal *M. haemolytica* or given sterile BHI as controls. Four of the five control bighorn sheep survived without evidence of disease while commingled with eight *M. haemolytica*-challenged bighorn sheep, of which seven died of pneumonia [8]. Commingled bighorn sheep also remained healthy in several other studies where individual bighorn sheep died with apparent *M. haemolytica* bronchopneumonia (confirmed by isolation of this bacterium from lung tissues) [15,25,26].

In addition to high transmissibility, the time course of disease development and the predominant microbiology of the pneumonic lung tissues following experimental introduction of *M. ovipneumoniae* differed from that seen in previous bighorn sheep challenge experiments with other respiratory pathogens. Bighorn sheep directly challenged with leukotoxin positive *M. haemolytica* or *B. trehalosi* develop peracute bronchopneumonia and >90% die within a week of challenges with 10<sup>7</sup> cfu or more [16,27–30]. In contrast, disease following experimental *M. ovipneumoniae* exposures was considerably slower in onset (14–21 days post infection) and development (deaths occurring 34 to 109 days post infection); respiratory disease persisted up to 6 months post infection); this slow time course closely resembles that documented previously in bighorn lamb pneumonia outbreaks [3]. After lethal *M. haemolytica* challenge, the agent is typically isolated from lung tissues in high numbers and pure cultures [15,25]; in contrast in naturally occurring pneumonia outbreaks *M. ovipneumoniae* may be predominant early in the disease course but 16S library analyses have been used to document its overgrowth by diverse other bacteria later in the disease course [14,23]. Although the numbers of animals in the experimental *M. ovipneumoniae* infection studies reported here are small, the results are consistent with the trend for early predominance of *M. ovipneumoniae* followed by overgrowth by diverse other bacterial later in the disease course (Tables 3 and 4) [13,14,23].

Our results also differ from our previous attempt to experimentally reproduce respiratory disease by challenge inoculation of 1-week-old bighorn lambs with *M. ovipneumoniae*, which produced minor lesions and seroconversion but no clinically significant respiratory disease [3]. However, laboratory passage of *M. ovipneumoniae* (as was performed in that experiment) has been reported to attenuate virulence in *M. ovipneumoniae* [31]. Challenge of bighorn sheep with un-passaged *M. ovipneumoniae* produced different results, as observed here in experiment #2. In another study [16], nasal washings from domestic sheep naturally colonized with *M. ovipneumoniae* or lung homogenates from a *M. ovipneumoniae*-infected bighorn sheep were used for challenge of bighorn sheep after celthiofur treatment to eliminate detectable Pasteurellaceae. Consistent with increased virulence of un-passaged *M. ovipneumoniae*, infection and respiratory disease signs were observed in all four bighorn sheep, one of which died 19 days following challenge. The three surviving animals continued to exhibit respiratory disease signs for 42 days, at which time the experiment was terminated by challenge with *M. haemolytica* (using a dose documented to be rapidly fatal to bighorn sheep even in the absence of *M. ovipneumoniae*) [16]. As a result, the longer term effects of the mycoplasma infection were not determined in that study. Therefore, the experiments reported here are the first in which naïve bighorn sheep were exposed to un-passaged *M. ovipneumoniae* and then followed over a time period comparable with the naturally occurring disease course.

The possibility of viral agents contributing to the disease observed in this study cannot be completely ruled out, since the inoculum was derived from nasal washings from domestic sheep



and no virucidal treatments were applied. However, a previous study using ultrafiltrates of bighorn sheep pneumonic lung tissues or nasal washings from domestic sheep failed to reproduce any respiratory disease in inoculated susceptible bighorn sheep [16]. In addition, serologic monitoring for the predominant domestic sheep respiratory viruses did not demonstrate seroconversion of the experimental animals in this study, as described in the Results and in Table 2. Therefore, the most parsimonious interpretation of the data presented here is that the disease observed resulted from *M. ovipneumoniae* infection and the sequelae of that infection.

The transmission of *M. ovipneumoniae* from pen-to-pen in these experiments strongly suggests that direct contact is not necessary for epizootic spread of pneumonia in bighorn sheep. Feeding, watering and other procedures involving animal care or research staff were designed to minimize the risk of human or fomite-mediated transmission of the pathogen from pen to pen, although we recognize it is impossible to completely rule out this possibility. On the other hand, since aerosolized droplet transmission is recognized as a transmission route for the closely related bacterium, *Mycoplasma hyopneumoniae* (the cause of atypical pneumonia of swine) [32], it is plausible that a similar transmission mode occurs with *M. ovipneumoniae*. Infectious aerosols generated by coughing animals would likely contribute to the explosive nature of the pneumonia outbreaks observed following initial introduction of *M. ovipneumoniae* into naïve bighorn sheep populations.

In conclusion, we demonstrated that experimental *M. ovipneumoniae* infection of naïve bighorn sheep induces chronic, severe bronchopneumonia associated with multiple secondary bacterial infections and that this infection spread rapidly to animals both within the same pen and to animals in nearby pens. The significance of these findings would be clarified by parallel experiments specifically designed to determine transmissibility and associated disease outcomes in other agents associated with bighorn sheep pneumonia, particularly *M. haemolytica*, in the absence of *M. ovipneumoniae*. Furthermore, the case-fatality rates of *M. ovipneumoniae* infected animals described here contrasts

with the nearly 100% mortality that follows experimental commingling of bighorn sheep with presumptively or documented *M. ovipneumoniae*-positive domestic sheep and suggests an important role for polymicrobial secondary infections in determining mortality rates, which could be investigated in future studies. Finally, *M. ovipneumoniae* was still detected in nasal swab samples of several surviving bighorn sheep that were euthanized at the completion of these studies, suggesting that survivors of naturally occurring pneumonia outbreaks may continue to carry and shed this agent in nasal secretions. Such carriage may provide a mechanism for the post-invasion disease epizootics in lambs described in free-ranging populations. If so, this presumptive carrier state requires further study to characterize the factors that determine its occurrence and persistence, as these may be critical for the development of effective management control measures for this devastating disease.

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## Author Contributions

Conceived and designed the experiments: TEB EFC JLO S. Srikumaran WJF. Performed the experiments: TEB EFC JLO KAP KL S. Shanthalingam. Analyzed the data: TEB EFC KAP KL. Contributed reagents/materials/analysis tools: TEB EFC KAP KL S. Shanthalingam S. Srikumaran. Contributed to the writing of the manuscript: TEB EFC KAP S. Shanthalingam S. Srikumaran WJF.

## References

- Festa-Bianchet M (2008) *Ovis canadensis*. The IUCN Red List of Threatened Species. Available: <http://www.iucnredlist.org/details/summary/15735/0>. Accessed 2014 Jul 24.
- Cassirer EF, Plowright RK, Manlove KR, Cross PC, Dobson AP, et al. (2012) Spatio-temporal dynamics of pneumonia in bighorn sheep (*Ovis canadensis*). *J Animal Ecol* 82: 518–528.
- Marsh H (1938) Pneumonia in Rocky Mountain bighorn sheep. *J Mammal* 19: 214–219.
- Buechner HK (1960) The bighorn sheep in the United States, its past, present, and future. *Wildl Monog* 4: 3–174.
- Forrester DJ (1971) Bighorn sheep lungworm-pneumonia complex. In: Davis JW, Anderson RC, editors. *Parasitic Diseases of Wild Mammals*. Ames, IA: Iowa State University Press. 158–173.
- Demartini JC, Davies RB (1977) An epizootic of pneumonia in captive bighorn sheep infected with *Muellerius* sp. *J Wildl Dis* 13: 117–124.
- Miller MW (2001) Pasteurellosis. In: Williams ES, Barker, I K., editor. *Infectious diseases of wild mammals*. Ames IA USA: Iowa State University Press. 558.
- Foreyt WJ, Snipes KP, Kasten RW (1994) Fatal pneumonia following inoculation of healthy bighorn sheep with *Pasteurella haemolytica* from healthy domestic sheep. *J Wildl Dis* 30: 137–145.
- Kraabel BJ, Miller MW, Conlon JA, McNeil HJ (1998) Evaluation of a multivalent *Pasteurella haemolytica* vaccine in bighorn sheep: Protection from experimental challenge. *J Wildl Dis* 34: 325–333.
- Rudolph KM, Hunter DL, Foreyt WJ, Cassirer EF, Rimler RB, et al. (2003) Sharing of *Pasteurella* spp. between free-ranging bighorn sheep and feral goats. *J Wildl Dis* 39: 897–903.
- Rudolph KM, Hunter DL, Rimler RB, Cassirer EF, Foreyt WJ, et al. (2007) Microorganisms associated with a pneumonic epizootic in Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*). *J Zoo Wildl Med* 38: 548–558.
- Weiser GC, DeLong WJ, Paz JL, Shafii B, Price WJ, et al. (2003) Characterization of *Pasteurella multocida* associated with pneumonia in bighorn sheep. *J Wildl Dis* 39: 536–544.
- Besser TE, Cassirer EF, Potter KA, VanderSchalie J, Fischer A, et al. (2008) Association of *Mycoplasma ovipneumoniae* infection with population-limiting respiratory disease in free-ranging rocky mountain bighorn sheep (*Ovis canadensis canadensis*). *J Clin Microbiol* 46: 423–430.
- Besser TE, EF Cassirer, MA Highland, P Wolff, A Justice-Allen, et al. (2012) Bighorn sheep pneumonia: Sorting out the cause of a polymicrobial disease. *Prev Vet Med* 108: 85–93.
- Besser TE, Cassirer EF, Yamada C, Potter KA, Herndon C, et al. (2012) Survival of Bighorn Sheep (*Ovis canadensis*) Commingling with Domestic Sheep (*Ovis aries*) in the Absence of *Mycoplasma ovipneumoniae*. *J Wildl Dis* 48: 168–172.
- Dassanayake RP, Shanthalingam S, Herndon CN, Subramaniam R, Lawrence PK, et al. (2010) *Mycoplasma ovipneumoniae* can predispose bighorn sheep to fatal *Mannheimia haemolytica* pneumonia. *Vet Microbiol* 145: 354–359.
- Blodgett R (2010) Bacteriologic Analytical Manual Appendix 2: Most Probable Number from Serial Dilutions. Washington DC. Available: <http://www.fda.gov/Food/FoodScienceResearch/LaboratoryMethods/ucm109656.htm>. Accessed 2014 Jul 24.
- Ziegler JC, Lahmers KK, Barrington GM, Parish SM, Kilzer K, et al. (2014) Safety and Immunogenicity of a *Mycoplasma ovipneumoniae* Bacterin for Domestic Sheep (*Ovis aries*). *PLoS One* 9(4): e95698.
- Herrmann LM, Cheevers WP, Marshall KL, McGuire TC, Hutton MM, et al. (2003) Detection of serum antibodies to ovine progressive pneumonia virus in sheep by using a caprine arthritis-encephalitis virus competitive-inhibition enzyme-linked immunosorbent assay. *Clin Diag Lab Immunol* 10: 862–865.
- Lawrence PK, Shanthalingam S, Dassanayake RP, Subramaniam R, Herndon CN, et al. (2010) Transmission of *Mannheimia haemolytica* from domestic sheep (*Ovis aries*) to bighorn sheep (*Ovis canadensis*): unequivocal demonstration with green fluorescent protein-tagged organisms. *J Wildl Dis* 46: 706–717; erratum, *J Wildl Dis* 46: 1346.



21. McAuliffe L, Hatchell FM, Ayling RD, King AI, Nicholas RA (2003) Detection of *Mycoplasma ovipneumoniae* in *Pasteurella*-vaccinated sheep flocks with respiratory disease in England. *Vet Rec* 153: 687–688.
22. Gentry MJ, Srikumaran S. (1991) Neutralizing monoclonal antibodies to *Pasteurella haemolytica* leukotoxin affinity purify the toxin from crude culture supernatants. *Microb Pathog* 10: 411–417.
23. Besser TE, Highland M, Baker K, Anderson NJ, Ramsey JM (2012) Causes of pneumonia epizootics among bighorn sheep, western United States, 2008–2010. *Emerg Infect Dis* 18: 406–414.
24. Petti CA (2007) Detection and identification of microorganisms by gene amplification and sequencing. *Clin Infect Dis* 44: 1108–1114.
25. Foreyt WJ, Jenkins EJ, Appleyard GD (2009) Transmission of lungworms (*Muellerius capillaris*) from domestic goats to bighorn sheep on common pasture. *J Wildl Dis* 45: 272–278.
26. Foreyt WJ, Lagerquist JE (1996) Experimental contact of bighorn sheep (*Ovis canadensis*) with horses and cattle, and comparison of neutrophil sensitivity to *Pasteurella haemolytica* cytotoxins. *J Wildl Dis* 32: 594–602.
27. Onderka DK, Rawluk SA, Wishart WD (1988) Susceptibility of Rocky Mountain bighorn sheep and domestic sheep to pneumonia induced by bighorn and domestic livestock strains of *Pasteurella haemolytica*. *Can J Vet Res* 52: 439–444.
28. Dassanayake RP, Shanthalingam S, Herndon CN, Lawrence PK, Cassirer EF, et al. (2009) *Mannheimia haemolytica* serotype A1 exhibits differential pathogenicity in two related species, *Ovis canadensis* and *Ovis aries*. *Vet Microbiol* 133: 366–371.
29. Subramaniam R, Shanthalingam S, Bavananthasivam J, Kugadas A, Potter KA, et al. (2011) A multivalent *Mannheimia-Bibersteinia* vaccine protects bighorn sheep against *Mannheimia haemolytica* challenge. *Clin Vaccine Immunol* 18: 1689–1694.
30. Foreyt WJ, Snipes KP, Kasten RW (1994) Fatal pneumonia following inoculation of healthy bighorn sheep with *Pasteurella haemolytica* from healthy domestic sheep. *J Wildl Dis* 30: 137–145.
31. Alley MR, Ionas G, Clarke JK (1999) Chronic non-progressive pneumonia of sheep in New Zealand - a review of the role of *Mycoplasma ovipneumoniae*. *N Z Vet J* 47: 155–160.
32. Desrosiers R (2011) Transmission of swine pathogens: different means, different needs. *Anim Health Res Rev* 12: 1–13.
33. Dassanayake RP, Call DR, Sawant AA, Casavant NC, Weiser GC, et al. (2010) *Bibersteinia trehalosi* inhibits the growth of *Mannheimia haemolytica* by a proximity-dependent mechanism. *Appl Environ Microbiol* 76: 1008–1013.
34. Shanthalingam S, Goldy A, Bavananthasivam J, Subramaniam R, Batra SA, et al. (2014) PCR assay detects *Mannheimia haemolytica* in culture-negative pneumonic lung tissues of bighorn sheep (*Ovis canadensis*) from outbreaks in the Western USA, 2009–2010. *J Wildl Dis* 50: 1–10.
35. Townsend KM, Frost AJ, Lec CW, Papadimitriou JM, Dawkins HJ (1998) Development of PCR assays for species- and type-specific identification of *Pasteurella multocida* isolates. *J Clin Microbiol* 36: 1096–1100.
36. Fisher MA, Weiser GC, Hunter DL, Ward ACS (1999) Use of a polymerase chain reaction method to detect the leukotoxin gene *lktA* in biogroup and biovariant isolates of *Pasteurella haemolytica* and *P. trehalosi*. *Am J Vet Res* 60: 1402–1406.
37. Rossi CR, Kiesel GK (1971) Microtiter tests for detecting antibody in bovine serum to parainfluenza 3 virus, infectious bovine rhinotracheitis virus, and bovine virus diarrhea virus. *Appl Microbiol* 22: 32–36.

## **MORTALITY DURING EPIZOOTICS IN BIGHORN SHEEP: EFFECTS OF INITIAL POPULATION SIZE AND CAUSE**

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# MORTALITY DURING EPIZOOTICS IN BIGHORN SHEEP: EFFECTS OF INITIAL POPULATION SIZE AND CAUSE

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**ABSTRACT:** One of the most severe threats to bighorn sheep (*Ovis canadensis*) populations is disease. With the objective of projecting possible epizootic consequences to bighorn sheep population dynamics, we examined 23 epizootic mortality episodes from presumably known causes that occurred in the United States and Canada from 1942 to 2005. These outbreaks were correlated with population size using regression models. Epizootic origins were documented by considering contact with a “new” pathogen for the bighorn sheep population or pneumonic processes, presumably triggered by stress. We suggest mortality rates are negatively related to population size in a logarithmic function, and offer a model to estimate the percentage of disease-related mortalities for a given population size of bighorn sheep. From a disease dynamics perspective, we suggest a minimum population of 188 bighorn sheep would be required to insure long-term persistence in the presence of epizootic disease.

**Key words:** Diseases, epizootics, *Ovis canadensis*, population size.

## INTRODUCTION

Bighorn sheep populations have decreased significantly in recent decades due mainly to habitat fragmentation and degradation, poaching, disease, urban development, and human recreational activities (Valdez and Krausman, 1999). The total population of bighorn sheep in Mexico (*Ovis canadensis mexicana*, *Ovis canadensis cremnobates*, and *Ovis canadensis weemsi*) is estimated between 5,500 and 8,800 animals (Medellín et al., 2005) distributed in Sonora, Baja California, and Tiburon Island. Bighorn sheep were extirpated from Nuevo León in the 1930s and from Chihuahua (Heffelfinger and Marquez-Muñoz, 2005) and Coahuila around the 1970s (Espinosa et al. 2006). Although conservation efforts, including reintroduction programs, are occurring in Chihuahua (Cassaigne, pers. obs.) and Coahuila (McKinney and Delgado-Villalobos, 2005; Sandoval and Espinosa-Treviño, 2001), the vast majority of the Mexican populations comprise only a few dozen individuals (Dirección General de Vida Silvestre, unpubl. data).

Although there is a general understand-

ing of the role diseases play in the survival of populations, in recent years this aspect has gained importance in the study, management, and conservation of wildlife. Disease has been considered the primary cause of many bighorn sheep population extinctions (Gross et al., 2000). Bighorn sheep are more susceptible than other sheep to a variety of pathogens that have been related to pneumonic epizootics with mortality rates of 25% to 100% (Onderka and Wishart, 1982; Jessup, 1985; Festa-Bianchet, 1988; Sandoval, 1988; Miller et al., 1991). The presence of domestic animals, especially domestic sheep (*Ovis aries*), adjacent to or in the same habitat as bighorn sheep increases the risk of transmission of pathogens that can be fatal for bighorn sheep (Ough and De Vos, 1986; Ramey et al., 2000). Additionally, animals that are restricted to small habitats or habitat fragments increase the possibility of retransmission of some diseases (Risenhoover et al., 1988) by remaining in contact with the sources of infection.

In addition to this increased susceptibility, several factors, including human

activities, the presence of domestic and feral livestock, climate change, and population isolation that can lead to local overgrazing, can provoke chronic stress, which decreases immune response (Pruett, 2003; Kemenya and Schedlowskib, 2007). Stress is a key factor that can increase the risk of an epizootic outbreak. Finally, the forced isolation in which many bighorn sheep populations exist (Allen, 1980) promotes inbreeding depression. Many researchers have suggested that detrimental characteristics associated with this process, such as the loss of evolutionary adaptability and the increase of disease can substantially increase risk of local extinction (O'Brien and Everman, 1988; Mills and Smouse, 1994; Saccheri et al., 1998).

Considering these factors, the need to understand the possible impact of epizootics among bighorn sheep populations of differing sizes is apparent. Specifically, we should be asking whether smaller populations have greater mortality rates than larger populations, and whether this places them at greater risk of extinction. Smaller populations may experience more direct contact among individuals, resulting in faster transmission rates of pathogens. Also, being gregarious, bighorn sheep might also become more stressed when living in reduced numbers.

This study was designed to determine the existence, type, and level of association between population size and mortality rate during epizootics in bighorn sheep populations. In addition, we estimate and suggest a minimum viable population size that considers disease, and evaluate possible risks of extinction of bighorn sheep populations related to epizootic events.

## MATERIALS AND METHODS

We compiled reports from the literature documenting disease outbreaks that lasted 1–15 yr in bighorn sheep populations of known size in North America. To define an epizootic event, we used 30% as the defining mortality level. Among documented epizootics of free-

ranging bighorn sheep populations that occurred in the USA and Canada, we used only those in which the initial population size, mortality rate, and presumed cause were reported. Mortality rates reported did not identify specific age or gender segments of the population. The time line we considered for the epizootic mortalities was as reported by the authors from the time when mortalities were first observed until the population was presumably no longer decreasing. From this analysis we identified two different potential origins of epizootics. The first were epizootics that originated from a suspected contact with a new or unknown pathogen to which bighorn sheep had no natural defenses. These included some *Pasteurella* and *Mannheimia* serotypes from domestic sheep and were considered as introduction of a new pathogen. Secondly, we considered epizootics that originated from pathogens that were most likely present in the population but disease may have been triggered by external stress. These were considered as stress-induced.

Scabies has been related to several epizootics but has also been detected in populations with no attributed mortalities (Sandoval, 1980; Welsh and Bunch, 1982; Boyce and Weisenberger, 2005). Therefore, we classified these epizootics based exclusively on the associated factors reported by the authors. If stress factors were described, we considered the epizootic as stress-induced, but if no other factor besides scabies was reported, we categorized it to be of new-pathogen origin. Epizootics where the possible origin seems to be related to both of the cited factors along with the presence of livestock were considered to be of mixed origin, and were considered only for the general analysis. Mortality percentages were graphed by the initial population size and a logarithmic regression line was fitted. This model was used because it stabilizes when a population is projected to infinity.

To calculate an estimated mortality rate for a specific population size, we converted the logarithmic model to a linear model to develop a more accurate estimation. The formulas obtained were applied to different hypothetical population sizes. Although the minimum viable population size for bighorn sheep is controversial, most researchers recommend a founder population of 41 to 125 animals (Berger, 1990; Ehrenfeld, 1994; Gross et al., 2000; Singer et al., 2000a, b, 2001). Management of the founder population may assist populations below that range to persist for the long term. However, for this analysis we considered 50 animals as the minimum size

for which a bighorn population would be able to recover after an epizootic event.

## RESULTS

Since the 1880s, at least 36<sup>''</sup> epizootic episodes have been documented in bighorn sheep populations from the USA and Canada. From these we analyzed 23 that had the information necessary for our analysis (Table 1). From the 23 episodes, 13 originated from a new pathogen. Of these, 84% were pneumonias derived from contact with domestic sheep, 8% were suspected to have resulted from contact with domestic sheep, and 8% were scabies where the population apparently had not been exposed previously. We found eight cases of epizootics triggered by stress. Of these, three (37%) were related to changes in weather (and two [25%] of these three were complicated with scabies), 3 (37%) were related to close human activities including capture events, and the remaining two (25%) were related to multiple factors such as the presence of cattle, human activities, population peaks, or extreme weather conditions (e.g., prolonged droughts, extreme low temperatures). Two cases were considered of mixed origin (Aravaipa Canyon [Mouton et al., 1991] 1989 and Hells Canyon ram 1995 [Cassirer et al., 1996]) and were counted only in the total epizootics analysis. In the case of the San Andres epizootic (Sandoval, 1980), we considered only the first years of the epizootic (1976–78), in which the most severe decline was observed. This event might be analyzed in the future as a case of continuing stress plus the presence of psoroptic scabies, which, after a period of more than 20 yr (1976–97) resulted in the decline of a population of more than 200 sheep to a single ewe (Boyce and Weisenberger, 2005). The remaining epizootics were considered in their total period of decline ( $\leq 15$  yr). All but two of the studies examined reported the duration of mortalities at  $\leq 5$  yr.

In the total epizootics analysis a negative logarithmic relationship was found

between population size before the epizootic (initial size) and the mortality in the epizootic (Fig. 1;  $r^2=0.4286$ ,  $SE=16.03$ ,  $P<0.01$ ). When dividing epizootics by their origin, we found no relationship for the new-pathogen origin but a negative logarithmic relationship for the stress-induced origin (Fig. 2;  $r^2=0.8055$ ,  $SE=14.9$ ,  $P<0.01$ ). In epizootics originated by stress, mortality rate was more predictable than when we considered total epizootics. For the estimated mortality rate related to a certain hypothetical population size, we used the equation obtained from the conversion of the logarithmic function to a linear model. Total epizootics estimations were based on the equation:  $y=85.0890+(-0.06293x)$ ;  $r^2=0.4283$ ;  $SE=4.84$ . Stress-induced epizootics estimations were based on the equation  $y=83.6310+(-0.07055x)$ ;  $r^2=0.7839$ ;  $SE=5.139$ .

To have a high probability of persisting, populations should consist of at least 173 animals to survive a stress-induced epizootic (Table 3) and 188 animals to survive a general epizootic (Table 2).

## DISCUSSION

The relationship between percentage of mortality and population size suggests that future minimum viable population size (MVP) for bighorn sheep should be greater than conventionally reported to account for the high risk of disease. Usually MVP considers only genetic, demographic, and environmental factors (Primack, 2001), and disease is considered as natural and predictable. Bighorn sheep are more susceptible than other ovine species to certain pathogens. The population impact of an epizootic may be great enough to affect population persistence through reduced recruitment and continuing mortality that may occur for 3–5 yr (Jessup, 1985; Gross et al., 2000). Such impacts could result in the local extinction of a population. Gross et al. (2000) demonstrated that disease was the most

TABLE 1. Epizootics and mortalities reported in bighorn sheep (*Ovis canadensis*) in the USA and Canada.

Epizootic date, place	Initial population/mortality (%) <sup>b</sup>	Associated disease/possible cause	Origin of epizootic	Reference
1881–85, Wyoming	U/U	Scabies	Unknown	Lange, 1980
1880–90, Montana	U/U	Scabies	Unknown	Lange, 1980
1870–80, Idaho	U/U	Scabies	Unknown	Goodson, 1982
1870–79, California	U/U	Scabies	Unknown	Lange, 1980
1900–20, Rock Creek, Montana	U/U	Not determined	Unknown	Goodson, 1982
1917–30, Rocky Mountain National Park, Colorado	U/U	Pneumonia	Unknown	Goodson, 1982
1916–22, Utah	U/U	Scabies	Unknown	Goodson, 1982
1925, Sun River, Montana	U/70	Not determined	Unknown	Goodson, 1982
1931, Colorado	U/U	Scabies	Unknown	Lange, 1980
1936, Oregon	U/U	Scabies	Unknown	Lange, 1980
1939, Kootenay National Park, British Columbia	U/U	Pneumonia	Unknown	Goodson, 1982
1942–50, Thompson Falls, Montana <sup>a</sup>	50/100	Contact with domestic sheep	New pathogen	Goodson, 1982
1950, Dinosaur National Monument, Colorado	U/100	Not determined	Unknown	Goodson, 1982
1965–70, Upper Rock Creek, Montana <sup>a</sup>	150/100	Pneumonia/contact with domestic sheep	New pathogen	Goodson, 1982
1965, Bull River, British Columbia <sup>a</sup>	250/97	Pneumonia/contact with domestic sheep	New pathogen	Goodson, 1982
1955–70, Big Hatchet, New Mexico <sup>a</sup>	125–150/84	Drought and other factors	Stress factors	Watts, 1979
1971, Black Gap Wildlife Management Area, Texas <sup>a</sup>	20/90	Pneumonia/stress when being released	Stress factors	Kilpatric, 1982
1976–78, San Andres National Wildlife Refuge, New Mexico <sup>a</sup>	200/67	Scabies/changes in weather	Stress factors	Sandoval, 1980
1980–81, Black Mountains, California and Nevada <sup>a</sup>	511/38	Scabies/drought, high population density	Stress factors	Welsh and Bunch, 1982
1980–81, Waterton Canyon, Colorado <sup>a</sup>	77/77	Pneumonia/human activities	Stress factors	Bailey, 1986
1981–82, Macquire Creek, British Columbia, Canada <sup>a</sup>	50/52	Pneumonia/contact with domestic sheep.	New pathogen	Goodson, 1982
1980, Lava Beds National Monument, California <sup>a</sup>	42/76	Pneumonia/capture stress	Stress factors	Blaisdell, 1982
1981, Mormon Mountains, Nevada <sup>a</sup>	600/50	Pneumonia/contact with domestic sheep	New pathogen	Jessup, 1981
1979–81, Methow Game Range, Washington <sup>a</sup>	14/93	Pneumonia/contact with domestic sheep	New pathogen	Foreyt and Jessup, 1982
1982, Wigvam, British Columbia, Canada <sup>a</sup>	300/50	Pneumonia/contact with domestic sheep	New pathogen	Goodson, 1982
1988, Warner Mountains, California <sup>a</sup>	65/100	Pneumonia/contact with domestic sheep	New pathogen	Weaver, 1989
1981, Latir Parks, New Mexico <sup>a</sup>	36/100	Pneumonia/contact with domestic sheep	New pathogen	Sandoval, 1988
1985, Sheep River Wildlife Sanctuary, Alberta <sup>a</sup>	250/54	Apparent pneumonia	Stress factors	Festa-Bianchet, 1988
1986, Lostine, Wallowa Mountains, Oregon <sup>a</sup>	97/70	Pneumonia/contact with domestic sheep	New pathogen	Coggins and Matthews, 1992
1988, Southeast Washington <sup>a</sup>	80/62	Scabies/contact with transplanted Rocky Mountain bighorn	New pathogen	Foreyt et al., 1990



TABLE 1. Continued.

Epizootic date, place	Initial population/mortality (%) <sup>b</sup>	Associated disease/possible cause	Origin of epizootic	Reference
1989, Aravaipa Canyon, Arizona <sup>a</sup>	195/59	Blue Tongue-EHD <sup>b</sup> /drought, cattle presence	Mixed origins	Mouton et al. 1991
1990–91, Whiskey Mountains, Dubois, Wyoming <sup>a</sup>	600–900/30–40	Pneumonia/cold temperatures	Stress factors	Ryder et al., 1992
1992–93, East Range, Nevada	U/U	Not determined	Unknown	Martin et al., 1996
1992–93, Desatoya Range, Nevada	U/U	Pneumonia	Unknown	Martin et al., 1996
1995, Hells Canyon, Washington and Oregon	700/50–75	Pneumonia/presence of cattle, goats, domestic sheep	Mixed origins	Cassirer et al., 1996
1997–2000, Kenosha and Tarryall Mountains, Colorado	250/50	Contact with domestic sheep	New pathogen	George et al., 2008
2005, Custer State Park, South Dakota <sup>a</sup>	200/75	Contact with domestic sheep	New pathogen	Freeman, 2006

<sup>a</sup> Epizootic analyzed for this study.

<sup>b</sup> U = unknown; EHD = epizootic hemorrhagic disease.

important factor influencing bighorn sheep population dynamics and in a similar study, Singer et al. (2001) suggested  $292 \pm 82$  animals as the minimum population size that would be able to recover from an epizootic. In the state of Sonora (excluding Tiburon Island) there are 46 bighorn ranges, which have been divided into seven wildlife management system units (SUMAS; Dirección General de Vida Silvestre, unpubl. data). These SUMAS are connected bighorn sheep ranges where these populations may have contact. Considering that populations have genetic flow between them, at least three of these units do not have populations above 188 animals. Our results indicate that 188 is the minimum population size that would not be at risk of extinction following an epizootic event.

Causes of bighorn population extinctions often can be associated with additional factors that are independent of stress or disease. Predation, for example, may be important, especially to smaller populations. Our analyses were based on historical epizootics and these complex

factors are present today. The information derived from these historic events were based on authors' knowledge of the initial population sizes and remaining numbers after the epizootic event, as well as the possible associated cause. Some of this information may not be as accurate as recent estimates. However, we consider that their observations were reliable for estimating a general mortality rate of the populations being studied.

Additional factors beyond population size should be considered. Current estimates of bighorn sheep populations in Mexico frequently are based on aerial survey data. Complex aspects such as population dynamics, probability of contact with domestic animals, inbreeding level, genetic flow among populations, and suitable habitat patch sizes are largely unknown. Many bighorn populations in Mexico are isolated and the loss of genetic variability can reduce population fitness through decreased reproductive ability and reduced immunologic capacity (Munson, 1993). These effects can increase mortality during an epizootic, increasing

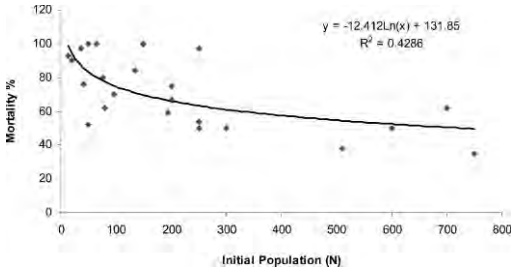


FIGURE 1. Negative logarithmic relationship found between initial population size and mortality in the analysis of total bighorn sheep epizootics (1942–2005).

the probability of population extinction. Although there are studies of the health status of bighorn sheep populations, there is insufficient information from serologic or mortality studies of Mexican bighorn sheep populations to fully understand the pathogens potentially associated with disease-related declines in these populations. The potential for disease transmission following translocations among resident populations is a factor rarely considered in Mexico. In many Wildlife Management and Utilization Units in Mexico, bighorn sheep are kept in proximity to cattle (2–5 km) and in some cases they are separated only by fences (Cassaigne, pers. obs.). Even though there is no direct contact between bighorn sheep and domestic animals, many diseases can be indirectly transmitted by vectors. Goats have been observed near two important bighorn sheep areas in Sonora State and may be associated with population declines in those areas (Lee, 2004). Goats or

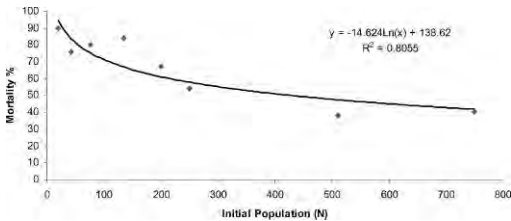


FIGURE 2. Negative logarithmic relationship found between initial population size and mortality in bighorn sheep epizootics induced by stress factors (1942–2005).

TABLE 2. Relationship between initial population size and the predicted mortality caused by epizootic events (see Materials and Methods for explanation of predictive model). For long-term persistence following an epizootic event (estimated remaining population  $\geq 50$ ), a minimum initial population size of  $\geq 188$  animals is required.

Initial population	Expected mortality (%)	Estimated remaining
20	80	4
50	82	9
150	75	37
<b>188</b>	<b>73</b>	<b>50</b>
200	72	56
250	69	77
300	69	102
500	53	235

cattle are present near bighorn sheep habitat and, in addition to increased potential for disease transmission, interactions with goats or cattle may also increase stress. Bissonette and Steinkamp (1996) reported avoidance of habitat by bighorn sheep when livestock were present. During an epizootic in Sierra del Viejo, Sonora, Mexico, the bighorn population decreased from 126 sheep in 1993 to 17 in 2003 (Lee, 2004). Specific causes for this decline are unknown and need to be understood to support management decisions related to Mexico’s bighorn sheep recovery program.

TABLE 3. Relationship between initial population size and predicted mortality caused by epizootic events originating from stress factors (see Materials and Methods for explanation of predictive model). For long-term persistence following an epizootic event, a minimum population size of 173 animals is required.

Initial population	Expected mortality (%)	Estimated remaining
20	82	3
50	80	10
150	73	40
<b>173</b>	<b>71</b>	<b>50</b>
200	69	62
250	66	85
300	62	114
500	48	260



Our suggested disease-based MVP size of 188 animals does not imply that smaller populations cannot survive after facing an epizootic event, but populations below that number may have lower probabilities of recovery and long-term persistence, and would probably require more intensive and costly management. On the other hand, populations above 188 animals also could become extinct, since additional factors such as inbreeding, habitat patch sizes, fragmentation, predation, and environmental conditions can increase mortality during an epizootic. Minimizing stress factors and avoidance of close contact with domestic sheep would decrease the probability of an epizootic; however, no bighorn sheep population can be considered entirely without risk.

Based on 2004 bighorn sheep population estimates by the wildlife department (Dirección General de Vida Silvestre, unpubl. data) in Sonora, our minimum population numbers suggests that only 42% of existing bighorn sheep would persist in the long term. The situation in the USA and Canada could be similar due to the fragmentation and isolation of many populations (Valdez and Krausman, 1999).

Information related to disease and population dynamics is needed to conserve and recover bighorn sheep populations in Mexico. Results from this study suggest that individual populations should be managed to exceed 170 animals but the causes and population factors (e.g., genetic variability, stress associated with live-stock contact, increased disease transmission on shared habitats with domestic animals) associated with epizootics need to be better defined to continue to refine and understand disease risks as they relate to long-term bighorn sheep management.

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#### LITERATURE CITED

- ALLEN, R. W. 1980. Natural mortality and debility. *In* The desert bighorn. Its life, history, ecology, and management. G. Monson and L. Sumner (eds.). University of Arizona Press, Tucson, Arizona. pp. 172–185.
- BAILEY, J. A. 1986. The increase and dieoff of Waterton Canyon bighorn sheep: Biology, management and dismanagement. *Proceedings of the Northern Wild Sheep and Goat Council* 5: 325–340.
- BERGER, J. 1990. Persistence of different-sized populations: An empirical assessment of rapid extinctions in bighorn sheep. *Conservation Biology* 4: 91–98.
- BISSONETTE, J. A., AND M. J. STEINKAMP. 1996. Bighorn sheep response to ephemeral habitat fragmentation by cattle. *Great Basin Naturalist* 56: 319–325.
- BLAISDELL, J. A. 1982. Lava beds wrap-up, what did we learn? *Desert Bighorn Council Transactions* 26: 32–33.
- BOYCE, W. M., AND M. E. WEISENBERGER. 2005. The rise and fall of psoroptic scabies in bighorn sheep in the San andres Mountains, New Mexico. *Journal of Wildlife Diseases* 41: 525–531.
- CASSIRER, F. E., L. OLDENBURG, V. COGGINS, P. FOWLER, K. RUDOLPH, D. HUNTER, AND W. J. FOREYT. 1996. Overview and preliminary analysis of a bighorn sheep dieoff, Hells Canyon 1995–96. *Proceedings of the Northern Wild Sheep and Goat Council* 10: 78–86.
- COGGINS, V. L., AND P. MATTHEWS. 1992. Lamb survival and herd status of the Lostine bighorn herd following a *Pasteurella* die-off. *Proceedings of the Northern Wild Sheep and Goat Council* 8: 147–154.
- EHRENFELD, D. 1994. Persistence and population size in mountain sheep: Why different interpretations? *Conservation Biology* 8: 617–618.
- ESPINOSA, T. A., A. SANDOVAL, AND B. A. CONTRERAS. 2006. Historical distribution of desert bighorn sheep (*Ovis canadensis mexicana*) in Coahuila, Mexico. *Southwestern Naturalist* 51: 282–288.
- FESTA-BIANCHET, M. 1988. A pneumonia epizootic in bighorn sheep, with comments on preventive management. *Proceedings of the Northern Wild Sheep and Goat Council* 6: 66–76.
- FOREYT, W. J., AND D. A. JESSUP. 1982. Fatal pneumonia of bighorn sheep following association with domestic sheep. *Journal of Wildlife Diseases* 18: 163–168.
- , V. L. COGGINS, AND P. FOWLER. 1990. Psoroptic scabies in bighorn sheep in Washing-

- ton and Oregon. Proceedings of Northern Wild Sheep and Goat Council 7: 135–142.
- FREEMAN, G. 2006. New threats and old standbys. North Dakota Outdoors. February, 2006. pp 8–13. <http://gf.nd.gov/multimedia/ndoutdoors/issues/2006/feb/docs/wildlife-diseases.pdf>. Accessed April 2010.
- GEORGE, J. L., D. J. MARTIN, P. M. LUKACS, AND M. W. MILLER. 2008. Epidemic pasteurellosis in a bighorn sheep population coinciding with the appearance of a domestic sheep. *Journal of Wildlife Diseases* 44: 399–403.
- GOODSON, N. J. 1982. Effects of domestic sheep grazing on bighorn sheep populations: A review. Proceedings of the Northern Wild Sheep and Goat Council 3: 287–313.
- GROSS, J. E., F. J. SINGER, AND M. MOSES. 2000. Effects of disease, dispersal, and area on bighorn sheep restoration. *Restoration Ecology* 8: 25–37.
- HEFFELFINGER, J. R., AND E. MARQUEZ-MUÑOZ. 2005. Historical occurrence and distribution of desert bighorn sheep in Chihuahua, Mexico. *Desert Bighorn Council Transactions* 48: 28–38.
- JESSUP, D. A. 1981. Pneumonia in bighorn sheep: Effects on populations. *California-Nevada Wildlife Society Transactions* 1981: 72–78.
- . 1985. Diseases of domestic livestock which threaten bighorn sheep populations. *Desert Bighorn Council Transactions* 29: 29–33.
- KEMENYA, M. E., AND M. SCHEDLOWSKIB. 2007. Understanding the interaction between psychosocial stress and immune-related diseases: A stepwise progression. *Brain Behavior and Immunity* 21: 1009–1018.
- KILPATRICK, J. 1982. Status of desert bighorn sheep in Texas—1982. *Desert Bighorn Council Transactions* 26: 102–104.
- LANGE, R. E., JR. 1980. Psoroptic scabies in wildlife in the United States and Canada. *Desert Bighorn Council Transactions* 24: 18–20.
- LEE, R. 2004. A 10-year view of wild sheep management in Sonora, Mexico. Report prepared for Dirección General de Vida Silvestre, Secretaría de Medio Ambiente y Recursos Naturales, Mexico, D. F., Mexico, 3 pp.
- MARTIN, K. D., T. SCHOMMER, AND V. L. COGGINS. 1996. Literature review regarding the compatibility between bighorn and domestic sheep. Proceedings of the Northern Wild Sheep and Goat Council 10: 72–77.
- McKINNEY, B. R., AND J. DELGADILLO-VILLALOBOS. 2005. Desert bighorn sheep reintroduction in Maderas del Carmen, Coahuila, Mexico. *Desert Bighorn Council Transactions* 48: 46–49.
- MEDELLIN, R. A., C. MANTEROLA, M. VALDEZ, D. G. HEWITT, D. DOAN-CRIDER, AND T. E. FULBRIGHT. 2005. History, ecology, and conservation of the pronghorn antelope, bighorn sheep, and black bear in Mexico. In *Biodiversity conservation in Northern Mexico*, J. L. Cartron and G. Ceballos (eds.). University of New Mexico Press, Albuquerque, New Mexico. pp. 387–404.
- MILLER, M. W., T. HOBBS, AND E. S. WILLIAMS. 1991. Spontaneous pasteurellosis in captive Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*): Clinical, laboratory, and epizootiological investigations. *Journal of Wildlife Diseases* 27: 534–542.
- MILLS, L. S., AND P. E. SMOUSE. 1994. Demographic consequences of inbreeding in remnant populations. *American Naturalist* 144: 412–431.
- MOUTON, R. J., R. M. LEE, AND R. J. OLDING. 1991. A desert bighorn sheep decline in Aravaipa Canyon, Arizona. *Desert Bighorn Council Transactions* 35: 18–19.
- MUNSON, L. 1993. Inbreeding and disease in captive wild animals. In *Zoo and wild animal Medicine. Current therapy* 3. 3rd Edition, M. E. Fowler (ed.). W. B. Saunders Company Ltd., Philadelphia, Pennsylvania. pp. 73–79.
- O'BRIEN, S. J., AND J. F. EVERMAN. 1988. Interactive influence of infectious disease and genetic diversity in natural populations. *Trends in Ecology and Evolution* 3: 254–259.
- ONDERKA, D. K., AND W. D. WISHART. 1982. Experimental contact transmission of *Pasteurella haemolytica* from clinically normal domestic sheep causing pneumonia in Rocky Mountain bighorn sheep. *Journal of Wildlife Diseases* 24: 663–667.
- OUGH, W. D., AND J. C. DE VOS. 1986. Intermountain travel corridors and their management implications for bighorn sheep. *Desert Bighorn Council Transactions* 28: 32–36.
- PRIMACK, R. 2001. Problemas de las poblaciones pequeñas. In *Fundamentos de conservación biológica. Perspectivas latinoamericanas*, R. Primack, R. Roíz, P. Feinsinger, R. Dirzo and F. Massardo (eds.). Fondo de Cultura Económica, México D.F., pp. 363–383.
- PRUETT, S. B. 2003. Stress and the immune system. *Pathophysiology* 9: 133–153.
- RAMEY, R. R., G. LUIKART, AND F. J. SINGER. 2000. Genetic bottlenecks resulting from restoration efforts: The case of bighorn sheep in Badlands National Park. *Restoration Ecology* 8: 85–90.
- RISENHOOVER, K. L., J. A. BAILEY, AND L. A. WAKELYN. 1988. Assessing the Rocky Mountain bighorn sheep management problem. *Wildlife Society Bulletin* 16: 346–352.
- RYDER, T. J., E. S. WILLIAMS, K. MILLS, K. H. BOWLES, AND T. E. THORNE. 1992. Effects of pneumonia on population size and lamb recruitment in Whiskey Mountain bighorn sheep. Proceedings of the Northern Wild Sheep and Goat Council 8: 136–146.
- SACCHERI, I., M. KUUSARI, M. KANKARE, P. VIKMAN, W. FORTELIUS, AND I. HANSKI. 1998. Inbreeding and extinction in a butterfly population. *Nature* 392: 491–494.

- SANDOVAL, A. V. 1980. Management of a psoroptic scabies epizootic in bighorn sheep (*Ovis canadensis mexicana*) in New Mexico. *Desert Bighorn Council Transactions* 24: 21–28.
- . 1988. Bighorn sheep die-off following association with domestic sheep: Case history. *Desert Bighorn Council Transactions* 32: 36–38.
- , AND A. ESPINOSA-TREVIÑO. 2001. Status of the bighorn sheep management programs in Coahuila, Mexico. *Desert Bighorn Council Transactions* 45: 53–61.
- SINGER, F. J., C. M. PAPOUCHISA, AND K. K. SYMONDS. 2000a. Translocation as a tool for restoring populations of bighorn sheep. *Restoration Ecology* 8: 6–13.
- , V. C. BLEICH, AND M. A. GUDORF. 2000b. Restoration of bighorn sheep metapopulations in and near Western national parks. *Restoration Ecology* 8: 14–24.
- , L. C. ZEIGENFUSS, AND L. SPICER. 2001. Role of patch size, disease, and movement in rapid extinction of bighorn sheep. *Conservation Biology* 15: 1347–1354.
- VALDEZ, R., AND P. R. KRAUSMAN. 1999. Description, distribution, and abundance of mountain sheep in North America. In *Mountain sheep of North America*, R. Valdez and P. R. Krausman (eds.). University of Arizona Press, Tucson, Arizona. pp. 3–19.
- WATTS, T. J. 1979. Status of the Big Hatchet desert sheep population, New Mexico. *Desert Bighorn Council Transactions* 23: 92–94.
- WEAVER, R. A. 1989. Status of bighorn sheep in California. 1988. *Desert Bighorn Council Transactions* 33: 11–13.
- WELSH, G. W., AND T. D. BUNCH. 1982. Three-year observation of psoroptic scabies in desert bighorn sheep from northwestern Arizona. *Desert Bighorn Council Transactions* 26: 42–44.

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# Spatio-temporal dynamics of pneumonia in bighorn sheep

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## Summary

1. Bighorn sheep mortality related to pneumonia is a primary factor limiting population recovery across western North America, but management has been constrained by an incomplete understanding of the disease. We analysed patterns of pneumonia-caused mortality over 14 years in 16 interconnected bighorn sheep populations to gain insights into underlying disease processes.

2. We observed four age-structured classes of annual pneumonia mortality patterns: all-age, lamb-only, secondary all-age and adult-only. Although there was considerable variability within classes, overall they differed in persistence within and impact on populations. Years with pneumonia-induced mortality occurring simultaneously across age classes (i.e. all-age) appeared to be a consequence of pathogen invasion into a naïve population and resulted in immediate population declines. Subsequently, low recruitment due to frequent high mortality outbreaks in lambs, probably due to association with chronically infected ewes, posed a significant obstacle to population recovery. Secondary all-age events occurred in previously exposed populations when outbreaks in lambs were followed by lower rates of pneumonia-induced mortality in adults. Infrequent pneumonia events restricted to adults were usually of short duration with low mortality.

3. Acute pneumonia-induced mortality in adults was concentrated in fall and early winter around the breeding season when rams are more mobile and the sexes commingle. In contrast, mortality restricted to lambs peaked in summer when ewes and lambs were concentrated in nursery groups.

4. We detected weak synchrony in adult pneumonia between adjacent populations, but found no evidence for landscape-scale extrinsic variables as drivers of disease.

5. We demonstrate that there was a >60% probability of a disease event each year following pneumonia invasion into bighorn sheep populations. Healthy years also occurred periodically, and understanding the factors driving these apparent fade-out events may be the key to managing this disease. Our data and modelling indicate that pneumonia can have greater impacts on bighorn sheep populations than previously reported, and we present hypotheses about processes involved for testing in future investigations and management.

**Key-words:** bacterial pneumonia, livestock-wildlife interface, Markov model, time series

## Introduction

Over the past 20 years, considerable advances have been made in understanding the spatio-temporal patterns of disease persistence and fade-out following invasion into susceptible host populations. Infections that generate

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rapid mortality such as Ebola virus, burn through susceptible populations until there are no more hosts and effectively die out (Sanchez *et al.* 2001). Infections with a strong immunizing effect, such as measles in England and Wales, persist in populations and exhibit biannual epidemic peaks that coincide with the birth and aggregation of sufficient susceptibles (Bjørnstad & Grenfell 2008). The dynamics of strong immunizing or fatal infections can leave a distinct spatio-temporal signature, although an infection that results in predictable disease in one instance, may appear almost chaotic in another setting; for example, contrast the dynamics of measles in the UK and Niger (Ferrari *et al.* 2008). Describing these spatio-temporal patterns can reveal underlying processes and this approach can be especially important in understanding infections that have recently invaded a population where the transmission routes or aetiological agents are not clear (Cleaveland *et al.* 2007). In this article, we examine the spatio-temporal dynamics of pneumonia in bighorn sheep, where the disease has been described for at least 80 years (Rush 1927), but debate continues about the identities and roles of causal agents, and disease remains an important factor limiting recovery of populations.

Bighorn sheep (*Ovis canadensis*) are social, sexually dimorphic ungulates. The species commonly occurs in spatially structured, demographically independent, interconnected populations in steep, rugged terrain. Males and females pursue different life-history strategies (Bleich *et al.* 1996; Rubin, Boyce & Caswell-Chen 2002). Interactions between the sexes are concentrated around the breeding season which is relatively short in northern latitudes and high altitudes (Bunnell 1982; Thompson & Turner 1982; Bleich, Bowyer & Wehausen 1997; Valdez & Krausman 1999). Seasonal breeding also governs contact patterns between age classes, and each year a pulse of neonates is reared in female-juvenile nursery groups. Outside the breeding season, mature males and females generally occur in male-only, female-only or female-offspring associations. Males are more mobile and more likely than females to contact conspecific hosts in adjacent populations, or potential disease reservoirs such as domestic sheep (Bleich, Bowyer & Wehausen 1997; Rubin *et al.* 1998; DeCesare & Pletscher 2006).

Pneumonia is a significant factor limiting the distribution and abundance of bighorn sheep (Gross, Singer & Moses 2000; Cassirer & Sinclair 2007; Boyce *et al.* 2011). The disease is associated with infection by directly transmitted bacteria, principally thought to be *Mycoplasma ovipneumoniae* and *Mannheimia haemolytica*, but, as is often the case with pneumonia, the precise aetiology remains unclear (Foreyt, Snipes & Kasten 1994; Besser *et al.* 2008, 2012b; Dassanayake *et al.* 2009, 2010). Initially, infection probably originates in domestic sheep, but once it has spilled over into bighorn sheep populations it is most likely maintained in the population and spread by bighorn sheep. Bighorn sheep appear highly susceptible to infection from domestic sheep: nearly all (98%) of a total of 90 bighorn sheep that were co-pastured with domestic

sheep in 11 experimental commingling studies conducted between 1979 and 2009 died of pneumonia within 100 days, while the domestic sheep remained healthy (summarized in Besser *et al.* (2012a). Although these captive experimental results support field observations by naturalists and field biologists (Grinnell 1928; Shillenger 1937; Goodson 1982; George *et al.* 2008), they do not replicate the range of demographic variation in pneumonia events observed under natural conditions. Pneumonia described in free-ranging bighorn sheep populations includes acute die-offs with wide ranges in all-age mortality (10–90%), chronic or sporadic low levels of adult mortality, and annual or sporadic epizootics with high mortality rates restricted to juveniles from 1 to many (>20) years following all-age outbreaks (Rush 1927; Jorgenson *et al.* 1997; Aune *et al.* 1998; Enk, Picton & Williams 2001; Hnilicka *et al.* 2002). The aim of this paper was to use empirical data to describe these mortality patterns in detail and to develop hypotheses about the underlying processes involved. Indeed, a lack of data has so far constrained models of pneumonia dynamics in bighorn sheep (Hobbs & Miller 1992; Gross, Singer & Moses 2000; Clifford *et al.* 2009; Cahn *et al.* 2011). Our objective was to develop an understanding of the disease that will ultimately aid in identifying and assessing intervention options.

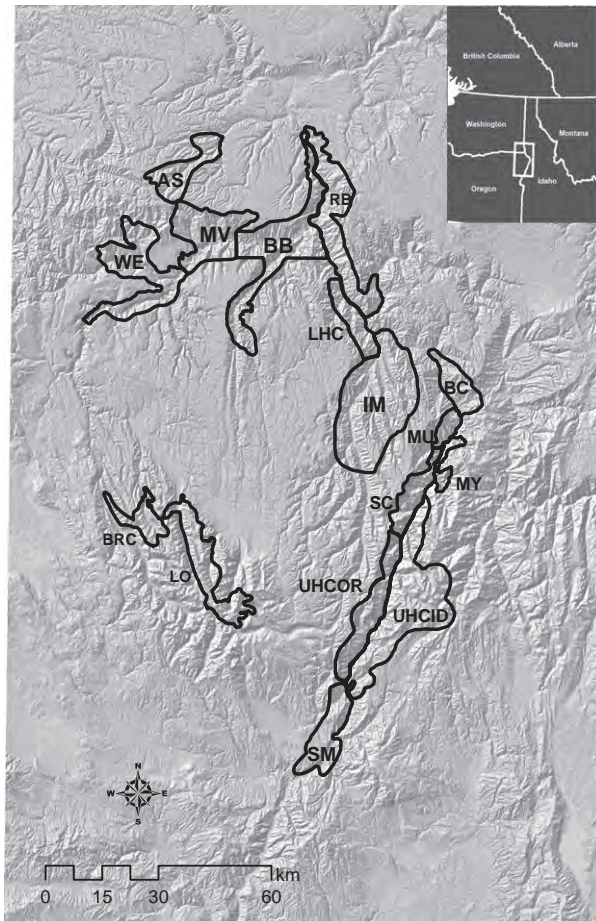
## Materials and methods

### STUDY AREA

We studied bighorn sheep in a 22 732 km<sup>2</sup> area encompassing Hells Canyon of the Snake River in the Blue Mountain and Columbia Plateau ecoregions of Idaho, Oregon and Washington (–117.875°, 46.500° to –116.250°, 44.750°, Fig. 1). Bighorn sheep occupy three climate zones within this diverse area from lowest to highest elevation: Snake River, Blue Mountains and Wallowa Mountains. The low elevation Snake River canyon is warm and dry with temperatures averaging 17.6 °C at Lewiston, ID. Average annual precipitation of 31.4 cm occurs fairly evenly year-round except during the months of July and August. The adjacent uplands including the Blue Mountains in Washington, are cooler and wetter with average temperatures of 10 °C in Pomeroy, Washington (WA) and average annual precipitation of 61 cm at Asotin, WA and 66 cm in Pomeroy. The upper elevations in the Wallowa and Seven Devils mountains receive annual precipitation of up to 205 cm, over two-thirds of which occurs as snow. Temperature averages 7 °C at the base of the Wallowa Mountains in Enterprise, OR and annual precipitation averages 76 cm. Seasonal temperature patterns in all three climate zones are similar, with highs in July and August and lows in December and January (Johnson & Simon 1987; Western 2008).

Bighorn sheep are native to Hells Canyon, but were extirpated by 1945, probably through a combination of unregulated hunting, competition with livestock for forage and diseases introduced from domestic sheep (Smith 1954; Johnson 1980; Coggins & Matthews 1996). From 1971 to 1995, wildlife agencies in Idaho, Oregon and Washington translocated a total





**Fig. 1.** Distribution of the 16 bighorn sheep populations in the Hells Canyon metapopulation, Idaho, Oregon and Washington. AS = Asotin; WE = Wenaha; BB = Black Butte; BC = Big Canyon; BRC = Bear Creek; IM = Imnaha; LHC = Lower Hells Canyon; LO = Lostine; MU = Muir; MV = Mountain View; MY = Myers Creek; RB = Redbird; SC = Upper Saddle Creek; SM = Sheep Mountain; UHCID = Upper Hells Canyon, Idaho; UHCOR = Upper Hells Canyon, Oregon.

of 329 bighorn sheep into Hells Canyon and moved 79 within the metapopulation, establishing 12 interconnected populations prior to our study (Figure S1). Another four populations were established and one population supplemented with translocations 1997–2005, during our study. Populations were delineated by movement patterns of females (Rubin *et al.* 1998). Females rarely move between populations whereas males may move seasonally or disperse among populations. Periodic pneumonia outbreaks were documented prior to this study, although monitoring was sporadic and most pneumonia events were documented following reports of sick and dying sheep. Over the same time period, domestic sheep grazing declined dramatically. However, reduced numbers of domestic sheep and goats continue to graze intermittently on public and private lands. Active management is ongoing to prevent contact between species: 22 bighorn sheep, five domestic goats and three domestic sheep were removed from areas where there was risk of contact during the study, nonetheless, some potential for disease transmission from domestic sheep and goats existed for all bighorn sheep populations throughout the study.

## MONITORING

In 1995 and 1996, all-age pneumonia outbreaks occurred in five populations in the northern part of the project area (Cassirer *et al.* 1996). In 1997, we started monitoring movements and survival of radio-collared bighorn sheep in three of these populations (Redbird, Black Butte and Wenaha) as part of an unsuccessful vaccination trial to improve lamb survival (Cassirer *et al.* 2001). We collared animals in additional populations in 1998, 1999, 2000, 2006 and 2010 including animals that were translocated and, as animals left the study due to death or were censored due to radio failure, we replaced them by collaring new individuals.

State wildlife agencies have conducted periodic ground and aerial surveys since initial reintroductions in 1971. Between 1997 and 2010, annual helicopter surveys were conducted between February and April. Visibility of sheep is high (87%), as determined by detection of radio-collared animals (Idaho Fish and Game data) and population estimates were derived by combining helicopter counts with observations from ground and observations from fixed-wing monitoring of radio-collared animals. Most lambs were born in May and we conducted our population analyses on a biological year, May–April. Annual exponential rate of population increase was calculated as  $r = \ln(N_t/N_{t-1})$ . During this period, 735–900 bighorn sheep were estimated to occur within the metapopulation. Estimated population sizes ranged from 5 to 190, with a median of 35.

We calculated annual adult survival by sex as the proportion alive in May that survived to the following May in populations with at least five radio-collared animals. Summer lamb survival was the proportion of known offspring of radio-collared ewes that survived until October (approximately to weaning). We classified a female as having a lamb when she was observed alone with, or nursing a lamb. We assumed lambs were dead when the female was no longer associating with a lamb. We located dead lambs through visual observation. We defined recruitment as the ratio of lambs to ewes recorded in the annual February–April surveys.

We located radio-collared sheep at least bi-weekly from the ground or from fixed-wing aircraft. We located females up to several times per week during lamb-rearing to monitor productivity and lamb survival. Radiocollars were equipped with a motion-sensitive switch. When no movement was detected for 4 h, the switch was activated and we conducted an investigation on site and collected the entire carcass or tissue samples for analysis at the Washington Animal Disease and Diagnostic Laboratory (WADDL), Washington State University, Pullman. On the basis of site investigations and necropsy results, we classified causes of death as disease, predation, accident or injury, human-caused or unknown. We censored animals that died within 30 days of capture and animals translocated to Hells Canyon did not enter the study until the start of the biological year following translocation (2–4 months following release).

## PATHOLOGY

We based diagnoses of pneumonia on gross and histological examination of lung tissue at WADDL. Gross features used to diagnose pneumonia included consolidation, presence of lung adhesions, abscesses, bronchiectasis or pleuritis. Affected areas of the lung were characterized by tissue colour, consistency and ability to float in formalin. Histological features of acute pneumonia included fibrin and oedema, increased presence of pulmonary macrophages, neutrophils, necrotic neutrophils,

necrosis, haemorrhage and bacterial colonies in lung tissue. Chronic pneumonia was characterized by the presence of fibrosis, abscesses or bronchiectasis. Bronchiolar epithelial hyperplasia and peribronchiolar lymphocytic infiltrates in the absence of fibrosis or abscessation was designated as subacute pneumonia. Severity (mild, moderate or severe) was based primarily on the percentage of both right and left lung fields affected on gross examination. Severity assessed by histopathology was based on the total percentage of affected tissue on individual sections of lung. Five to 15% total affected lung or tissue was considered mild, > 15–50% was moderate and > 50% was severe.

#### HEALTH STATUS

We used confirmed and suspected (for lambs) pneumonia-caused mortalities to characterize the seasonality, duration and intensity of four types of pneumonia events by population and year: (i) all-age pneumonia, (ii) secondary all-age pneumonia, (iii) adults only, and (iv) lambs only. We classified a population-year as healthy if animals were radiocollared in the population, but we did not detect any pneumonia in adults or detect or suspect pneumonia in lambs as described in the results.

#### ANALYSIS

We used Mann–Whitney's *U* test and Wilcoxon's Rank Sum (Siegel & Castellan 1988) to compare median survival rates of adults and juveniles and population growth by health class due to lack of normality in the data (Shapiro-Wilks test  $P < 0.0001$ ). We analysed seasonal patterns in lamb survival to weaning by translocation status and climate zone with Kaplan–Meier estimates and log-rank tests (Kaplan & Meier 1958).

We fit Bayesian survival models to analyse the effect of pneumonia on the daily mortality risk from birth to 140 days in lambs. Starting at day 0 (birth), we used a piecewise-constant hazard approach where the instantaneous daily mortality hazard,  $h(a)$ , was assumed to be constant for each day. Daily hazard estimates were smoothed using a first order conditional autoregressive approach,  $h(a) = \exp(\beta + y(a))$ , where  $\beta$  is a global intercept with an improper flat prior distribution and  $y(a)$  was specified using the *car.normal* function in WinBUGS assuming a *Uniform*(0,10) hyperprior on  $\sigma$ , and  $\tau$ , the *car.normal* precision parameter, set equal to  $\frac{1}{\sigma^2}$  (Besag, York & Mollie 1991; Heisey *et al.* 2010). We used Markov chain Monte Carlo methods to generate separate posterior distributions for daily mortality hazards by health class (pneumonia or healthy). We ran three Markov chains for 100 000 iterations, discarded the first 50 000 steps, and thinned the remaining steps so that our posterior included every 10th iteration. The Markov chains readily converged (Gelman-Rubin statistic  $\leq 1.13$  for healthy years, and  $\leq 1.02$  for pneumonia-years). Further details are provided in Appendix S1.

To identify significant seasonal clustering in adult pneumonia mortalities, we fit a logistic regression model to a series of seasons. The response was a binomial equal to the proportion of adult pneumonia mortalities occurring in that season weighted by month, and the predictor was a binary season indicator for 'summer' or 'winter'. We varied the months categorized as summer by starting with the lamb-rearing months, May–August, and classifying all other months as 'winter' and systematically extended the endpoints of the summer season. We present the grouping that showed the greatest difference between seasons.

In populations where we documented pneumonia during the study (we excluded the healthy Asotin and Upper Saddle Creek populations), we used health status in the current year (a categorical predictor taking on separate values for all-age pneumonia, adult-only pneumonia, lamb-only pneumonia or healthy, with healthy as the baseline) as a predictor for future pneumonia (coded as 0 if the next year was healthy, and 1 otherwise). To test for differences among translocated and resident populations, logistic regression models were of the form,  $\frac{\pi(x)}{1-\pi(x)} = e^{\alpha_i + \beta X_i}$  where  $e^{\alpha_i}$  is the odds of pneumonia this year given last year's health status and  $e^{\beta X_i}$  is the multiplicative adjustment to these odds accounting for the population's translocation status,  $X_i$  (an indicator taking on the value 0 for resident populations and 1 for translocated populations). We used Firth's bias-reduction technique for complete separation (Firth 1993) because we always observed pneumonia the year following all-age pneumonia.

We estimated annual transition probabilities between pneumonia classes for populations that had experienced epizootics by building a matrix from the frequency of transitions between classes during the study. Since the transition matrix was regular and irreducible (any state could potentially transition to any other state), we derived the stationary distribution by repeatedly multiplying the probability transition matrix by itself until row values converged (*c.* 15 iterations) (Taylor & Karlin 1998).

To assess the evidence for spatial synchrony of pneumonia, we used logistic regression to evaluate the influence of pneumonia status in neighbouring populations on a population's odds of pneumonia. We calculated centroids of 95% contours of fixed kernel home ranges of radiolocations of resident animals by population in Hawth's Tools (Beyer 2004) and ArcMap 9.3 (ESRI 2008). We defined a population's neighbours to be all populations with centroids within a designated Euclidean distance (from 10 to 70 km) of the population of interest. Pneumonia in neighbours was a categorical predictor that took on the value 1 if any neighbouring population had pneumonia in the year of interest, and 0 otherwise. We included years when pneumonia was known to be present in the neighbourhood, even if some neighbours were not sampled. We recognize that our probability of detecting pneumonia was less than 1, so we excluded data points (range from 26 to 53% of points at each distance category) where no pneumonia was detected in neighbours, but not all neighbours were sampled. Since a population's pneumonia status in year  $t-1$  altered its pneumonia odds in year  $t$ , we included last year's pneumonia status in both the population of interest and the neighbouring populations as predictors in the models. To evaluate the effect of translocations, we added an indicator variable for translocated populations in the neighbourhood.

Data were analysed in the R statistical computing environment (R Development Core Team, 2008) through the *lme4* (Bates, Maechler & Dai 2008) and *logistf* (Pioner *et al.* 2006) packages. The lamb mortality hazard model was fit in WinBUGS version 1.4 (Lunn *et al.* 2000) through R version 2.13.0 using the *R2WinBUGS* package (Sturtz, Ligges & Gelman 2005).

## Results

### PNEUMONIA IN ADULTS

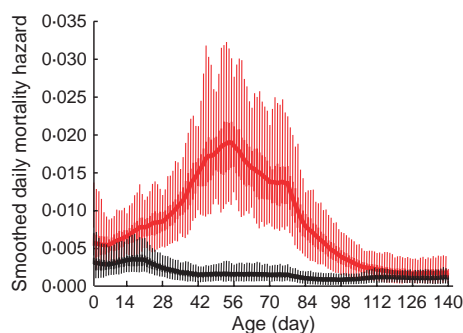
Between 1997 and 2010, 477 bighorn sheep were radiocollared (313F, 164M) in 14 populations (Fig. 1) and monitored for a total of 141 population-years (1–14 years

per population). On average, 117 radio-collared adults (range 35–146) were monitored each year, with a median of 24% (range 5–100%) of adults collared in each study population (Table S1). This included 339 resident sheep monitored for 1220 sheep-years. Another 104 sheep translocated to Hells Canyon from presumably healthy populations in British Columbia, Alberta and Montana 1997–2002, and 34 sheep that were moved within the Hells Canyon metapopulation 1999–2005 were monitored for a total of 459 sheep-years. The translocations established the Big Canyon, Muir Creek, and Myers Creek and Saddle Creek populations, and supplemented existing populations at Asotin, Upper Hells Canyon Oregon, Lostine and Bear Creek (Table S1 and Figure S1).

We determined a cause of death for 179 of 264 radio-collared bighorn sheep (94M, 170F) that died and 53 (30%) were diagnosed with bacterial pneumonia (17M, 36F). We also found 12 (8M, 4F) unmarked dead adult sheep that were diagnosed with bacterial pneumonia. Pneumonia-caused mortality of radio-collared sheep was 27% (28 of 104) of translocated animals and 7% of radio-collared resident animals (25 of 339,  $\chi^2 = 28.87$ , 1 d.f.,  $P < 0.01$ ).

#### PNEUMONIA IN LAMBS

We submitted 129 unmarked dead lambs from 14 populations for necropsy and euthanized 11 live lambs in four populations. We determined a cause of death for 104 lambs and 92 (88%) were diagnosed with pneumonia including 9 of 11 euthanized lambs (Besser *et al.* 2008). Although juveniles of all ages died from pneumonia, most mortality was prior to weaning, between 4 and 14 weeks of age (Fig. 2). We found no differences in the summer survival distribution functions of lambs in years with pneumonia among the Snake River, Blue Mountains and Wallowa Mountains climate zones ( $\chi^2 = 0.1$ , 2 d.f.,



**Fig. 2.** Daily mortality hazard from 0 to 140 days of lambs born to radio-collared ewes in population-years where no pneumonia was documented (in black, 267 lambs) and where pneumonia was diagnosed (in red, 262 lambs). Solid line is the smoothed daily hazard, dark and light bars represent 50% and 95% credible intervals from a conditional autoregressive model. The 95% credible intervals for lamb hazards in pneumonia and healthy population-years did not overlap between the ages of 27 and 101 days.

$P = 0.97$ ) or between lambs of translocated and resident ewes ( $\chi^2 = 1.5$ , 1 d.f.,  $P = 0.23$ ).

Due to the difficulty of detecting freshly dead unmarked lambs in a large, relatively inaccessible and rugged landscape, we assigned a class of ‘suspected pneumonia’ in lambs based on (1) the distinct temporal signature of documented pneumonia-induced mortality in 37 lamb-only or secondary all-age population-years (Fig. 2); and (2) observations of clinical signs of pneumonia including lethargy, coughing, nasal discharge and discovery of intact dead lambs that were too autolysed for diagnosis. We were conservative in assigning the suspected class of pneumonia to lambs. Median summer lamb survival and recruitment (lamb : ewe ratio) were higher or did not differ in population-years with documented vs. suspected pneumonia (Fig. 3).

#### HISTOPATHOLOGY

Lung lesions observed at necropsy included acute fibrinous bronchopneumonia and pleuritis, sub-acute broncho-interstitial pneumonia with lymphocytic cuffing of airways and bronchiolar hyperplasia, and chronic pneumonia with fibrosis and abscessation. Acute lesions were observed in approximately half of the mortalities regardless of age class (30 of 65 adults and 33 of 66 lambs). Chronic lesions were present in about half (33) of the adult mortalities compared with about a quarter of the lambs (15). Sub-acute lesions were more common in lambs ( $n = 18$ , 27%) than in adults ( $n = 2$ , 3%).

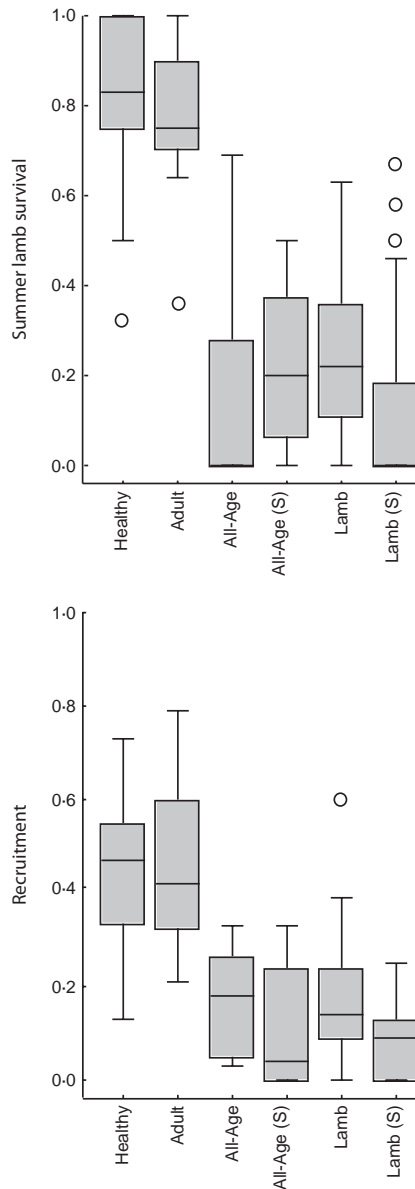
#### SEASONAL PATTERNS

There was no difference between sexes in monthly patterns of pneumonia-caused adult mortality ( $\chi^2 = 6.77$ , d.f. = 11,  $P = 0.82$ ). In both sexes, the odds of pneumonia-caused mortalities were almost three times higher between October and February than during the rest of the year (odds ratio 2.85, 95% CI 1.7–4.8,  $P < 0.0001$ ). The seasonal pattern was driven by mortalities with acute lesions (odds ratio 4.29, 95% CI 1.7–10.9,  $P = 0.002$ ). Deaths of animals with chronic lesions were more evenly distributed across seasons (odds ratio 1.9, 95% CI 1.0–4.0,  $P = 0.05$ ). No acute pneumonia was detected in adults between May and July, the period when most (80%) pneumonia mortalities were detected in lambs. Peak pneumonia mortalities in lambs at 1–3 months of age corresponded to the period when ewes congregated in nursery groups and mortalities associated with pneumonia in adults peaked during the breeding season when mixed sex group sizes were largest (Fig. 4).

#### TEMPORAL AND SPATIAL PATTERNS

Pneumonia was detected or suspected in 33–77% of the study populations each year. Two populations remained healthy throughout the study: Asotin and Saddle

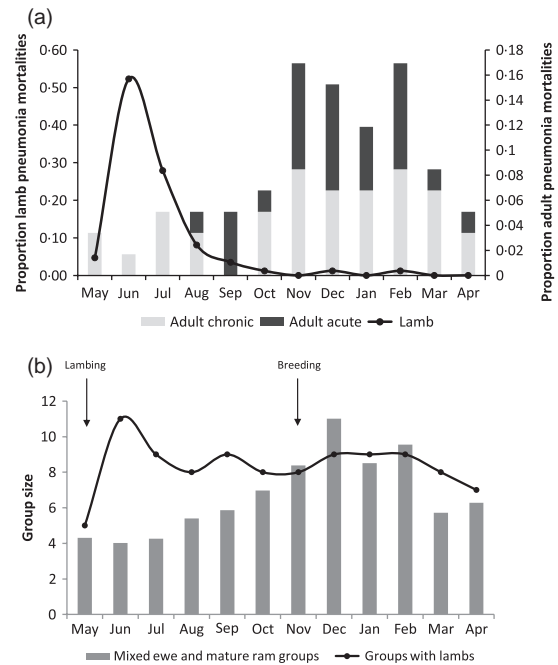




**Fig. 3.** Summer lamb survival and recruitment in healthy, adult-only, all-age and lamb pneumonia-years vs. suspected all-age or lamb pneumonia-years. The horizontal line denotes the median, the box encloses 50% of the observations and the whiskers show the 2.5th and 97.5th percentiles. Median summer lamb survival and recruitment did not differ significantly between all-age pneumonia population-years when pneumonia was detected in both adults and lambs and population-years when pneumonia was detected in adults and suspected in lambs ( $W \leq 48$ ,  $P > 0.10$ ).

Creek (Fig. 5). Survival and population growth patterns differed significantly among age-structured health classes, indicating that pneumonia was a dominant and additive source of mortality (Table 1).

Pneumonia restricted to lambs (lamb-only) was the most frequent class of pneumonia observed, and populations usually remained stable (Table 1). Pneumonia in both adults and lambs simultaneously (all-age) occurred in translocated populations in biological years 2000, 2002



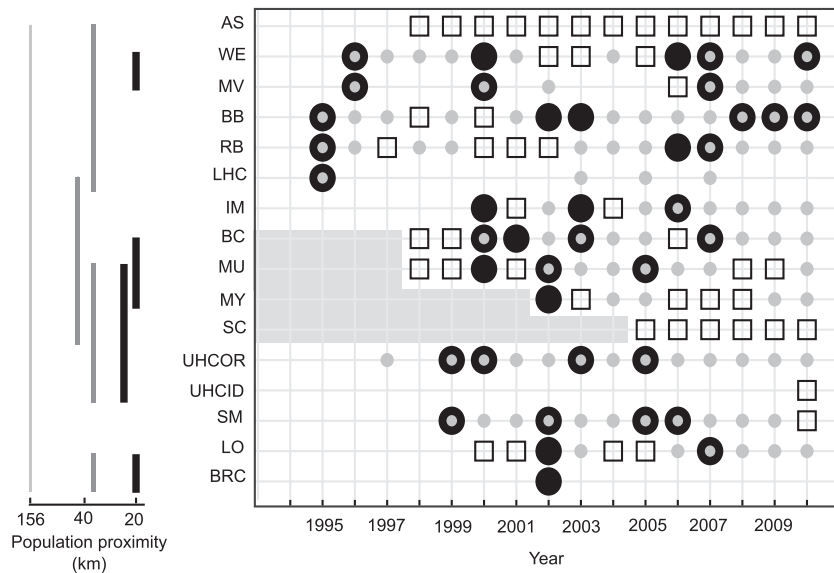
**Fig. 4.** Seasonal patterns of pneumonia and life-history events. (a) Monthly distribution of pneumonia mortalities detected in adults and lambs. (b) Median group sizes of groups with lambs and ewe-mature ram groups by month.

and 2003. This accounted for 68% (19 of 28) of the pneumonia mortalities in translocated animals and resulted in immediate population declines. Secondary all-age pneumonia events occurred in both resident and translocated sheep in populations that had previously experienced all-age outbreaks. These events were characterized by summer pneumonia outbreaks in lambs followed by lower rates of pneumonia-induced mortality in adults. Pneumonia in adults only was an infrequent, usually low mortality event (Table 1).

We observed high survival and stable to increasing populations in population-years classified as healthy, even in populations with a previous history of pneumonia. However, once pneumonia invaded a population, healthy periods were usually of short duration (median 1 year, range 1–3 years, Table 1, Fig. 5).

Median Euclidian distance between population centroids was 67 km with a range from 1 (populations separated by the Snake River) to 156 km (Fig. 5). We detected no significant differences in probability of pneumonia relative to distance to neighbouring populations with pneumonia. There was a slight, but insignificant increase in probability of adult or all-age pneumonia-years in populations centred 20 km or less apart ( $\beta_{\text{NeighbourPN}} = 0.97$ ,  $SE = 0.76$ ,  $P = 0.20$ ) and no spatial correlation of pneumonia in lambs (Figure S2). Adding a 1-year lag or an indicator for the presence of translocated populations in the neighbourhood did not alter this result ( $P > 0.32$ ).

We found a significant predictive effect of current pneumonia class on health status of the population the follow-



**Fig. 5.** Fourteen year time series of pneumonia classes in 16 populations in the Hells Canyon bighorn sheep metapopulation 1995–2010. Black circles represent documented pneumonia in adults, small grey dots represent documented or suspected pneumonia in lambs, open squares indicate no pneumonia detected or suspected. White background with no symbols indicates no data. Grey background indicates years prior to establishment of population through translocation. Vertical lines to the left of the plot connect population centroids at three distance scales. All population centroids were within 156 km or less. AS = Asotin; WE = Wenaha; MV = Mountain View; BB = Black Butte; RB = Redbird; LHC = Lower Hells Canyon, Oregon; IM = Imnaha; BC = Big Canyon; MU = Muir; MY = Myers Creek; SC = Upper Saddle Creek; UHCOR = Upper Hells Canyon, Oregon; UHCID = Upper Hells Canyon, Idaho; SM = Sheep Mountain; LO = Lostine; BRC = Bear Creek.

ing year. Continued pneumonia, usually in lambs, was most likely following all-age and secondary all-age (98%) or lamb-only pneumonia-years (83%). The probability of a pneumonia-year following adult-only and healthy years was similar (63% and 62%, respectively,  $P = 0.98$ ), and pneumonia was significantly less likely after healthy years than all-age or lamb pneumonia-years ( $P \leq 0.05$ , Table 2).

We used the observed frequency of transitions between health classes to develop a transition matrix (Table 2) with Markov properties: there were a finite number of health classes (or states), health class in the current year was dependent on health in the previous year, and any health class could transition to any other health class. Thus, we could predict the stationary distribution of health classes. Assuming transition probabilities among health classes remain constant, pneumonia is predicted in 81% of populations annually: lamb-only pneumonia 57%, all-age and secondary all-age pneumonia combined 17%, adult-only pneumonia 7%. To further illustrate the dynamics of pneumonia-induced mortality, we combined the stationary distribution with mortality and transition rates (Tables 1 and 2) for a visual representation of the impact of disease over time (Fig 6).

## Discussion

Analysis of a 14-year time series of pneumonia in 16 interconnected bighorn sheep populations revealed that

age-structured classes of pneumonia and healthy years had markedly different demographic impacts on populations. All-age pneumonia was consistently associated with population declines, but ultimately, lambs carried the greatest burden of disease. Rates of pneumonia-induced mortality in lambs can vary significantly by population and year, but on average, pneumonia in lambs had an even greater impact than previously reported (Clifford *et al.* 2009; Cahn *et al.* 2011). Recurring annual pneumonia epizootics in lambs may pose the greatest threat to population recovery, and when accompanied by high adult survival, the true consequences of disease may not be realized until senescent adults die and are not replaced.

While pathogen invasion, reinvasion, persistence and fade-out can't be confirmed in the absence of known disease agents, we can evaluate evidence for these processes to develop hypotheses for future investigation. High initial all-age mortality, when compared with subsequent adult mortality in translocated and resident populations is consistent with invasion of pathogens into groups of apparently naïve individuals. Pneumonia in lambs after all-age events must be due to infection from carrier ewes as lambs have little contact with other potential sources of pathogens prior to weaning (Festa-Bianchet 1991; Bleich, Bowyer & Wehausen 1997). Lamb pneumonia outbreaks have also been described in captivity with similar conclusions (Foreyt 1990; Ward *et al.* 1992; Cassirer *et al.* 2001). Pneumonia in lambs is thus a good indication of

**Table 1.** Demographic characteristics of health classes in 14 Hells Canyon bighorn sheep populations, 1997–2010. Data reported as median (range). Years where no adults were radiocollared were excluded from analyses

Outbreak class	<i>n</i>	<i>n</i> pneumonia cases confirmed	Consecutive years	Population growth ( <i>r</i> )	Ewe survival <sup>a</sup>	Ram survival <sup>a</sup>	Summer lamb survival	Spring lamb:ewe ratio
All-age	3	28 Adult	1 (1, 1)	-0.34 (-0.42, -0.28)	0.50 (0.29, 0.57)	NA	0.71 (0.29, 0.88)	0.13 (0.06, 0.17)
Secondary all-age	16	(20 Adult, 27 Lamb)	1 (1, 1)	0 (-0.17, 0.03)	0.82 (0.60, 1)	0.75 (0.67, 1)	0.10 <sup>b</sup> (0, 0.69)	0.05 <sup>b</sup>
Adult only	11	14	1 (1, 2)	0.03 (-0.17, 0.16)	0.83 (0.67, 1)	0.74 (0.67, 0.83)	0.75 (0.36, 1)	0.42 (0.21, 0.79)
Lamb only	62	65	2 (1, 4)	0 (-0.69, 0.22)	0.93 (0.56, 1)	0.83 (0.60, 1)	0.20 <sup>b</sup> (0, 0.67)	0.14 <sup>b</sup> (0, 0.60)
Healthy	49	0	1 (1, 13)	0.12 (-0.03, 0.37)	0.93 (0.71, 1)	0.90 (0.71, 1)	0.83 (0.33, 1)	0.47 (0.13, 0.73)

<sup>a</sup>Survival of radio-collared ewes and rams in years where *n* = 5 or more.

<sup>b</sup>Survival in years with documented pneumonia in lambs (*n* = 8 secondary all-age, *n* = 33 lamb-only).

infection and pathogen shedding in ewes. The absence of pneumonia-induced mortality or clear symptoms in these ewes during outbreaks in lambs confirms that they have either developed resistance or perhaps tolerance of the pathogen(s) that are lethal to their offspring (Råberg, Graham & Read 2009). Reasons for more frequent fade-out following years with pneumonia restricted to adults remains unclear, but could be explained by differences in pathogens, host immunity or transmission rates.

Our study confirms previously reported accounts of seasonality of pneumonia deaths in bighorn sheep, a pattern commonly observed in infectious diseases of humans and wildlife (Spraker *et al.* 1984; Aune *et al.* 1998; Enk, Picton & Williams 2001; Altizer *et al.* 2006; Cassirer & Sinclair 2007). Age-specific seasonal patterns in pneumonia mortality corresponded to breeding and lamb-rearing: life-history events that are accompanied by especially intensive and concentrated social interactions. The distinct seasonality of adult pneumonia mortality observed in wild populations is not observed in captive experimental bighorn and domestic sheep commingling trials where bighorn sheep die of pneumonia regardless of season. Seasonal physiological or environmental factors are therefore probably less important in precipitating pneumonia epizootics than the timing of pathogen introduction, pathogen virulence and exposure to infections (contact rates). The lack of synchrony of disease events across populations and the absence of an effect of climate on lamb survival during pneumonia-years also suggest that weather or other landscape-scale extrinsic variables (Grenfell *et al.* 1998; Cattadori, Haydon & Hudson 2005), are unlikely to be important drivers of pneumonia in Hells Canyon.

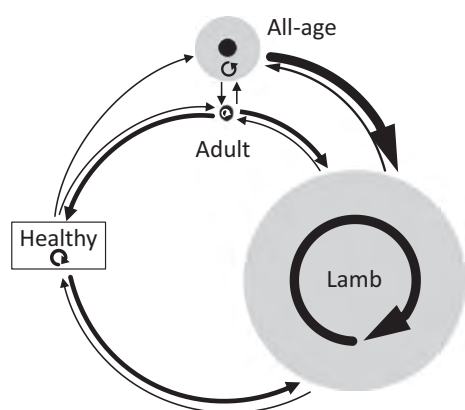
In lambs, most pneumonia-induced mortality occurred between 1 and 3 months of age, a period that coincided with aggregation in nursery groups. Lamb-to-lamb contact may be an important route of infection as happens in many directly transmitted human 'childhood diseases'; thus, the synchrony in parturition and subsequent concentration of ewes during lamb-rearing which is typical in northern latitudes, could contribute to the timing and high rates of mortality. This period also coincides with the age when passively acquired immunity is probably waning in lambs (Rajala & Castrén 1995), which would further promote transmission and mortality.

By analysing long-term monitoring data to elucidate disease processes from patterns of mortality, we have diverged from studies of bighorn sheep pneumonia that focus on identifying the primary causal agent. The benefits of such a study were that we were able to examine demographic patterns at comparatively large spatial and temporal scales, allowing us to make inferences about processes such as disease introduction, persistence and fade-out. However, the weakness in our approach is an inability to track a known pathogen and directly measure transmission (i.e. infection may occur long before mortality); no opportunity to verify pathogen absence during healthy years;

**Table 2.** Temporal pattern of pneumonia within affected populations: annual probabilities of transition among health states and annual probability of any pneumonia. Populations that remained healthy throughout the study, population-years before the initial observation of pneumonia, and years where no adults were radiocollared were excluded from analyses (Fig. 5 and Table S2)

Initial state	n	Transition state				Probability of any pneumonia following initial state (95% CI; P-value relative to healthy state)
		All-age <sup>a</sup>	Healthy	Adult	Lamb	
Healthy	24	0.13	0.33	0.08	0.46	0.62 (0.4, 0.8)
All-age <sup>a</sup>	17	0.18	0.00	0.06	0.72	0.97 (0.8, 1; $P < 0.01$ )
Adult	11	0.18	0.36	0.09	0.36	0.63 (0.3, 0.9; $P = 0.98$ )
Lamb	54	0.15	0.19	0.07	0.59	0.82 (0.6, 0.9; $P = 0.05$ )

<sup>a</sup>All-age and secondary all-age classes combined.



**Fig. 6.** Long-term patterns of pneumonia mortality in bighorn sheep populations experiencing epizootics, Hells Canyon 1997–2010. Stationary distribution of four age-structured population health classes (all-age includes secondary all-age) and the probabilities of staying within a class or transitioning out. Pneumonia classes are circles scaled by relative frequency multiplied by median death rates of ewes (black) and/or lambs (grey) in the class. The healthy class is not scaled. The thickness of arrows between classes is proportional to transition probabilities (Table 2).

and no possibility to monitor genetic variation in the pathogen over time. Given these limitations, as well as the usual constraints of marking and monitoring animals in the field, a primary concern is an imperfect detection probability for pneumonia, which could lead to overestimating healthy population-years. However, the likelihood of detecting pneumonia was not correlated with the intensity of monitoring as measured by the proportion of the population that was radiocollared (median in suspected and detected pneumonia-years = 0.22; in healthy years = 0.28,  $U = 3331.5$ , 1 d.f.,  $P = 0.09$ , Tables S1 and S2), or the frequency of locations (median locations per animal per year in suspected and detected pneumonia-years = 30; in healthy years = 32;  $U = 2427.5$ , 1 d.f.,  $P = 0.45$ ). Therefore, there was no bias towards monitoring populations with pneumonia and, despite potentially misclassifying some lower mortality pneumonia events, we still detected significant differences in population dynamics between several different classes of pneumonia and healthy years. Survival and population growth were also similar in years

classified as healthy in populations with and without a history of pneumonia, suggesting that healthy years, with true absence of disease-related mortality (but not necessarily true absence of infection), did occur, even in populations with previous pneumonia, and these classifications are useful and appropriate for describing the system.

Our observations concur with many of the results of previous studies, but also raise questions about disease models that assume all-age pneumonia outbreaks followed by lamb mortality at a constant or declining rate for a period of usually 1–6 years (Gross, Singer & Moses 2000; Clifford *et al.* 2009; Cahn *et al.* 2011). We observed that pneumonia persisted within populations (or was periodically reintroduced) consistently longer than previous models have assumed, and, as indicated by the Markov model stationary frequency distribution, continued to affect all-age classes, not just lambs. The consequence is that all-age pneumonia events can result in sporadic or chronic, long-term reduction of survival of both adult and juvenile age classes. The disparity between our findings and previous studies may be due to the greater sampling intensity, duration and spatial scale of our study. Furthermore, whereas initial invasion associated with high rates of mortality is fairly easy to detect, the end of an epizootic is not always clear. Previously published models assume that low mortality or healthy years represent the pathogen extinction and the end of the epizootic. However, if disease in a long-lived animal like bighorn sheep is accompanied by latent periods and low rates of mortality in chronically infected animals, absence of mortality may not reflect absence of pathogens. Long-term dynamics could be a function of changes in immune status in individuals and include stochastic events common to small populations, such as dispersal, colonization, recruitment, death, intermittent pathogen shedding or lambing status of asymptomatic carriers.

By analysing long-term patterns, we have generated hypotheses about the disease processes associated with pneumonia epizootics in bighorn sheep. As with other diseases with high levels of heterogeneity, these processes are probably affected by a number of factors, including previous exposure of hosts, pathogen dose or virulence, and spatial structuring and contact rates in host popula-



tions (Grassly & Fraser 2008; Salkeld *et al.* 2010; Wendland *et al.* 2010; Jesse & Heesterbeek 2011). On the basis of the patterns we observed, the disease appears to be an infection that, in some ways is similar to measles and other immunizing diseases in humans in that it spreads through all-age classes during invasion, but subsequently mainly affects susceptible juveniles. However, in contrast with measles, pathogens apparently persist, occasionally causing fatal pneumonia in previously exposed adults, and the variable lung lesions and associated bacteriology suggest a polymicrobial aetiology, thus secondary pathogens may play a role in severity and recurrence (Besser *et al.* 2012b). The course of the disease may also be affected by the timing of pathogen invasions relative to contact rates associated with seasonal breeding and parturition. The importance of between-population transmission and recurrent infection from domestic sheep deserves additional investigation as do the conditions that lead to disease and pathogen fade-out.

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## References

- Altizer, S., Dobson, A., Hosseini, P., Hudson, P., Pascual, M. & Rohani, P. (2006) Seasonality and the dynamics of infectious disease. *Ecology Letters*, **9**, 467–484.
- Aune, K.E., Anderson, N., Worley, D., Stackhouse, L., Henderson, J. & Daniel, J.E. (1998) A comparison of population and health histories among seven Montana bighorn sheep populations. *Proceedings Northern Wild Sheep and Goat Council*, **11**, 46–69.
- Bates, D., Maechler, M. & Dai, B. (2008) lme4: Linear mixed-effects models using S4 classes. R package version 0.999375-28. <http://lme4.r-forge.r-project.org/>
- Besag, J.P., York, J. & Mollie, A. (1991) Bayesian image-restoration, with two applications in spatial statistics. *Annals of the Institute of Statistical Mathematics*, **43**, 1–20.
- Besser, T.E., Cassirer, E.F., Potter, K.A., VanderSchalie, J., Fischer, A., Knowles, D.P., Herndon, D.R., Rurangirwa, F.R., Weiser, G.C. & Srikumaran, S. (2008) Association of *Mycoplasma ovipneumoniae* infection with population-limiting respiratory disease in free-ranging Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*). *Journal of Clinical Microbiology*, **46**, 423–430.
- Besser, T.E., Cassirer, E.F., Yamada, C., Potter, K.A., Herndon, C.N., Foreyt, W.J., Knowles, D.P. & Srikumaran, S. (2012a) Survival of bighorn sheep (*Ovis canadensis*) commingled with domestic sheep (*Ovis aries*) in the absence of *Mycoplasma ovipneumoniae*. *Journal of Wildlife Diseases*, **48**, 168–172.
- Besser, T.E., Highland, M., Baker, K., Cassirer, E.F., Anderson, N.J., Ramsey, J.M., Mansfield, K.M., Bruning, D., Wolff, P., Smith, J.B. & Jenks, J.A. (2012b) Causes of pneumonia epizootics among bighorn sheep, western United States, 2008–2010. *Emerging Infectious Diseases*, **18**, <http://dx.doi.org/10.3201/eid1803.111554>.
- Beyer, H.L. (2004) Hawth's Analysis Tools for ArcGIS. <http://www.spatial-ecology.com/htools>.
- Bjørnstad, O. & Grenfell, B. (2008) Hazards, spatial transmission and timing of outbreaks in epidemic metapopulations. *Environmental and Ecological Statistics*, **15**, 265–277.
- Bleich, V.C., Bowyer, R.T. & Wehausen, J.D. (1997) Sexual segregation in mountain sheep: resources or predation? *Wildlife Monographs*, **134**, 1–50.
- Bleich, V.C., Wehausen, J.D., Ramey III, R.R. & Rechel, J.L. (1996) *Metapopulation Theory and Mountain Sheep: Implications for Conservation*. Island Press, Washington, DC, USA.
- Boyce, W.M., Weisenberger, M.E., Penedo, M.C. & Johnson, C.K. (2011) Wildlife translocation: the conservation implications of pathogen exposure and genetic heterozygosity. *BMC Ecology*, **11**, 5.
- Bunnell, F.L. (1982) The lambing period of mountain sheep - synthesis, hypotheses, and tests. *Canadian Journal of Zoology-Revue Canadienne De Zoologie*, **60**, 1–14.
- Cahn, M.L., Conner, M.M., Schmitz, O.J., Stephenson, T.R., Wehausen, J.D. & Johnson, H.E. (2011) Disease, population viability, and recovery of endangered Sierra Nevada bighorn sheep. *Journal of Wildlife Management*, **75**, 1753–1766.
- Cassirer, E.F. & Sinclair, A.R.E. (2007) Dynamics of pneumonia in a bighorn sheep metapopulation. *Journal of Wildlife Management*, **71**, 1080–1088.
- Cassirer, E.F., Oldenburg, L.E., Coggins, V.L., Fowler, P., Rudolph, K.M., Hunter, D.L. & Foreyt, W.J. (1996) Overview and preliminary analysis of a bighorn sheep dieoff, Hells Canyon 1995–96. *Biennial Symposium Northern Wild Sheep and Goat Council*, **10**, 78–86.
- Cassirer, E.F., Rudolph, K.M., Fowler, P., Coggins, V.L., Hunter, D.L. & Miller, M.W. (2001) Evaluation of ewe vaccination as a tool for increasing bighorn lamb survival following pasteurellosis epizootics. *Journal of Wildlife Diseases*, **37**, 49–57.
- Cattadori, I.M., Haydon, D.T. & Hudson, P.J. (2005) Parasites and climate synchronize red grouse populations. *Nature*, **433**, 737–741.
- Cleaveland, S., Mlengeya, T., Kaare, M., Haydon, D., Lembo, T., Laurenson, M.K. & Packer, C. (2007) The conservation relevance of epidemiological research into carnivore viral diseases in the Serengeti. *Conservation Biology*, **21**, 612–622.
- Clifford, D.L., Schumaker, B.A., Stephenson, T.R., Bleich, V.C., Cahn, M.L., Gonzales, B.J., Boyce, W.M. & Mazet, J.A.K. (2009) Assessing disease risk at the wildlife-livestock interface: a study of Sierra Nevada bighorn sheep. *Biological Conservation*, **142**, 2559–2568.
- Coggins, V.L. & Matthews, P.E. (1996) Rocky mountain bighorn sheep in Oregon, history and present status. *Biennial Symposium Northern Wild Sheep and Goat Council*, **10**, 87–92.
- Dassanayake, R.P., Shanthalingam, S., Herndon, C.N., Lawrence, P.K., Cassirer, E.F., Potter, K.A., Foreyt, W.J., Clinkenbeard, K.D. & Srikumaran, S. (2009) *Mannheimia haemolytica* serotype A1 exhibits differential pathogenicity in two related species, *Ovis canadensis* and *Ovis aries*. *Veterinary microbiology*, **133**, 366–371.
- Dassanayake, R.P., Shanthalingam, S., Herndon, C.N., Subramaniam, R., Lawrence, P.K., Bavananthasivam, J., Cassirer, E.F., Halderson, G.J., Foreyt, W.J., Rurangirwa, F.R., Knowles, D.P., Besser, T.E. & Srikumaran, S. (2010) *Mycoplasma ovipneumoniae* can predispose bighorn sheep to fatal *Mannheimia haemolytica* pneumonia. *Veterinary microbiology*, **145**, 354–359.
- DeCesare, N.J. & Pletscher, D.H. (2006) Movements, connectivity, and resource selection of Rocky Mountain bighorn sheep. *Journal of Mammalogy*, **87**, 531–538.
- Enk, T.A., Picton, H.D. & Williams, J.S. (2001) Factors limiting a bighorn sheep population in Montana following a dieoff. *Northwest Science*, **75**, 280–291.
- ESRI. (2008) ArcMap 9.3, Service Pack 1. <http://www.esri.com>. Redlands, CA.
- Ferrari, M.J., Grais, R.F., Bharti, N., Conlan, A.J.K., Bjørnstad, O.N., Wolfson, L.J., Guerin, P.J., Djibo, A. & Grenfell, B.T. (2008) The dynamics of measles in sub-Saharan Africa. *Nature*, **451**, 679–684.

- Festa-Bianchet, M. (1991) The social system of bighorn sheep: grouping patterns, kinship and female dominance rank. *Animal Behaviour*, **42**, 71–82.
- Firth, D. (1993) Bias reduction of maximum likelihood estimates. *Biometrika*, **80**, 27–38.
- Foreyt, W.J. (1990) Pneumonia in bighorn sheep: effects of *Pasteurella haemolytica* from domestic sheep and effects on survival and long-term reproduction. *Biennial Symposium Northern Wild Sheep and Goat Council*, **7**, 92–101.
- Foreyt, W.J., Snipes, K.P. & Kasten, R.W. (1994) Fatal pneumonia following inoculation of healthy bighorn sheep with *Pasteurella haemolytica* from healthy domestic sheep. *Journal of Wildlife Diseases*, **30**, 137–145.
- George, J.L., Martin, D.J., Lukacs, P.M. & Miller, M.W. (2008) Epidemic pasteurellosis in a bighorn sheep population coinciding with the appearance of a domestic sheep. *Journal of Wildlife Diseases*, **44**, 388–403.
- Goodson, N.J. (1982) Effects of domestic sheep grazing on bighorn sheep populations: a review. *Biennial Symposium Northern Wild Sheep and Goat Council*, **3**, 287–313.
- Grassly, N.C. & Fraser, C. (2008) Mathematical models of infectious disease transmission. *Nature Reviews Microbiology*, **6**, 477–487.
- Grenfell, B.T., Wilson, K., Finkenstadt, B.F., Coulson, T.N., Murray, S., Albon, S.D., Pemberton, J.M., Clutton-Brock, T.H. & Crawley, M.J. (1998) Noise and determinism in synchronized sheep dynamics. *Nature*, **394**, 674–677.
- Grinnell, G.B. (1928) Mountain sheep. *Journal of Mammalogy*, **9**, 1–9.
- Gross, J.E., Singer, F.J. & Moses, M.E. (2000) Effects of disease, dispersal, and area on bighorn sheep restoration. *Restoration Ecology*, **8**, 25–37.
- Heisey, D.M., E., O.E., Cross, P.C., Joly, D.O., Langenberg, J.A. & Miller, M.W. (2010) Linking process to pattern: estimating spatiotemporal dynamics of a wildlife epidemic from cross-sectional data. *Ecological Monographs*, **80**, 221–240.
- Hnilicka, P.A., Mionczynski, J., Mincher, B.J., Hirschberger, M., Oberlie, S., Thompson, C.B., Yates, B. & Siermer, D.D. (2002) Bighorn sheep lamb survival, trace minerals, rainfall, and air pollution: are there any connections? *Biennial Symposium Northern Wild Sheep and Goat Council*, **13**, 70–94.
- Hobbs, N.T. & Miller, M.W. (1992) Interactions between pathogens and hosts: simulation of pasteurellosis epizootics in bighorn sheep populations. *Wildlife 2001: Populations*, (eds D.R. McCullough & R.H. Barrett), pp. 997–1007. Elsevier, London.
- Jesse, M. & Heesterbeek, H. (2011) Divide and conquer? Persistence of infectious agents in spatial metapopulations of hosts. *Journal of Theoretical Biology*, **275**, 12–20.
- Johnson, R.L. (1980) Re-introduction of bighorn sheep in Washington. *Biennial Symposium Northern Wild Sheep and Goat Council*, **2**, 106–112.
- Johnson, C.G. & Simon, S.A. (1987) Plant associations of the Wallowa-Snake province. U.S. Forest Service Pacific Northwest Region Report R6-ECOL-TP-255B-86, Baker City, Oregon, USA.
- Jorgenson, J.T., Festa-Bianchet, M., Gaillard, J.-M. & Wishart, W.D. (1997) Effects of age, sex, disease, and density on survival of bighorn sheep. *Ecology*, **78**, 1019–1032.
- Kaplan, E.L. & Meier, P. (1958) Nonparametric estimation from incomplete observations. *Journal of the American Statistical Association*, **1**, 53, 457–481.
- Lunn, D.J., Thomas, A., Best, N. & Spiegelhalter, D. (2000) WinBUGS - A Bayesian modelling framework: concepts, structure, and extensibility. *Statistics and Computing*, **10**, 325–337.
- Pioner, M., Dunkler, D., H., S. & Heinze, G. (2006) LogistF: Firth's bias reduced logistic regression. R package version 1.06., <http://www.meduniwien.ac.at/msi/biometrie/programme/fl/index.html>.
- R Development Core Team. (2008) R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria.
- Råberg, L., Graham, A.L. & Read, A.F. (2009) Decomposing health: tolerance and resistance to parasites in animals. *Philosophical Transactions of the Royal Society B: Biological Sciences*, **364**, 37–49.
- Rajala, P. & Castrén, H. (1995) Serum Immunoglobulin concentrations and health of dairy calves in two management systems from birth to 12 weeks of age. *Journal of Dairy Science*, **78**, 2737–2744.
- Rubin, E.S., Boyce, W.M. & Caswell-Chen, E.R. (2002) Modeling demographic processes in an endangered population of bighorn sheep. *Journal of Wildlife Management*, **66**, 796–810.
- Rubin, E.S., Boyce, W.M., Jorgenson, M.C., Torres, S.G., Hayes, C.L., O'Brien, C.S. & Jessup, D.A. (1998) Distribution and abundance of bighorn sheep in the Peninsular Ranges, California. *Wildlife Society Bulletin*, **26**, 539–551.
- Rush, W.M. (1927) Notes on diseases in wild game mammals: mountain sheep. *Journal of Mammalogy*, **8**, 163–165.
- Salkeld, D.J., Salathe, M., Stapp, P. & Jones, J.H. (2010) Plague outbreaks in prairie dog populations explained by percolation thresholds of alternate host abundance. *Proceedings of the National Academy of Sciences of the United States of America*, **107**, 14247–14250.
- Sanchez, A., Khan, A.S., Zaki, S.R., Nabel, G.J., Ksiazek, T.G. & Peters, C. J. (2001) Filoviridae: Marburg and Ebola viruses. *Fields Virology* (eds D.M. Knipe & P.M. Howley), pp. 1279–1304. Lippincott Williams & Wilkins, Philadelphia, USA.
- Shillenger, J.E. (1937) Disease relationship between domestic animals and wildlife. *Transactions North American Wildlife and Natural Resources Conference*, **2**, 298–302.
- Siegel, S. & Castellan, N.J.J. (1988) *Nonparametric statistics for the behavioral sciences*, 2nd edn. McGraw-Hill, New York.
- Smith, D.R. (1954) The bighorn sheep in Idaho: its status, life history, and management. *Wildlife Bulletin No. 1, Federal Aid to Wildlife Restoration Act., Idaho Project 99R*, pp. 154. Idaho Department of Fish and Game, Boise, Idaho, USA.
- Spraker, T.R., Hibler, C.P., Schoonveld, G.G. & Adney, W.S. (1984) Pathologic changes and microorganisms found in bighorn sheep during a stress-related die-off. *Journal of Wildlife Diseases*, **20**, 319–327.
- Sturtz, S., Ligges, U. & Gelman, A. (2005) R2WinBUGS: a package for running Win BUGS from R. *Journal of Statistical Software*, **12**, 1–16.
- Taylor, H.M. & Karlin, S. (1998) *An introduction to stochastic modeling*, 3rd edn. Academic Press, San Diego, CA.
- Thompson, R.W. & Turner, J.C. (1982) Temporal geographic variation in the lambing season of bighorn sheep. *Canadian Journal of Zoology - Revue Canadienne De Zoologie*, **60**, 1781–1793.
- Valdez, R. & Krausman, P.R. (1999) *Mountain sheep of North America*. University of Arizona Press, Tucson.
- Ward, A.C.S., Hunter, D.L., Jaworski, M.D., Lane, M.V., Zaugg, J.L. & Bulgin, M.S. (1992) Naturally occurring pneumonia in caesarian-derived Rocky Mountain bighorn sheep lambs. *Biennial Symposium Northern Wild Sheep and Goat Council*, **8**, 164–173.
- Wendland, L.D., Wooding, J., White, C.L., Demcovitz, D., Littell, R., Berish, J.D., Ozgul, A., Oli, M.K., Klein, P.A., Christman, M.C. & Brown, M.B. (2010) Social behavior drives the dynamics of respiratory disease in threatened tortoises. *Ecology*, **91**, 1257–1262.
- Western, R.C.C. (2008) Historical Climate information. Desert Research Institute, Reno, NV, <http://www.wrcc.dri.edu/>.

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## Supporting Information

Additional Supporting Information may be found in the online version of this article.

### Appendix S1. Lamb mortality hazard analysis.

**Figure S1.** Demographic histories of Hells Canyon bighorn sheep populations.

**Figure S2.** Spatial synchrony of pneumonia-years across populations.

**Table S1.** Number and proportion of adult bighorn sheep radio-collared in each population by year and translocation status.

**Table S2.** Health classification of population-years (141) used to estimate demographic characteristics and transition probabilities of pneumonia and healthy years in Hells Canyon, 1997–2010.

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# GUIDELINES FOR MANAGEMENT OF DOMESTIC SHEEP IN THE VICINITY OF DESERT BIGHORN HABITAT

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Technical Staff  
Desert Bighorn Council

The Bureau of Land Management (BLM) requested that the Technical Staff (Tech Staff) of the Desert Bighorn Council (DBC) prepare management guidelines for domestic sheep in the vicinity of desert bighorn habitat. Desert bighorn habitat includes all geographic areas that would provide for the life requisites of desert bighorn sheep, as defined by state wildlife and/or land management agencies. This request followed a meeting of BLM biologists concerned with problems resulting from interactions between bighorn sheep (*Ovis canadensis* ssp.) and domestic sheep (*O. aries*).

The Tech Staff understands that 2 additional factors should be considered. First, the BLM has prepared, or is preparing, land use planning documents in several western states (Nev., Ariz., Colo., and Ut.) that would allow reintroduction of desert bighorns (*O. c. nelsoni*, *O. c. mexicana*, and *O. c. cremnobates*) into suitable historic habitat. Several potential bighorn reintroductions in Nevada have been contested by the livestock industry; e.g., woolgrowers and cattlemen. They contend that bighorn reintroductions will seriously hamper their ability to graze livestock of their choice on public lands. Second, in 1989, the BLM issued a "Rangewide Plan for Managing Habitat of Desert Bighorn Sheep on Public Lands," which states "Livestock grazing on desert bighorn habitats will be managed via land-use or activity plans to mitigate impacts to desert bighorns and their habitats to ensure objectives for desert bighorn are achieved."

The DBC is comprised of state fish and game and federal agency biologists, private research organizations, academia, and the public. The 4 primary objectives of the DBC are to: provide for the exchange of information on the needs and management of desert bighorns; stimulate and coordinate studies in all phases of the life history, ecology, management and protection, recreational, and economic uses of desert bighorns; provide a clearinghouse for information among all agencies, organizations, and individuals professionally engaged in work on the desert bighorn; and function in a professional advisory capacity, where appropriate, on local, national, and international questions involving the management and protection of desert bighorn.

The DBC's Tech Staff is comprised of 7 elected members. One of the functions of the Tech Staff is to answer requests from agencies and organizations such as the BLM, regarding desert bighorn management.

This document describes problems associated with domestic sheep and bighorn interactions, with emphasis on diseases. Recommendations are then provided to minimize interaction, especially physical contact between domestic and bighorn sheep.

The Tech Staff appreciates the opportunity to consider the problems and develop these guidelines, with the underlying goal of eliminating domestic sheep and bighorn conflicts on public lands.

## BACKGROUND

Current bighorn numbers are <2% of what they were prior to the coming of European man and his livestock and firearms (Wagner 1978). Following enormous population declines in the late 1800s and early 1900s, bighorn populations did not recover, in contrast to other wildlife species such as mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*). Bighorns have demonstrated much less tolerance than other na-

tive North American ungulates to poor range conditions, interspecific competition, overhunting, and stress caused by loss of habitat. Furthermore, they have shown a much greater susceptibility to diseases (Goodson 1982).

Bighorns have died from a wide variety of diseases that they have contracted from domestic sheep. These include scabies (a major cause of mortality in the 1800s and as late as the 1970s in New Mexico), chronic frontal sinusitis, internal nematode parasites (worms), pneumophilic bacteria, footrot, parainfluenza III, bluetongue, and soremouth (contagious echthyma) (Jessup 1985). Documented bighorn die-offs were recorded as early as the mid-1800s and have continued up to the present (Jessup 1985, Goodson 1982, Foreyt and Jessup 1982, Sandoval 1988, Weaver 1988). Die-off documentation covers not only desert bighorns, but also California bighorns (*O. c. californiana*) and Rocky Mountain bighorns (*O. c. canadensis*). Bighorn die-offs have occurred in every state in the western United States.

In broad perspective, when there has been contact between apparently healthy bighorns and domestic sheep, the bighorns die within a few days to a few weeks. While many diseases or stress factors may be involved, bighorns exposed to domestic sheep almost invariably die from pneumonia.

Little is known about the actual mechanism(s) that lead to the demise of bighorns after they have come into contact with domestic sheep. In all of the cases of bighorn die-offs following direct contact with domestic sheep or overlap of grazing in bighorn ranges, 2 things are apparent.

1. There is a preponderance of evidence (Table 1) strongly linking the presence of domestic sheep with the subsequent loss of part or all of the affected bighorn population. Of the 25 documented cases (Table 1) 4 of the situations were in controlled laboratory experiments in 3 states, and 2 were in situations where bighorns were penned in large paddocks.
2. The effects have all been I way—bighorns have died, while domestic sheep never have suffered ill effects because of coming into contact with bighorn. The prevailing theory on why this has occurred can be summed up as follows: New World sheep (bighorns) are so susceptible to diseases of Old World sheep (domestics) because the bighorns did not co-evolve with the above-listed diseases, as did domestic sheep. Bighorns have not developed effective immunity against these diseases. Domestic sheep are inoculated or, through natural selection over hundreds of years, have developed a resistance against some of these diseases, but carry blood titers for most of them. When there is contact between bighorns and domestic sheep, the bighorns have little defense. This theory is analogous to the accepted explanation for the transmission of human diseases carried to the Native Americans by Europeans. The Native American populations had no immunity to Old World diseases and suffered many documented die-offs.

## RECOMMENDATIONS

The DBC Tech Staff has reviewed the bighorn sheep problem and developed recommendations for eliminating domestic and bighorn sheep conflicts on public lands. They consist of 1 general recommendation and 4 specific recommendations dealing with buffer strips, livestock supervision, trailing, and reintroductions. Each recommendation is preceded by a statement of the issue, followed by a justification.

### General Recommendation

Issue.—Desert bighorn that come into contact with domestic sheep die as a result of the contact.

Recommendation.—Domestic sheep in the vicinity of desert bighorn ranges should be managed so that desert bighorn never come into contact with domestic sheep nor the disease organisms that domestic sheep carry.

Justification.—Evidence (Table 1) indicates that contact with domestic sheep is almost invariably lethal to desert bighorn. The recommendations that follow deal with methods to minimize interaction, especially physical contact between domestic and bighorn sheep.



Table 1. Bighorn declines and die-offs resulting from contracts with domestic sheep.

Location	Cause of die-off	Results	Year(s)	Source
Sun River, Mont.		>70 died	1910-35	Goodson (1982)
Upper Rock Ck., Mont.		All died	1965-70s	Goodson (1982)
Thompson Falls, Mont.		All died	1940-60	Goodson (1982)
Kootenay National Park, B.C., Can.	Pneumonia		1939	Goodson (1982)
Bull River, B.C., Can.	Pneumonia	96% died	1965	Bandy (1968) in Goodson (1982)
MacQuire Creek, B.C., Can.	Pneumonia		1981-82	Davidson in Goodson (1982)
Lava Beds National Monument, Calif. <sup>a</sup>	Pneumonia	All died	1980	Blaisdell (1982)
Mormon Mts., Nev.	Pneumonia	50% died	1980	Jessup (1981)
Dinosaur National Monument, Colo.		All died	1950	Barmore (1962) in Goodson (1982)
Rock Creek, Mont.		8 left	1900-20	Goodson (1982)
Rocky Mtn. National Park, Colo.	Pneumonia	All died	1917-30	Packard (1939a, 1939b) in Goodson (1982)
Methow Game Range, Wash. <sup>a</sup>	Pneumonia	13 of 14 died	1979-81	Foreyt and Jessup (1982)
Warner Mt., Calif.	Pneumonia	All died	1988	Weaver (1988)
Oregon	Scabies		1936	Lange (1980)
California	Scabies		1870-79, 1898	Jones (1900) in Lange (1980)
Grey Bull River, Wyo.			1881	Honess and Frost (1942) in Lange (1980)
Wyo., Mont.			1885	Hornaday (1901) in Lange (1980)
Colo.	Scabies		1859-31	Packard (1946) in Lange (1980)
Rocky Mtn. National Park, Colo.	Scabies		1878-1903	Lange (1980)
Latir Parks, N.M.	Pneumonia	All died	1978-82	Sandoval (1988)
Utah St. Univ., Utah <sup>b</sup>	Pneumonia	All died	1970s	Spillett in Goodson (1982)
Univ. B.C., Can. <sup>b</sup>	Pneumonia	All died	1970s	Hebert in Goodson (1982)
Colorado St. Univ., Colo. <sup>b</sup>	Pneumonia	All died	1970s	Hibler in Goodson (1982)
Utah St. Univ., Utah <sup>b</sup>	Pneumonia	4 of 5 died	1988	T. D. Bunch (Utah State Univ., pers. commun.)

<sup>a</sup>Large pen or paddock.

<sup>b</sup>University controlled conditions.

### Specific Recommendation 1: Buffer Strips

Issue.—Desert bighorn and domestic sheep must be spatially separated to minimize the possibility of these 2 species coming into contact.

No domestic sheep grazing should be authorized or allowed within buffer strips  $\geq 13.5$  km wide surrounding desert bighorn habitat, except where topographic features or other barriers prevent any interaction.

*Justification.*—Armentrout and Brigham (1988) recommended a 13.5-km-wide separation strip as optimum, based on 9 cited literature sources. Bighorn and domestic sheep separation distances cited in the literature range from 3.2 to 32 km. The California Department of Fish and Game (1983), in its discussion of conflicting land uses, recommended that domestic sheep grazing be eliminated within 3.2 km of bighorn habitat where feasible. The 3.2-km buffer strip also is included in the Mina Habitat Management Plan in Nevada (U.S. Dep. Interior, BLM 1988a) in  $\geq 1$  land-use plan in the Boise, Idaho BLM District (Goodson 1982); and in the Winnemucca, Nevada BLM 1978 grazing Environmental Impact Statement for the Sonoma-Gerlach Resource Area. A 9.6-km-wide buffer strip was recommended in the Lahontan Resource Management Plan (RMP) and the Stillwater Habitat Management Plan in Nevada (U.S. Dep. Interior, BLM 1985, 1986b). The widest recommended buffer (32 km) was used in Arizona. A 32-km buffer was agreed upon in the original Memorandum of Understanding (MOU) between the BLM and Arizona Game and Fish Department. However, when the master MOU was redrafted in 1976, the section relating to domestic sheep grazing in bighorn habitat was not included (Gallizioli 1980). Situations involving potential bighorn and domestic sheep conflicts in Arizona now are handled on a case-by-case basis.

The reason for the 32-km buffer strip was concern over the chronic frontal sinusitis in desert bighorn. This disease occurs when bot fly (*Oestrous ovis*) larvae enter the sinus cavities of bighorns, grow too large to get out, and die, thus infecting the bighorn (Bunch 1978). Sinus cavities in desert bighorns are much larger than those in domestic sheep. The major unanswered question asked by biologists in the 1970s was "what is the range of the bot fly?" Although the U.S. Department of

Agriculture has investigated this question, there is no definitive answer, as it depends upon variables such as temperature, precipitation, and wind. The 32-km buffer strip, however, was felt to be adequate (Gallizioli 1980).

Another problem when considering buffer strips is that young (3-4 yr old) desert bighorn, especially rams, tend to travel extensively ( $\leq 64$  km). Extensive travel by bighorns increases the potential for nose-to-nose contact with domestic sheep. Nose-to-nose contact and resultant transmission of disease(s) was blamed for the catastrophic loss of penned bighorns at the Lava Beds National Monument, California in 1980 (Blaisdell 1982) and in the total population loss of transplanted bighorns in the Warner Mountains, California, in 1988 (Weaver 1988).

Considering all the evidence presented above and cited in Armentrout and Brigham (1988), the Tech Staff feels that buffer strips of  $\geq 13.5$ -km are needed to minimize the potential of disease transmission, including chronic frontal sinusitis, and to avert nose-to-nose contact between wandering bighorns and domestic sheep.

### Specific Recommendation 2: Livestock Supervision

Issue.—Domestic sheep must be closely and carefully herded to prevent them from straying into desert bighorn range.

Recommendation.—Domestic sheep that are trailed or grazed outside the 13.5-km buffer, but in the vicinity of desert bighorn ranges, should be closely supervised by competent, capable, and informed herders.

*Justification.*—There is virtually no practical way to control movements of young bighorns, but control of domestic sheep is possible. The key to minimizing impacts by domestic sheep upon bighorns is very close supervision of domestic bands by herding, both while trailing and grazing. Both the Warner Mountains and Lava Beds bighorn die-offs were attributed to stray domestic sheep. Had domestic sheep herding been more intensive, neither of these catastrophes probably would have occurred.

Sheep herders and their control of domestic sheep bands vary considerably. Many herders come to the United States from other countries,

especially South America. Many have never herded sheep before their arrival in the U.S. Permittees who graze domestic sheep on public lands should ensure that their herders are competent and capable and that herders understand the potential problems that may be caused by straying domestic sheep.

The Tech Staff recognizes that the BLM's grazing regulations may need modification to further implement this recommendation. Existing regulations provide that the authorized officer can require herders. The regulations also could be strengthened to allow impoundment of stray domestic sheep, whenever they are found in occupied bighorn habitat. This recommendation could be partially implemented by directives requiring that BLM area managers, range conservationists, and wildlife biologists meet with the permittees and their herders to explain the importance of close supervision by the herders and what could result if domestic sheep are allowed to stray.

### Specific Recommendation 3: Trailing

**Issue.**—Domestic sheep being trailed near desert bighorn range are likely to transmit diseases to bighorns, especially when ewes are in estrus.

**Recommendation.**—Domestic sheep should be trucked rather than trailed, when trailing would bring sheep closer than 13.5 km to bighorn range. Trailing should never occur when domestic ewes are in estrus.

**Justification.**—Many domestic sheep are still trailed between grazing allotments. The Tech Staff recommends that domestic sheep be trucked whenever possible to minimize possible contact with bighorns. Close supervision by herders is essential. The time of trailing also is important. When domestic ewes are in estrus, they will attract bighorn rams from distances >3.2 km. The Tech Staff recommends, therefore, that domestic sheep not be trailed closer than 13.5 km to occupied bighorn habitat. Domestic sheep also should not be trailed when ewes are in estrus, to reduce potential for bighorn sheep contact. This prescription should be included in BLM grazing regulations as part of the supervision and husbandry requirements.

### Specific Recommendation 4: Reintroduction

**Issue.**—Ranges formerly occupied by domestic sheep can harbor diseases detrimental to desert bighorn.

**Recommendation.**—Bighorn sheep should not be reintroduced into areas where domestic sheep have grazed during the previous 4 years.

**Justification.**—Our concern involves bighorn reintroductions into habitats formerly occupied by domestic sheep. The Tech Staff does not advocate the co-use of bighorn habitat by both bighorn and domestic sheep. Two diseases that could be transmitted to bighorn after domestic sheep have been removed are footrot and soremouth (Jessup 1985, Kistner 1982). Both of these diseases can lie in the soil and, when conditions are right, be transmitted to bighorns. The soremouth virus can remain viable in the soil for 10 to 20 years (Jessup 1985, Lance 1980).

### SUMMARY

The DBC Tech Staff herein has identified some of the problems associated with bighorn and domestic sheep interactions, and has rec-

ommended procedures that should eliminate or reduce contact between domestic and desert bighorn sheep. These recommendations include: no nose-to-nose contact between bighorn and domestic sheep; a minimum of a 13.5-km-wide buffer strip between ranges used by domestic sheep and bighorns; trucking of domestic sheep in preference to trailing, and no trailing when domestic ewes are in estrus; and no bighorn reintroductions onto areas that have been grazed by domestic sheep during the previous 4 years.

### REFERENCES CITED

- Armentrout, D. J. and W. R. Brigham. 1988. Habitat suitability rating system for desert bighorn sheep in the Basin and Range Province. U.S. Dep. Interior, Bur. Land Manage. Tech. Note 384. 18pp.
- Blaisdell, J. A. 1982. Lava beds wrap-up—what did we learn? Desert Bighorn Council. Trans. 26:32–33.
- Bunch, T. D., S. R. Paul, and H. Crutchen. 1978. Chronic sinusitis in the desert bighorn (*Ovis canadensis nelsoni*). Desert Bighorn Council. Trans. 22:16–20.
- California. 1983. A plan for bighorn sheep in California. Calif. Dep. Fish and Game. 11pp.
- Foreyt, W. J. and D. A. Jessup. 1982. Fatal pneumonia of bighorn sheep following association with domestic sheep. J. Wildl. Diseases 18:163–168.
- Gallizioli, S. 1980. Memo from the Arizona Game and Fish Dep. to Clair M. Whitlock, BLM State Director, Arizona. 3pp.
- Goodson, N. 1982. Effects of domestic sheep grazing on bighorn sheep populations: a review. Northern Sheep and Goat Council. 3:287–313.
- Jessup, D. A. 1981. Pneumonia in bighorn sheep: effects on populations. Transactions of Cal-Neva Wildlife (Annual meeting of the Western Section of the Wildlife Society and California-Nevada Chapter of the American Fisheries Society). 72–78pp.
- . 1985. Diseases of domestic livestock which threaten bighorn sheep populations. Desert Bighorn Council. Trans. 29:29–33.
- Kistner, T. P. 1982. Letter to Josh Warburton, BLM, Burns, Oregon. 11pp.
- Lance, W. E. 1980. Implications of contagious ecthyma in bighorn sheep. Northern Sheep and Goat Council. 2:16–18.
- Lange, R. E., Jr. 1980. Psoroptic scabies in wildlife in the United States and Canada. Desert Bighorn Council. Trans. 24:18–20.
- Sandoval, A. V. 1988. Bighorn sheep die-off following association with domestic sheep: case history. Desert Bighorn Council. 32:36–37.
- U.S. Dep. Interior, BLM. 1985. Lahontan resource management plan, Carson City District, Nevada. 150pp.
- . 1988a. Mina habitat management plan, Carson City District, Nevada. 60pp.
- . 1988b. Stillwater habitat management plan, Carson City District, Nevada. 40pp.
- Wagner, F. H. 1978. Western rangeland: troubled American resource. Trans. North Amer. Wildl. Conf. 43:453–461.
- Weaver, R. A. 1988. Status of bighorn sheep in California, 1987. Desert Bighorn Council. Trans. 31:20.

# TRANSMISSION OF *MANNHEIMIA HAEMOLYTICA* FROM DOMESTIC SHEEP (*OVIS ARIES*) TO BIGHORN SHEEP (*OVIS CANADENSIS*): UNEQUIVOCAL DEMONSTRATION WITH GREEN FLUORESCENT PROTEIN-TAGGED ORGANISMS

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**ABSTRACT:** Previous studies demonstrated that bighorn sheep (*Ovis canadensis*) died of pneumonia when commingled with domestic sheep (*Ovis aries*) but did not conclusively prove that the responsible pathogens were transmitted from domestic to bighorn sheep. The objective of this study was to determine, unambiguously, whether *Mannheimia haemolytica* can be transmitted from domestic to bighorn sheep when they commingle. Four isolates of *M. haemolytica* were obtained from the pharynx of two of four domestic sheep and tagged with a plasmid carrying the genes for green fluorescent protein (GFP) and ampicillin resistance (AP<sup>R</sup>). Four domestic sheep, colonized with the tagged bacteria, were kept about 10 m apart from four bighorn sheep for 1 mo with no clinical signs of pneumonia observed in the bighorn sheep during that period. The domestic and bighorn sheep were then allowed to have fence-line contact for 2 mo. During that period, three bighorn sheep acquired the tagged bacteria from the domestic sheep. At the end of the 2 mo of fence-line contact, the animals were allowed to commingle. All four bighorn sheep died 2 days to 9 days following commingling. The lungs from all four bighorn sheep showed gross and histopathologic lesions characteristic of *M. haemolytica* pneumonia. Tagged *M. haemolytica* were isolated from all four bighorn sheep, as confirmed by growth in ampicillin-containing culture medium, PCR-amplification of genes encoding GFP and Ap<sup>R</sup>, and immunofluorescent staining of GFP. These results unequivocally demonstrate transmission of *M. haemolytica* from domestic to bighorn sheep, resulting in pneumonia and death of bighorn sheep.

**Key words:** Bighorn sheep, domestic sheep, green fluorescent protein, *Mannheimia haemolytica*, *Ovis canadensis*, pneumonia, transmission.

## INTRODUCTION

The large decline in the bighorn sheep (*Ovis canadensis*) population in North America, from an estimated two million at the beginning of the 19th century to fewer than 70,000 now (2009) (Buechner, 1960; Valdez and Krausman, 1999), has been attributed in part to diseases, particularly pneumonia caused by bacteria of the genera *Mannheimia*, *Bibersteinia*, and *Pasteurella* (Coggins, 1988; Miller, 2001). Bighorn sheep are much more susceptible to pneumonia than are domestic sheep (*Ovis aries*; Foreyt, 1994). Since the early 1980s, there

have been anecdotal field reports of bighorn deaths due to pneumonia following contact with domestic sheep (Foreyt and Jessup, 1982; Coggins, 1988; George et al., 2008).

Bacteria of the genera *Mannheimia*, *Bibersteinia*, and *Pasteurella* are commensal bacteria in the pharynx and nasal cavities of domestic and bighorn sheep (Ward et al., 1990). Experimental inoculation of some of the isolates from domestic sheep—isolates which do not readily cause disease in the domestic sheep—have resulted in fatal pneumonia in bighorn sheep (Onderka et al., 1988; Foreyt et al., 1994). In five experimental

commingling studies conducted by three investigators, 41 of 43 bighorn sheep died following contact with domestic sheep (Onderka and Wishart, 1988; Foreyt, 1989, 1990; Callan et al., 1991). These findings appeared to confirm earlier reports of the death of bighorn sheep after contact with domestic sheep, thus incriminating domestic sheep in the induction of fatal pneumonia in bighorn sheep. Although *Mannheimia (Pasteurella) haemolytica*, *Bibersteinia (Pasteurella) trehalosi*, and *Pasteurella multocida* were isolated from the dead bighorn sheep, these studies did not demonstrate that these organisms were transmitted from the domestic sheep to the bighorn sheep. In some of these studies, the bacteria that were isolated from the dead bighorn sheep were not shown to be present in the domestic sheep. It is possible that the bacteria responsible for the death of the bighorn sheep were not carried by the domestic sheep. It is also conceivable that these bacteria were present in the domestic sheep, but were not isolated, because nasal swabs rather than pharyngeal swabs were obtained or because adequate numbers of bacterial colonies from the initial isolation were not picked up for further characterization. Even the isolation of bacteria belonging to the same species, serotype, or biotype, from the domestic sheep and bighorn sheep did not demonstrate that the organism was transmitted from domestic sheep.

Our objective was to determine, unambiguously, whether a respiratory pathogen can be transmitted from domestic sheep to bighorn sheep. Multiple genera, species, and serotypes of bacteria can colonize the nasal cavities and the pharynx of a single animal (Ward et al., 1997). *Mannheimia haemolytica*, *B. trehalosi*, and *P. multocida* are commonly isolated from pneumonic lungs of bighorn sheep, (Jaworski et al., 1998; Kelley et al., 2007; George et al., 2008). *Mannheimia haemolytica* consistently causes severe bronchopneumonia and the rapid death of bighorn sheep

under experimental conditions (Onderka et al., 1988; Foreyt et al., 1994; Dassanayake et al., 2009). Therefore, we selected *M. haemolytica* for this study. We obtained four *M. haemolytica* isolates from the nasopharynx of domestic sheep and tagged them with a plasmid encoding genes for green fluorescent protein (GFP), and for beta-lactamase (Bla), which confers ampicillin resistance (Ap<sup>R</sup>). The four domestic sheep were colonized with the tagged bacteria and allowed to commingle with bighorn sheep to determine whether there was transmission of the GFP-tagged bacteria.

## MATERIALS AND METHODS

### Screening of animals for respiratory pathogens

Experimental protocols were reviewed and approved by the Institutional Animal Care and Use Committee (IACUC) at Washington State University.

Four, clinically normal domestic sheep from the same flock were selected for the study. Nasal and pharyngeal swabs, from two groups of four domestic sheep and four bighorn sheep, were collected twice at 1- to 2-wk intervals. The swabs were collected from the domestic sheep at the beginning of the study (61 wk and 63 wk prior to the beginning of the transmission study) to obtain *M. haemolytica* isolates for tagging with GFP and Ap<sup>R</sup>. The bighorn sheep were sampled 42 days and 35 days prior to the beginning of the transmission study. The swabs were analyzed for the presence of ovine respiratory disease (ORD) pathogens by protocols routinely used at Washington Animal Disease Diagnostic Laboratory (WADDL; Pullman, Washington, USA). The pathogens screened for included the bacteria *M. haemolytica*, *B. trehalosi*, and *Mycoplasma ovipneumoniae* and the viruses respiratory syncytial virus (RSV), parainfluenza 3 virus (PI-3), bovine herpesvirus1 (BHV-1), and bovine viral diarrhoea virus (BVDV).

### Isolation of viruses from nasopharyngeal swabs and lungs

The bovine turbinate (BT) cell line was used for viral propagation because these cells were known to support the growth of all the above viruses. Swabs in universal viral transport medium (BD Biosciences, Sparks, Maryland, USA) were vortexed, and the medium was plated onto BT cells in minimal essential

medium (MEM) supplemented with 10% fetal bovine serum (FBS; free of antibodies to known respiratory viruses) and antibiotics (penicillin-streptomycin 100 IU/ml; gentamicin 50 µg/ml; and fungizone 25 µg/ml). Inoculated cell cultures were incubated at 37 C in a humidified atmosphere of 5% CO<sub>2</sub>. The BT cells were observed daily for cytopathic effect.

#### Isolation of *M. ovipneumoniae* and *M. haemolytica* from nasopharyngeal swabs and lungs

Swabs from each animal were streaked onto blood agar plates and kept at 37 C overnight under aerobic and anaerobic growth conditions. The bacterial colony morphology on brain-heart infusion (BHI) sheep blood agar and triple sugar iron (TSI) medium; Gram staining; the ability to hydrolyze arabinose, trehalose, indole, nitrate, xylose, and catalase; and oxidase activity were used to differentiate *M. haemolytica* from *B. trehalosi* and *P. multocida* isolates. *Mycoplasma ovipneumoniae* was isolated by growth on pleuropneumonia-like organism broth and selective agar plates according to a previously described protocol (Besser et al., 2008).

#### Serotyping of *M. haemolytica* isolates

*Mannheimia haemolytica* strains were serotyped using serotype-specific rabbit antisera obtained from Glynn Frank (National Animal Disease Center, Ames, Iowa, USA). Cells from a single colony of overnight growth on a sheep blood agar plate were swirled for 30 sec in 30 µl of serum on a glass microscope slide. Agglutination was observed under a dissecting microscope. Serotype-specific antisera for the following serotypes were tested: A1, A2, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, and A16.

#### Polymerase chain reaction (PCR) detection of *M. haemolytica*

The PCR assay specific for *M. haemolytica* has been described (Dassanayake et al., 2010). A portion of the gene encoding *M. haemolytica* O-sialoglycoprotein endopeptidase (*gcp*; Genbank accession number AY83967) was amplified by PCR using primers MhgcpF: 5'-AGA GGC CAA TCT GCA AAC CTC G-3' and reverse primer MhgcpR: 5'-GTT CGT ATT GCC CAA CGG CG-3'. PCRs were carried out in a final, 50-µl volume with GoTaq® PCR SuperMix (Promega Inc., Madison, Wisconsin, USA) with 0.2 µM each primer and 2 µl bacterial culture. The PCR cycling conditions consisted of an initial denaturation at 95 C for

5 min followed by 35 cycles of denaturation at 95 C for 30 sec, annealing at 55 C for 30 sec, and extension at 72 C for 40 sec, and a final elongation at 72 C for 5 min. The PCR products were visualized after electrophoresis in 1.0% agarose gels run at 7.0 V/cm and staining with ethidium bromide.

#### PCR detection of *M. ovipneumoniae*

Both standard PCR and real-time PCR (RT-PCR) were used. Standard PCR amplification conditions were essentially the same as previously described (Besser et al., 2008). Real-time PCR was developed in-house at WADDL using the following primers: Movip F: 5'-GGG GTG CGC AAC ATT AGT TA-3'; Movip R: 5'-CTT ACT GCT GCC TCC CGT AG-3'; and Movip (Probe): 5'-6-FAM-TTA GCG GGC CCA AGA GGC TGT A-BHQ-1-3' derived from GenBank sequences EU290066 and NR\_025989 of *M. ovipneumoniae*. The RT-PCR was run in an ABI 7500 Fast Thermocycler (Applied Biosystems, Carlsbad, California, USA) with the following cycling parameters: Stage 1: 1 hold at 50 C for 2 min (optics off) 95 C for 600 sec (optics off); Stage 2: 45 repeat cycles of 95 C for 15 sec (optics off) to denature and 61 C for 60 sec for annealing and extension (optics on). Test samples were read on the FAM wavelength. Those with a cycle threshold below 40.0 on the FAM channel were classed as positive for *M. ovipneumoniae*.

#### Tagging of *M. haemolytica* isolates with a plasmid carrying the genes encoding GFP and Ap<sup>R</sup>

Plasmid pAM2425 was constructed by cloning the *gfp* gene from plasmid pAG408 into an *M. haemolytica* shuttle vector, pAM2355 (Marciel, 2001). Briefly, the *Clai*/*EcoRI* fragment of pAG408 was cloned into a pBluescript KS II+ plasmid carrying the leukotoxin C promoter, then the P<sub>lktC</sub>::*gfp* fusion was amplified using M13 universal forward (5'-GTA AAA CGA CGG CCA GT-3') and modified reverse (5'-GGG ATA TCT AGA AGC TTA ACA GCT ATG ACC ATG ATT ACG-3', *HindIII* site italicized) primers, and then cloned as a *HindIII/XbaI* fragment into the Bla-resistant vector pAM2355 to create pAM2425 (Fig. 1). All constructions were performed in *Escherichia coli* XL1-Blue (Stratagene, La Jolla, California, USA) as described (Fedorova and Highlander, 1997). Plasmid DNA was purified using the Qiagen miniprep kit (Qiagen, Valencia, California, USA), and the four *M. haemolytica* isolates from the domestic sheep were transformed with plasmid pAM2425, by electroporation, as described by Craig et al. (1989). One-hundred



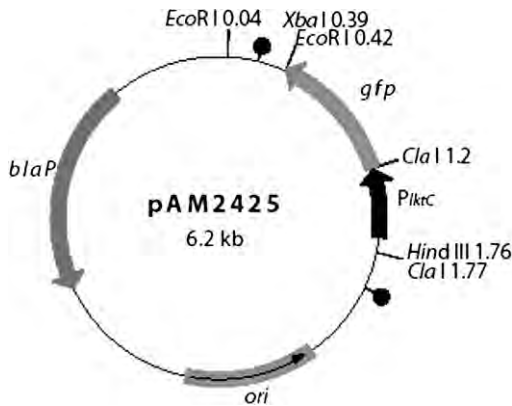


FIGURE 1. Schematic representation of the plasmid pAM2425 carrying *gfp* and *bla* genes. Plasmid pAM2425 was constructed by cloning the *gfp* gene from plasmid pAG408 into a *Mannheimia haemolytica* shuttle vector pAM2355, as described in materials and methods.

nanograms of plasmid DNA were added to each cuvette, which contained 100  $\mu$ l electro-competent cells. An electrical pulse of 15–20 kilovolt, 400 ohm, 25  $\mu$ farad was applied and, immediately, 1 ml BHI/SOC medium (BHI broth; 2.5 mM KCl; 10 mM MgSO<sub>4</sub>; 10 mM MgCl<sub>2</sub>; 20 mM glucose) was added and the mixture was incubated at 37 C for 3–4 hr to allow expression of markers. One-hundred-microliter aliquots were spread onto sheep blood agar plates containing 20  $\mu$ g/ml ampicillin (Bioline, Randolph, Massachusetts, USA) and plates were incubated overnight at 37 C. Ampicillin-resistant colonies containing pAM2425 were identified by colony PCR using *gfp* and *bla* gene-specific primers, respectively (*gfp* forward 5'-ATG AGT AAA GGA GAA GAA CT-3' and reverse 5'-GTA TAG TTC ATC CAT GCC ATG-3' and *bla* forward 5'-ATG TTA AAT AAG TTA AAA ATC-3' and reverse 5'-TTA GTT GAG CTG TAA AGT ATG AAA TAC-3'), in a 25- $\mu$ l mastermix reaction containing GoTaq, as directed by the manufacturer (Promega Corp.) with slight modification. The PCR cycling conditions consisted of an initial denaturation at 95 C for 5 min, followed by 30 cycles of denaturation at 94 C for 30 sec, annealing at 55 C for 30 sec, extension at 72 C for 1 min, and a final elongation at 72 C for 10 min.

#### Leukotoxin production by *M. haemolytica* isolates before and after tagging with GFP and Ap<sup>R</sup>

Leukotoxin production by the *M. haemolytica* isolates was confirmed by subjecting

culture supernatant fluid to MTT dye reduction cytotoxicity assay as described by Gentry and Srikumaran (1991). The percent cytotoxicity was calculated as follows: % cytotoxicity = [1 – (OD of toxin-treated cells/OD of toxin-untreated cells)]  $\times$  100.

#### Colonization of domestic sheep with tagged *M. haemolytica*

Bacteria were cultured overnight at 37 C in BHI agar supplemented with 5% sheep blood (Remel, Lenexa, Kansas, USA). Tagged *M. haemolytica* was cultured on plates containing BHI supplemented with 20  $\mu$ g/ml ampicillin (Bioline). To prepare the inoculum, the bacteria were cultured in BHI broth at 37 C for 2–3 hr followed by growth in Roswell Park Memorial Institute (RPMI) 1640 medium, without phenol red (GIBCO), under the same conditions. The bacterial suspension was diluted in RPMI 1640 to obtain the desired concentration (colony-forming units [CFU]/ml; Petras et al., 1995). Using an atomizer, about 10<sup>9</sup> CFU of tagged *M. haemolytica* in 5 ml of phosphate-buffered saline (PBS) were sprayed intranasally into all four domestic sheep from which they were originally isolated. Nasal and pharyngeal swabs were collected 2 wk following inoculation to confirm the presence of tagged bacteria by colony PCR, as described above. A serotype-2 strain of *M. haemolytica*, isolated several years ago from a domestic sheep (Foreyt et al., 1994), also was tagged with the plasmid carrying the *gfp* and *bla* genes. This strain failed to colonize the pharynx of the four domestic sheep and was not used further.

#### Domestic sheep-bighorn sheep contact experiments

On day 0, the four domestic sheep and the four bighorn sheep were placed in two identical pens (about 20  $\times$  3 m) separated by another pen (20  $\times$  10 m), and animals were monitored for clinical signs. After 1 mo, the bighorn sheep were moved into the middle pen so that they had fence-line contact with domestic sheep. For the next 2 mo, the animals were observed for clinical signs of pneumonia, and nasal and pharyngeal swabs were collected twice (days 51 and 60) for detection of the presence of tagged *M. haemolytica*. After 2 mo in fence-line contact, the domestic sheep and bighorn sheep were allowed to commingle in the middle pen (20  $\times$  10 m).

#### Clinical assessment and necropsy

The bighorn sheep were observed once a day for clinical signs including anorexia,

TABLE 1. Microbial profile of the nasopharynx of domestic sheep before commingling.

Animal no.	Sample site <sup>a</sup>	Bacteria recovered, sample 1/sample 2 <sup>b</sup>			
		Mh <sup>c</sup>	Bt <sup>d</sup>	Past <sup>e</sup>	Movi <sup>f</sup>
1	P	+/+ <sup>g</sup>	+/-	-/-	+/+
	N	-/-	-/-	-/-	+/-
2	P	-/+	-/-	+/-	+/+
	N	+/+	-/-	-/-	-/-
3	P	-/+	-/-	+/-	+/-
	N	-/+	-/-	-/-	-/-
5	P	+/-	+/-	-/-	+/-
	N	-/-	-/-	-/-	+/-

<sup>a</sup> Site of sample collection: P = pharynx; N = nasal cavity.

<sup>b</sup> Sample 1/sample 2 = Swabs collected at two different dates.

<sup>c</sup> Mh = *Mannheimia haemolytica*.

<sup>d</sup> Bt = *Bibersteinia trehalosi*.

<sup>e</sup> Past = *Pasteurella* species.

<sup>f</sup> Movi = *Mycoplasma ovipneumoniae*.

<sup>g</sup> (-) = Absent or not detected; (+) = present.

lethargy, cough, dyspnea, and nasal discharge. When the animals began to show clinical signs of pneumonia, they were observed more frequently. Animals that died during the experiment were necropsied within 6 hr. Lungs were removed from each animal and carefully examined for lesions of pneumonia. The degree of involvement of the lung lobes was estimated as percent pneumonic scores (percent of lung that appeared pneumonic on visual examination). Pleuritis was noted as present or absent. Representative samples of pneumonic and normal lung tissue were prepared for both bacteriologic and histopathologic examination (Odugbo et al., 2004). Animals that showed severe signs of pneumonia were euthanized by intravenous administration of pentobarbital and then necropsied in the same manner as those found dead.

#### Detection of tagged *M. haemolytica*

**Colony PCR:** Swabs were directly streaked onto sheep blood agar plates containing 20 µg/ml ampicillin and the plates were incubated overnight at 37 C. The following day, 5–10 representative colonies from each plate were picked and subjected to colony PCR assay, performed as described above, to confirm the presence of *gfp* and *bla* genes.

**Immunofluorescence labeling of GFP-tagged *M. haemolytica*:** To detect GFP by immunofluorescence, bacterial cells were fixed in 2% paraformaldehyde for 10 min, washed with

PBS, and incubated with 100 µl of FITC-conjugated rabbit polyclonal antibodies specific for GFP (Abcam, Cambridge, Massachusetts, USA) for 30 min at 4 C. The cells were washed with PBS and mounted onto microscopic slides and visualized using a fluorescence microscope.

## RESULTS

### Microbial flora of the upper respiratory tract before commingling

Microbial isolation revealed that all four domestic sheep carried *Pasteurellaceae* in the nasopharynx (Table 1). All four also yielded *M. haemolytica* from nasopharyngeal samples, at least once, prior to commingling (Table 1). All four domestic sheep were culture-positive for *M. ovipneumoniae* but were negative for the respiratory viruses RSV, PI-3, BVDV, and BHV-1.

Prior to beginning the study, the four bighorn sheep were negative for viruses and for *M. ovipneumoniae* by culture (Table 2). However, three of the bighorn sheep yielded *M. haemolytica* from nasopharyngeal swabs and all four had *B. trehalosi* in their pharynx (Table 2).

### Characteristics of the *M. haemolytica* isolates from domestic sheep selected for tagging

Four *M. haemolytica* isolates obtained from two of the domestic sheep were designated as numbers 7, 10, 15, and 16. These isolates were determined to be *M. haemolytica* by cultural and biochemical characteristics and were confirmed by *M. haemolytica*-specific PCR assays. Serotype analysis with antisera specific for all known serotypes (A1, A2, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, and A16) revealed that isolate 7 belonged to serotype 9, while the other three were untypable. All of these isolates produced leukotoxin in culture (Fig. 2).

### *Mannheimia haemolytica* isolates from domestic sheep get tagged with the plasmid carrying the *gfp* and *bla* genes

Growth of tagged *M. haemolytica* isolates on ampicillin plates suggested that



TABLE 2. Microbial profile of the nasopharynx of bighorn sheep before and after their commingling with domestic sheep. Bacteria were recovered via culture, except that *Mycoplasma ovipneumoniae* was also detected postmortem using polymerase chain reaction (PCR) assay.

Animal	Sample site <sup>a</sup>	Bacteria recovered before commingling (sample 1/sample 2) <sup>b</sup>			Sample site	Bacteria recovered after commingling (postmortem)			
		Mh <sup>c</sup>	Bt <sup>d</sup>	Movi <sup>e</sup>		Mh	Bt	Movi (culture)	Movi (PCR)
Y13	P	-/- <sup>f</sup>	+/+	-/-	P	+	-	-	-
	N	-/-	-/-	-/-	N	+	+	-	-
					L	+	+	-	-
Y15	P	-/+	+/-	-/-	P	-	+	+	+
	N	+/+	-/-	-/-	N	+	-	-	-
					L	+	-	-	-
Y16	P	+/-	+/+	-/-	P	-	+	-	-
	N	-/-	-/-	-/-	N	+	+	-	-
					L	+	+	-	-
Y47	P	-/-	+/+	-/-	P	nd <sup>g</sup>	nd	nd	-
	N	-/+	-/-	-/-	N	nd	nd	nd	-
					L	+	-	-	+

<sup>a</sup> Site of sample collection: P = pharynx; N = nasal cavity; L = lung.

<sup>b</sup> Sample 1/sample 2 = Swabs collected on two different dates.

<sup>c</sup> Mh = *Mannheimia haemolytica*.

<sup>d</sup> Bt = *Bibersteinia trehalosi*.

<sup>e</sup> Movi = *Mycoplasma ovipneumoniae*.

<sup>f</sup> (-) = Absent or not detected; (+) = present.

<sup>g</sup> nd = not done.

the bacteria were successfully tagged with GFP and Ap<sup>R</sup>. PCR using *gfp*- and *bla*-specific primers confirmed the presence of *gfp* (Fig. 3A) and *bla* (Fig. 3C) in all four isolates. Immunofluorescence assays using FITC-labeled anti-GFP antibodies further confirmed the expression of GFP in these isolates (Fig. 4A). Cytotoxicity assays of the culture supernatant fluid, before and after the tagging, revealed that the leukotoxin production was not affected by the presence of extrachromosomal plasmid (Fig. 2). In a separate experiment, two bighorn sheep inoculated intratracheally with  $5 \times 10^9$  CFU of the *M. haemolytica* isolates tagged with GFP/Ap<sup>R</sup> plasmid developed pneumonia and died within 2 days postinoculation, indicating that organisms tagged with the GFP/Ap<sup>R</sup> plasmid were pathogenic.

#### GFP- and Ap<sup>R</sup>-tagged *M. haemolytica* effectively colonize the nasopharynx of domestic sheep

Three inoculations using a cocktail of all four, tagged *M. haemolytica* isolates re-

sulted in colonization of the nasopharynx of three of the four domestic sheep. The colonization was detected by analyzing nasal and pharyngeal swabs for two consecutive weeks postinoculation (data not shown). The PCR amplification of *gfp* and *bla* genes confirmed the presence of the plasmid-tagged *M. haemolytica* in all of the three domestic sheep. All of the four domestic sheep continued to remain clinically normal after inoculation with tagged *M. haemolytica*.

#### Domestic sheep transmit GFP- and Ap<sup>R</sup>-tagged *M. haemolytica* to bighorn sheep

The domestic sheep and bighorn sheep were separated by about 10 m in individual pens during the first month. During that time, no symptoms of respiratory disease were observed in either domestic sheep or bighorn sheep. Three bighorn sheep (Y13, Y15, and Y47) yielded tagged *M. haemolytica* from samples collected on days 51, 60, or both (21 days, 30 days, or both after fence-line contact began), as

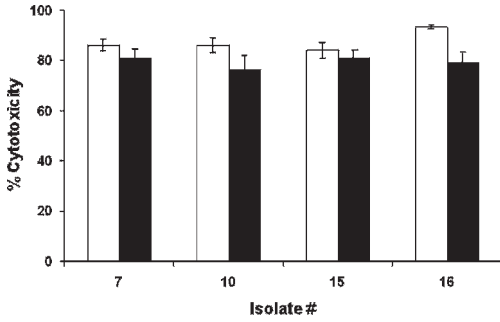


FIGURE 2. Leukotoxin production by *Mannheimia haemolytica* isolates before and after tagging with the plasmid carrying *gfp* and *bla*. Culture supernatant fluids from the *M. haemolytica* isolates numbers 7, 10, 15, and 16, before and after tagging with the plasmid carrying *gfp* and *bla*, were subjected to the MTT-dye reduction cytotoxicity assay. The percent cytotoxicity was calculated as follows: % cytotoxicity =  $[1 - (\text{OD of toxin-treated cells} / \text{OD of toxin-untreated cells})] \times 100$ . The open and shaded bars represent % cytotoxicity of culture supernatant fluids from the respective isolates, before and after tagging, respectively. Results shown are the means of three independent experiments. The error bars indicate standard deviations of the means.

revealed by *gfp* and *bla* gene-specific PCR. One of these bighorn sheep (Y15) developed coughing on day 83, 32 days following the first evidence of tagged *M. haemolytica* infection, but none of the animals died. On day 92 (2 days post-commingling), one bighorn sheep (Y15) died. The remaining animals at this time were lethargic and showed intermittent coughing. On day 95 (5 days postcommingling), two more bighorn sheep (Y13 and Y16) died, and on day 99 (9 days postcommingling), the remaining bighorn sheep (Y47) exhibited severe clinical signs of pneumonia and was euthanized.

#### Induction of pneumonia in, and death of, bighorn sheep are caused by *M. haemolytica* transmitted by the domestic sheep

Postmortem examinations revealed that all four bighorn sheep had acute, bilateral, fibrinohemorrhagic pneumonia that was equally distributed on both sides (Fig. 5A).

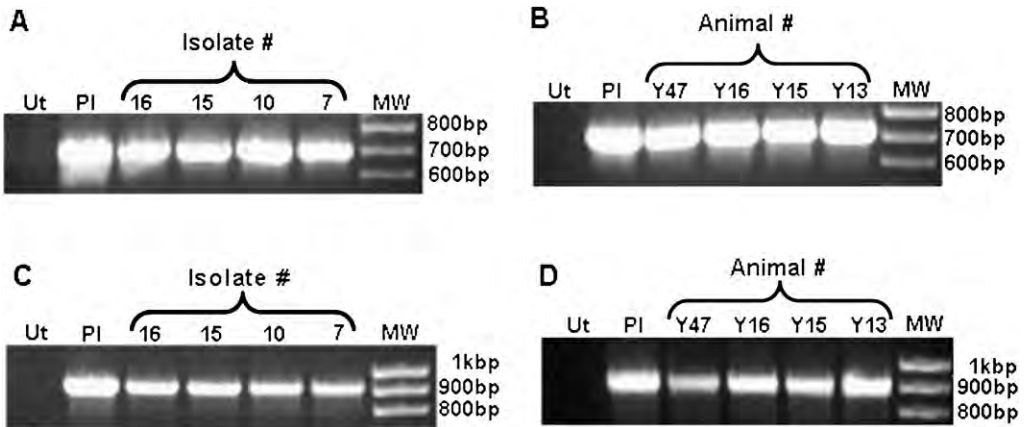


FIGURE 3. Detection of *gfp* and *bla* in *Mannheimia haemolytica* isolates by polymerase chain reaction (PCR) amplification. The *M. haemolytica* isolates tagged with the plasmid carrying *gfp* and *bla*, and the *M. haemolytica* isolates recovered from the lungs of the four dead bighorn sheep, were tested for the presence of *gfp* and *bla* by PCR analysis using primers described under materials and methods. Panels A and B represent PCR amplification of *gfp*. Panels C and D represent PCR amplification of *bla*. Ut=the untagged *M. haemolytica* (pool of all 4 isolates); PI=plasmid pAM2425 used as positive control in PCR to indicate the presence of *gfp* and *bla*; numbers 16, 15, 10, and 7 represent the tagged isolates and the numbers Y47, Y16, Y15, and Y13 represent *M. haemolytica* isolated from the lungs of bighorn sheep numbers Y47, Y16, Y15, and Y13 at necropsy. MW=molecular weight markers. Results of one representative experiment out of three are shown.

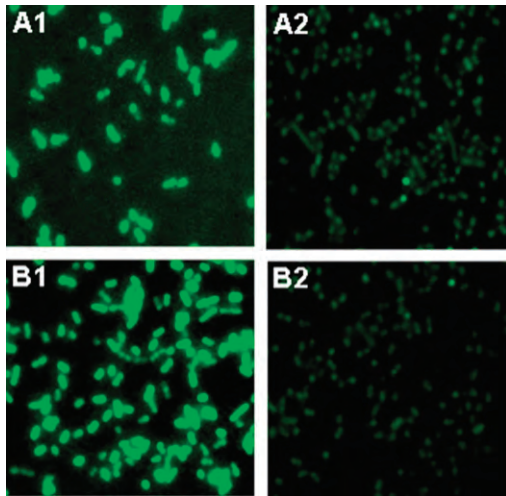


FIGURE 4. Detection of expression of GFP by immunofluorescence staining. The *Mannheimia haemolytica* isolates tagged with the plasmid carrying *gfp* and *bla*, and the *M. haemolytica* isolates recovered from the lungs of the four dead bighorn sheep, were tested for the expression of GFP by immunofluorescence staining with FITC-conjugated rabbit anti-GFP antibodies. All four tagged isolates (7, 10, 15, and 16), and isolates recovered from the lungs of all four dead bighorn sheep (Y13, Y15, Y16, and Y47), were positive for fluorescence expression. Fluorescence exhibited by one representative tagged isolate (Panel A1), and one representative isolate recovered from the lungs of the dead bighorn sheep (Panel B1), are shown. Panel A2 and B2 represent untagged *M. haemolytica* used as the negative control.

Estimated percent pneumonic involvement ranged from 70–95% in both the lungs. Fibrinous pleuritis was present in all four bighorn sheep. Although the lungs from the different bighorn sheep varied in severity in gross lesions, they were histologically very similar. In affected areas of the lungs, alveolar spaces and bronchioles were filled with edema, fibrin, red blood cells, and dense collections of primarily macrophages and neutrophils (Fig. 5B). The inflammatory cells showed degenerative changes and often had streaming nuclei ('oat cells'). Many alveolar walls, and occasional bronchiolar walls, were disrupted by necrosis and hemorrhage. When present, pleuritis was fibrinous.

#### Re-isolation of tagged *M. haemolytica* from pneumonic lungs of bighorn sheep

The swabs taken from lungs during necropsy were plated on BHI-agar plates which, upon incubation, showed the presence of colonies resistant to 20 µg/ml ampicillin. Further *gfp* gene- and *bla* gene-specific PCR confirmed the presence of tagged bacteria in the lungs (Fig. 3B, D). Immunofluorescence assays using FITC-labeled antiGFP antibodies further confirmed the expression of GFP in these isolates (Fig. 4B). None of the tagged isolates recovered from the lungs were typable with the antisera specific for the known serotypes of *M. haemolytica* (A1, A2, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, and A16).

#### DISCUSSION

Several anecdotal reports suggest that bighorn sheep die from pneumonia following contact with domestic sheep (Foreyt and Jessup, 1982; Coggins, 1988; George et al., 2008). Fatal pneumonia in bighorn sheep following experimental inoculation of *M. haemolytica* isolates from domestic sheep, isolates which did not cause disease in the domestic sheep, prompted researchers to perform commingling experiments to determine whether there was transmission of respiratory pathogens from domestic sheep to bighorn sheep (Onderka and Wishart, 1988; Foreyt, 1989, 1990; Callan et al., 1991). Although over 95% of the bighorn sheep in these studies died following contact with domestic sheep, there was not clear documentation of transmission of *M. haemolytica*, or of any other pathogen, from domestic sheep to bighorn sheep.

Whole genome sequencing, pulsed field gel electrophoresis, or amplified fragment length polymorphism, ribotyping, multi-locus enzyme electrophoresis, and multi-locus sequence typing are molecular tools that are available to compare bacterial pathogens isolated from domestic sheep and bighorn sheep. Whole genome se-

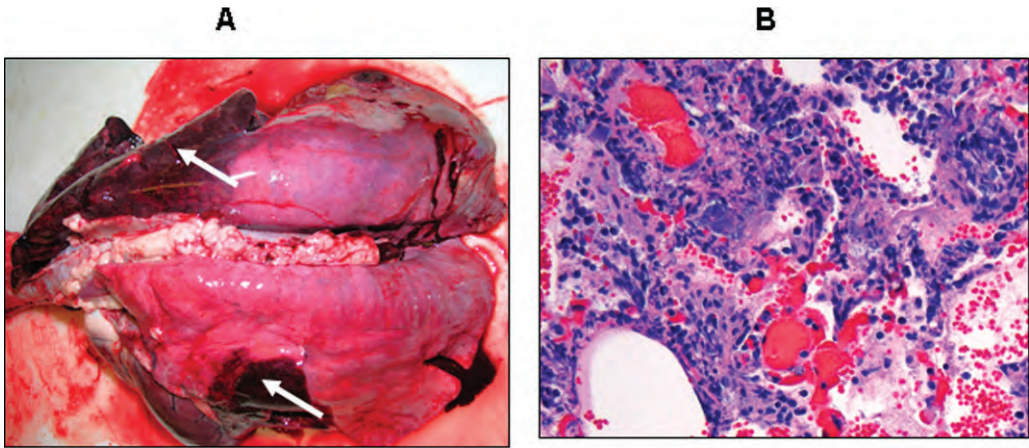


FIGURE 5. Representative gross lesions and histopathology of the lungs of the dead bighorn sheep. (A) Typical gross appearance of the lungs of the dead bighorn sheep. The lungs were removed from the carcass for examination, and the total area of gross lung consolidation was discerned by visual inspection and by palpation. In this case, the right cranial and middle, and the left middle lung lobes, are dark red and consolidated, and additional consolidation was evident from palpation; darkened areas in the photograph were subsequently determined to be areas of severe hemorrhage. Fibrin strands on the lung surface indicate pleuritis. (B) The typical histopathologic appearance of the lungs of the dead bighorn sheep. Lung tissue samples of bighorn sheep were aseptically removed and processed for histopathology. Alveolar septa are necrotic and replaced by fibrin and debris. Bronchioles and alveoli are filled with streaming mononuclear cells. H&E stain. 100 $\times$ .

quencing is an elaborate and expensive procedure. The other molecular methods are time-consuming and cannot identify bacterial isolates with 100% certainty (Pitt, 1999; Yakubu et al., 1999). We reasoned that tagging the bacterial isolates obtained from domestic sheep, recolonizing the nasopharynx of these animals with the tagged bacteria, and commingling them with bighorn sheep would circumvent these problems and provide an irrefutable method of determining whether bacterial pathogens can be transmitted from domestic sheep to bighorn sheep. We selected *M. haemolytica* for this study because of its documented ability to consistently induce pneumonia in, and death of, bighorn sheep (Onderka et al., 1988; Foreyt et al., 1994; Dassanayake et al., 2009). We employed two markers, the GFP and Ap<sup>R</sup>, to enhance the validity of our findings. We also utilized two tests to detect each marker (PCR and immunofluorescence for GFP and growth on ampicillin-containing medium and PCR

for Ap<sup>R</sup>). The growth of the tagged *M. haemolytica* in the presence of ampicillin, the PCR amplification of the genes *gfp* and *bla*, and the immunofluorescence staining with anti-GFP antibodies clearly indicated that the four isolates of *M. haemolytica* obtained from the domestic sheep were tagged with the markers (Fig. 3A, C, 4A). These three parameters were used to clearly document the successful colonization of the pharynx of domestic sheep by the tagged *M. haemolytica* and, more importantly, to identify the tagged organisms isolated from the dead bighorn sheep (Fig. 3B, D, 4B).

Tagged-isolate 7 typed as serotype 9 while the other three (numbers 10, 15, and 16) were untypable. However, none of the isolates recovered from the lungs of the four dead bighorn sheep typed as serotype 9. This could be because the tagged-isolate 7 did not colonize the nasopharynx of domestic sheep; because it colonized the domestic sheep but was not shed in adequate amounts to be



acquired by the bighorn sheep; or because it was acquired by the bighorn sheep but not recovered by us because it was present in the lungs in lower numbers than the other isolates at the time of sampling. Nevertheless, transmission from domestic sheep to bighorn sheep clearly occurred because other tagged isolates of *M. haemolytica* were recovered from the lungs of every bighorn sheep.

Our finding that three out of the four bighorn sheep acquired the tagged *M. haemolytica* within 1 mo of fence-line contact indicates that such contact was adequate for transmission of these organisms to occur. Death of the first bighorn sheep occurred about 1 mo after tagged *M. haemolytica* was first detected in that animal. This lag period may have been necessary for the transmitted *M. haemolytica* to colonize and proliferate to the threshold number of organisms required to induce pneumonia and death in bighorn sheep. It is conceivable that the bighorn sheep that acquired the tagged *M. haemolytica* during the fence-line contact would have died even without commingling with the domestic sheep. This notion is supported by the fact that one bighorn died only 2 days after commingling with the domestic sheep. However, in order to determine with certainty whether fence-line contact is adequate for induction of pneumonia and death of bighorn sheep, the experiment would need to be performed with a longer period of fence-line contact.

It is also possible that another pathogen(s) was necessary to predispose the bighorn sheep to pneumonia by *M. haemolytica* infection. The bighorn sheep were not positive for *M. ovipneumoniae* before commingling with the domestic sheep. Lung tissue from one of the dead bighorn sheep was positive for *M. ovipneumoniae* by standard and RT-PCR (Table 2), and *M. ovipneumoniae* was detected in the nasopharynx of a second dead bighorn sheep by culture and PCR, which raises the possibility that these

organisms, along with the tagged *M. haemolytica*, were transmitted from the domestic sheep to the bighorn sheep. It is possible that during the lag period, *M. ovipneumoniae* colonized the upper respiratory tract of at least two bighorn sheep and predisposed them to the tagged *M. haemolytica*, but whether *M. ovipneumoniae* played any role in the other two bighorn sheep seems even less certain, based on available data (Table 2). In domestic sheep, *M. ovipneumoniae* has been shown to render the cilia on the epithelial cells of the upper respiratory tract dysfunctional (Jones et al., 1985; Niang et al., 1998). Previous studies have shown that *M. ovipneumoniae* does not kill bighorn sheep (Besser et al., 2008) but can predispose them to *M. haemolytica* infection (Dassanayake et al., 2010). However, it is not likely that *M. ovipneumoniae* is a necessary predisposing factor for fatal infection of bighorn sheep by every strain of *M. haemolytica* because, in an earlier study, intranasal inoculation with *M. haemolytica* resulted in the death of 75% of inoculated bighorn sheep ( $n=4$ ) within 48 hr (unpubl. data). The *M. haemolytica* used in that study was a serotype 2 strain, which is known to be virulent in bighorn sheep (Foreyt et al., 1994). Therefore, we believe that only less-virulent strains of *M. haemolytica* may require *M. ovipneumoniae* or another predisposing agent. Studies are currently underway to elucidate the role of *M. ovipneumoniae* in the development of pneumonia in bighorn sheep following contact with domestic sheep. In summary, this study irrefutably demonstrated the transmission of *M. haemolytica* from domestic sheep to bighorn sheep and the resulting pneumonia and death of bighorn sheep.

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#### LITERATURE CITED

- BESSER, T. E., E. F. CASSIRER, K. A. POTTER, J. VANDERSCHALIE, A. FISCHER, D. P. KNOWLES, D. R. HERNDON, F. R. RURANGIRWA, G. C. WEISER, AND S. SRIKUMARAN. 2008. Association of *Mycoplasma ovipneumoniae* infection with population-limiting respiratory disease in free-ranging Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*). *Journal of Clinical Microbiology* 46: 423–430.
- BUECHNER, H. K. 1960. The bighorn sheep in the United States, its past, present, and future. *Wildlife Monograph* 4: 3–174.
- CALLAN, R. J., T. D. BUNCH, G. W. WORKMAN, AND R. E. MOCK. 1991. Development of pneumonia in desert bighorn sheep after exposure to a flock of exotic wild and domestic sheep. *Journal of the American Veterinary Medical Association* 198: 1052–1056.
- COGGINS, V. L. 1988. The Lostine Rocky Mountain bighorn sheep die-offs and domestic sheep. *Proceedings of the Biennial Symposium of Northern Sheep and Goat Council* 6: 57–64.
- CRAIG, F. F., J. G. COOTE, R. PARTON, J. H. FREER, AND N. J. GILMOUR. 1989. A plasmid which can be transferred between *Escherichia coli* and *Pasteurella haemolytica* by electroporation and conjugation. *Journal of General Microbiology* 135: 2885–2890.
- DASSANAYAKE, R. P., S. SHANTHALINGAM, C. N. HERNDON, P. K. LAWRENCE, E. F. CASSIRER, K. A. POTTER, W. J. FOREYT, K. D. CLINKENBEARD, AND S. SRIKUMARAN. 2009. *Mannheimia haemolytica* serotype A1 exhibits differential pathogenicity in two related species, *Ovis canadensis* and *Ovis aries*. *Veterinary Microbiology* 133: 366–371.
- , D. R. CALL, A. A. SAWANT, N. C. CASAVANT, G. C. WEISER, D. P. KNOWLES, AND S. SRIKUMARAN. 2010. *Bibersteinia trehalosi* inhibits growth of *Mannheimia haemolytica* by a proximity-dependent mechanism. *Applied and Environmental Microbiology* 76: 1008–1013.
- , SHANTHALINGAM, S., C. N. HERNDON, R. SUBRAMANIAM, P. K. LAWRENCE, J. BAVANANTHASIVAM, E. F. CASSIRER, G. J. HALDORSON, W. J. FOREYT, F. R. RURANGIRWA, D. P. KNOWLES, T. E. BESSER, AND S. SRIKUMARAN. 2010. *Mycoplasma ovipneumoniae* can predispose bighorn sheep to fatal *Mannheimia haemolytica* pneumonia. *Veterinary Microbiology* (Epub ahead of print). doi: 10.1016/j.vetmic.2010.04.011.
- FEDOROVA, N. D., AND S. K. HIGHLANDER. 1997. Plasmids for heterologous expression in *Pasteurella haemolytica*. *Infection and Immunity* 186: 207–211.
- FOREYT, W. J. 1989. Fatal *Pasteurella haemolytica* pneumonia in bighorn sheep after direct contact with clinically normal domestic sheep. *American Journal of Veterinary Research* 50: 341–344.
- . 1990. Pneumonia in bighorn sheep: Effects of *Pasteurella haemolytica* from domestic sheep and effects on survival and long term reproduction. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 7: 92–101.
- . 1994. Effects of controlled contact exposure between healthy bighorn sheep and llamas, domestic goats, mountain goats, cattle, domestic sheep, or mouflon sheep. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 9: 7–14.
- , AND D. A. JESSUP. 1982. Fatal pneumonia of bighorn sheep following association with domestic sheep. *Journal of Wildlife Diseases* 18: 163–168.
- , K. P. SNIPES, AND R. W. KASTEN. 1994. Fatal pneumonia following inoculation of healthy bighorn sheep with *Pasteurella haemolytica* from healthy domestic sheep. *Journal of Wildlife Diseases* 30: 137–145.
- GENTRY, M. J., AND S. SRIKUMARAN. 1991. Neutralizing monoclonal antibodies to *Pasteurella haemolytica* leukotoxin affinity-purify the toxin from crude culture supernatants. *Microbial Pathogenesis* 10: 411–417.
- GEORGE, J. L., D. J. MARTIN, P. M. LUKACS, AND M. W. MILLER. 2008. Epidemic Pasteurellosis in a bighorn sheep population coinciding with the appearance of a domestic sheep. *Journal of Wildlife Diseases* 44: 388–403.
- JAWORSKI, M. D., D. L. HUNTER, AND A. C. S. WARD. 1998. Biovariants of isolates of *Pasteurella* from domestic and wild ruminants. *Journal of Veterinary Diagnostic Investigations* 10: 49–55.
- JONES, G. E., W. A. KEIR, AND J. S. GILMOUR. 1985. The pathogenicity of *Mycoplasma ovipneumoniae* and *Mycoplasma arginini* in ovine and caprine tracheal organ cultures. *Journal of Comparative Pathology* 95: 477–487.
- KELLEY, S. T., E. F. CASSIRER, G. C. WEISER, AND S. SAFAEE. 2007. Phylogenetic diversity of Pasteurellaceae and horizontal gene transfer of leukotoxin in wild and domestic sheep. *Infection, Genetics and Evolution* 7: 13–23.
- MARCIEL, A. M. 2001. Genetic tools for studying the transcription of *Mannheimia (Pasteurella) haemolytica*: Identification of cis-, trans-, and environmental factors modulating leukotoxin expression. PhD Thesis, Baylor College of Medicine, Houston, Texas, pp. 129–132.
- MILLER, M. W. 2001. Pasteurellosis. *In Infectious diseases of wild mammals*, 3rd Edition, E. S. Williams and I. K. Barker (eds.). Iowa State University Press, Ames, Iowa, pp. 330–339.
- NIANG, M., R. F. ROSENBUSCH, M. C. DEBEY, Y. NIYO,

- J. J. ANDREWS, AND M. L. KAEBERLE. 1998. Field isolates of *Mycoplasma ovipneumoniae* exhibit distinct cytopathic effects in ovine tracheal organ cultures. *Zentralbl Veterinär Medicine A* 45: 29–40.
- ODUGBO, M. O., L. E. ODAMA, J. U. UMOH, AND L. H. LOMBIN. 2004. The comparative pathogenicity of strains of eight serovars and untypable strains of *Mannheimia haemolytica* in experimental pneumonia of sheep. *Veterinary Research* 35: 661–669.
- ONDERKA, D. K., AND W. D. WISHART. 1988. Experimental contact transmission of *Pasteurella haemolytica* from clinically normal domestic sheep causing pneumonia in Rocky Mountain bighorn sheep. *Journal of Wildlife Diseases* 24: 663–667.
- , S. A. RAWLUK, AND W. D. WISHART. 1988. Susceptibility of Rocky Mountain bighorn sheep and domestic sheep to pneumonia induced by bighorn and domestic livestock strains of *Pasteurella haemolytica*. *Canadian Journal of Veterinary Research* 52: 439–444.
- PETRAS, S. F., M. CHIDAMBARAM, E. F. ILLYES, S. FROSHAUER, G. M. WEINSTOCK, AND C. P. REESE. 1995. Antigenic and virulence properties of *Pasteurella haemolytica* leukotoxin mutants. *Infection and Immunity* 63: 1033–1039.
- PITT, T. L. 1999. Molecular typing in practice. *Journal of Hospital Infection* 43: S85–S88.
- VALDEZ, R., AND P. R. KRAUSMAN. 1999. Mountain sheep of North America. University of Arizona Press, Tucson, Arizona, pp. 19–20.
- WARD, A. C., M. R. DUNBAR, D. L. HUNTER, R. H. HILLMAN, M. S. BULGIN, W. J. DELONG, AND E. R. SILVA. 1990. Pasteurellaceae from bighorn and domestic sheep. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 7: 109–117.
- , D. L. HUNTER, M. D. JAWORSKI, P. J. BENOLKIN, M. P. DOBEL, J. B. JEFFRESS, AND G. A. TANNER. 1997. *Pasteurella* spp. in sympatric bighorn and domestic sheep. *Journal of Wildlife Diseases* 33: 544–547.
- YAKUBU, D. E., J. R. FARIBORZ, R. ABADI, AND T. H. PENNINGTON. 1999. Molecular typing methods for *Neisseria meningitidis*. *Journal of Medical Microbiology* 48: 1055–1064.

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*Accepted 16 February 2010.*





# United States Department of the Interior



## Pacific Southwest Region FISH AND WILDLIFE SERVICE

Nevada Fish and Wildlife Office  
1340 Financial Blvd., Suite 234  
Reno, Nevada 89502  
Ph: (775) 861-6300 ~ Fax: (775) 861-6301

June 17, 2014

Board of Supervisors  
Mono County  
P. O. Box 715  
Bridgeport, California 93517

Dear Mono County Board of Supervisors;

Subject: Mono County Draft Grant Deed of Conservation Easement Conway and Mattly Ranches

We have reviewed the draft Grant Deed of Conservation Easement Conway and Mattly Ranches and associated documents. We commend Mono County's efforts to protect the natural, scenic, open space, habitat, and historic values (referred to as "Conservation Values") present on the Conway and Mattly Ranches (collectively referred to in the associated documents as "Conway Ranch"). We also support the development of a conservation easement between Mono County and the Eastern Sierra Land Trust to preserve, protect, and maintain these Conservation Values. However, we do have concerns regarding the activities and uses, operations, and management of these properties and potential effects to the federally endangered Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*; Sierra bighorn), and the federally proposed Bi-State Distinct Population Segment of the Greater sage-grouse (*Centrocercus urophasianus*; sage-grouse) and its proposed critical habitat.

The U.S. Fish and Wildlife Service's (Service) responsibilities include administering the Endangered Species Act of 1973, as amended (Act), including sections 7, 9, and 10. Section 9 of the Act prohibits the taking of any federally listed endangered or threatened species. Section 3(19) of the Act defines take to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Service regulations (50 CFR 17.3) define harm to include significant habitat modification or degradation which actually kills

or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harassment is defined by the Service as an intentional or negligent action that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. The Act provides for civil and criminal penalties for the unlawful taking of listed species.

Exemptions to the prohibitions against take may be obtained through coordination with the Service in two ways. If the subject project is to be funded, authorized, or carried out by a Federal agency and may affect a listed species, the Federal agency must consult with the Service, pursuant to section 7(a)(2) of the Act. If a proposed project does not involve a Federal agency but may result in the take of a listed animal species, the project proponent should apply for an incidental take permit, pursuant to section 10(a)(1)(B) of the Act. At present, we believe that several activities proposed or already occurring on these properties have the potential to result in take of federally listed or proposed species. We offer these comments to call your attention to these activities, and the need for further discussion with our agency.

#### *Domestic Sheep Grazing and Sierra Bighorn*

Domestic sheep can transfer bacteria that cause pneumonia to bighorn sheep (Lawrence et al. 2010). The 2007 Sierra Nevada Bighorn Sheep Recovery Plan identifies disease transmission and associated die-offs as a potentially significant source of mortality for this species (Service 2007). Additionally, disease can affect bighorn sheep populations well-beyond the initial mortality event. Disease may persist in a population and cause high mortality of lambs, which results in low recruitment and limits population recovery (Cassirer et al. 2013). In recent years, between 2009 and 2010, a bighorn sheep die-off occurred in nine herds located across five western states and resulted in a mortality rate of between 5 and 95 percent, depending upon the herd (WAFWA 2010). Three of the nine herds had observed or suspected association with domestic sheep or goats and the other herds occupied range near allotments where domestic sheep or goats were grazed (WAFWA 2010). Therefore, the transmission of disease from domestic sheep to Sierra bighorn could result in the take of a listed species and also negatively affect its recovery.

In 2010, representatives from the Service, California Department of Fish and Wildlife (CDFW), and members of the Mono County Board of Supervisors met to discuss the Service's and CDFW's concerns regarding domestic sheep grazing on Conway Ranch and the risk of disease transmission to Sierra bighorn. We have attached the letter that was sent to Mr. Dan Lyster following this meeting (Attachment 1). As mentioned in the attached letter, we discussed findings from a disease risk assessment model that was developed by a subgroup of the Sierra bighorn recovery team to assess the disease risk associated with domestic sheep grazing allotments in the eastern Sierra Nevada. While the model specifically addresses domestic sheep grazing allotments on federal land, it can also be used to inform decisions about domestic sheep grazing on private property. The results of this model indicate that both the Conway and Mattly

Ranch properties are located within a predicted area of potential contact (Croft et al. 2009; Attachment 2). This predicted area of potential contact indicates that there is a high risk of Sierra bighorn coming into contact with domestic sheep.

It is unclear in the draft Conway Ranch Conservation Easement Management Plan as to when domestic sheep graze the Conway and Mattly Ranches. We ask that Mono County and the Eastern Sierra Land Trust clarify when domestic sheep will be grazed on these two properties. In 2012, we received a letter from the Los Angeles Department of Water and Power stating that, in late October, domestic sheep were observed trespassing on their property, which is adjacent to Mattly Ranch. The risk of contact between Sierra bighorn and domestic sheep increases during the Sierra bighorn breeding season (September through November) when rams are likely to make long-distance movements in search of females. Consequently, grazing this late in the season poses a serious risk to Sierra bighorn.

#### *Greater Sage-Grouse*

On October 28, 2013, the Service issued a proposed rule to list the Bi-State Distinct Population Segment of Greater sage-grouse (sage-grouse) as a threatened species and designate critical habitat. The Conway and Mattly Ranches are both located within proposed critical habitat for the sage-grouse. We encourage Mono County, as a partner in the Bi-State Local Area Working Group, to consider any potential impacts to sage-grouse and its habitat associated with the activities and uses, operations, and management of these properties.

#### *Aquaculture*

The draft Conway Ranch Conservation Easement Management Plan and associated documents do not indicate what fish species will be used for commercial fish-rearing. However, it is our understanding that, in the past, Mono County has expressed interest in rearing the federally threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) on these properties. In the draft Grant Deed of Conservation Easement Conway and Mattly Ranches, it states that the construction of a fish-rearing raceway in the “Mattly Ranch Aquaculture Area” could occur if “a State or Federal wildlife agency identifies the development of a site as important to the recovery of endangered species and provide funding for a facility, operations and maintenance”. The rearing of a federally threatened fish species on private property will require further discussions with the Service.

We appreciate the opportunity to review the draft Grant Deed of Conservation Easement Conway and Mattly Ranches Grant Deed and associated documents. We would like to coordinate with representatives from Mono County and the Eastern Sierra Land Trust to refine

Board of Supervisors, Mono County

June 16, 2014

the draft Conway Ranch Conservation Easement Management Plan and identify measures that would meet the needs of the county, while also, protecting federally listed and proposed species. If you have any questions regarding this letter, please contact Erin Nordin at (760) 872-5020.

Sincerely,


Edward D. Koch  
State Supervisor

Enclosures

ccs:

Tony Dublino, Mono County, South county Office, Mammoth Lakes, California  
Dr. Tom Stephenson, Senior Environmental Scientist, California Department of Fish and  
Wildlife, Inland Deserts Region, Bishop, California  
Kay Ogden, Executive Director, Lands Director, Eastern Sierra Land Trust, Bishop,  
California  
Aaron Johnson, Lands Director, Eastern Sierra Land Trust, Bishop, California

LITERATURE CITED

- Cassirer, E.F., R.K. Plowright, K.R. Manlove, P.C. Cross, A.P. Dobson, K.A. Potter, and P.J. Hudson. Spatio-temporal dynamics of pneumonia in bighorn sheep. 2013. *Journal of Animal Ecology* 82:518–528.
- Croft, B., M. Haworth, M. Hennessy, R. Mazur, S. Nelson, R. Perloff, J. Robson, and T. Stephenson. 2009. Revised February 25, 2010. Application of the document entitled, a process for identifying and managing risk of contact between Sierra Nevada bighorn sheep and domestic sheep. April 2009. 19 pp.
- Lawrence, P.K., S. Shanthalingam, R.P. Dassanayake, R. Subramaniam, C.N. Herndon, D.P. Knowles, F.R. Rurangirwa, W.J. Foreyt, G. Wayman, A.M. Marciel, S.K. Highlander, and S. Srikumaran. 2010. Transmission of *Mannheimia haemolytica* from domestic sheep (*Ovis aries*) to bighorn sheep (*Ovis canadensis*): unequivocal demonstration with green fluorescent protein-tagged organisms. *Journal of Wildlife Disease* 46(3): 706-717.
- U.S. Fish and Wildlife Service. 2007. Recovery Plan for the Sierra Nevada bighorn sheep. Sacramento, California. 199 pp.
- Western Association of Fish and Wildlife Agencies (WAFWA). 2010. Summary of nine bighorn sheep herds that died across five western states. Wild Sheep Working Group. June 22, 2010. 2 pp.



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United States Department of the Interior



FISH AND WILDLIFE SERVICE

Ventura Fish and Wildlife Office  
2493 Portola Road, Suite B  
Ventura, California 93003

VFWO	INITIAL	DATE
F.S.		
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A.F.S.	CS	12-9-10
COORD		
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DIV. CHIEF		December 9, 2010
I&E		
BIO.		
A.A.		
O.A.	JK	12-9-2010

IN REPLY REFER TO:  
81440-2011-CPA-00456

Dan Lyster  
Mono County  
P. O. Box 2415  
Mammoth Lakes, California 93546

Dear Mr. Lyster:

We appreciated the opportunity to meet with you and discuss our concerns regarding domestic sheep grazing at Conway Ranch and the risk of disease transmission to the federally endangered Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*). This meeting was part of the U.S. Fish and Wildlife Service's effort to closely coordinate with you and other non-federal entities that authorize domestic sheep grazing in areas that have a potential for disease transmission between domestic sheep and Sierra Nevada bighorn sheep.

At the meeting, we presented findings from a risk assessment model that are relevant to domestic sheep grazing on Conway Ranch. As directed in the 2007 *Recovery Plan for the Sierra Nevada Bighorn Sheep*, the U.S. Fish and Wildlife Service established a subgroup of the recovery team to assess the disease risk associated with domestic sheep grazing allotments in the eastern Sierra Nevada. The model developed by the risk assessment team, and presented at our meeting, allows land managers to assess the relative risk of Sierra Nevada bighorn sheep rams entering areas where domestic sheep are grazed. The relative risk values, calculated by the model, provide information on the likelihood of a Sierra Nevada bighorn sheep ram entering an area based on habitat type and proximity to Sierra Nevada bighorn sheep populations. Based on these values, a land manager can determine which grazing allotments pose a higher risk of disease transmission. The risk assessment model indicates that Conway Ranch is located within an area of high risk; therefore, it is important to develop a land management plan for Conway Ranch that addresses the potential for disease transmission.

We would like to coordinate with you on development of a land management plan for Conway Ranch. We hope that the outcome of this process will provide benefits for Mono County and increased protection for Sierra Nevada bighorn sheep. As discussed at our meeting, we will continue to search for funding opportunities to aid in the development of a land management plan for Conway Ranch. In the meantime, we hope that you will continue to work with us on this endeavor. We will contact you at a future date to discuss this proposed plan in more detail.





# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Ventura Fish and Wildlife Office  
2493 Portola Road, Suite B  
Ventura, California 93003



IN REPLY REFER TO:  
81440-2011-CPA-0045

December 9, 2010

Dan Lyster  
Mono County  
P. O. Box 2415  
Mammoth Lakes, California 93546

Dear Mr. Lyster:

We appreciated the opportunity to meet with you and discuss our concerns regarding domestic sheep grazing at Conway Ranch and the risk of disease transmission to the federally endangered Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*). This meeting was part of the U.S. Fish and Wildlife Service's effort to closely coordinate with you and other non-federal entities that authorize domestic sheep grazing in areas that have a potential for disease transmission between domestic sheep and Sierra Nevada bighorn sheep.

At the meeting, we presented findings from a risk assessment model that are relevant to domestic sheep grazing on Conway Ranch. As directed in the 2007 *Recovery Plan for the Sierra Nevada Bighorn Sheep*, the U.S. Fish and Wildlife Service established a subgroup of the recovery team to assess the disease risk associated with domestic sheep grazing allotments in the eastern Sierra Nevada. The model developed by the risk assessment team, and presented at our meeting, allows land managers to assess the relative risk of Sierra Nevada bighorn sheep rams entering areas where domestic sheep are grazed. The relative risk values, calculated by the model, provide information on the likelihood of a Sierra Nevada bighorn sheep ram entering an area based on habitat type and proximity to Sierra Nevada bighorn sheep populations. Based on these values, a land manager can determine which grazing allotments pose a higher risk of disease transmission. The risk assessment model indicates that Conway Ranch is located within an area of high risk; therefore, it is important to develop a land management plan for Conway Ranch that addresses the potential for disease transmission.

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TAKE PRIDE<sup>®</sup>  
IN AMERICA 



Dan Lyster

2

Should you have any questions regarding this matter, contact Erin Shapiro at the Ventura Fish and Wildlife Office at (805) 644-1766, extension 369.

Sincerely,

A handwritten signature in black ink, appearing to read "Carl T. Benz". The signature is fluid and cursive, with the first name "Carl" being the most prominent.

Carl T. Benz  
Assistant Field Supervisor

**Application of the Document Entitled *A Process for Identifying and Managing Risk of Contact between Sierra Nevada Bighorn Sheep and Domestic Sheep***

Original April 3, 2009

Brian Croft<sup>1</sup>, Marcy Haworth<sup>2</sup>, MaryBeth Hennessy<sup>3</sup>, Rachel Mazur<sup>4</sup>, Steven Nelson<sup>5</sup>, Richard Perloff<sup>3</sup>, Joe Robson<sup>6</sup>, and Tom Stephenson<sup>7</sup>

Revised February 25, 2010

Brian Croft<sup>1</sup>, Amy Fesnock<sup>8</sup>, Marcy Haworth<sup>2</sup>, Rachel Mazur<sup>4</sup>, Leeann Murphy<sup>3</sup>, Steven Nelson<sup>5</sup>, Richard Perloff<sup>3</sup>, and Tom Stephenson<sup>7</sup>

## INTRODUCTION

On February 12, 2009, representatives of the U.S. Forest Service (Inyo and Humboldt-Toiyabe National Forests), Bureau of Land Management (Bishop Field Office), U.S. Fish and Wildlife Service (Ventura and Nevada Fish and Wildlife Offices), and the California Department of Fish and Game (Bishop Field Office) held a meeting in Bishop, California, to discuss implementation of *A Process for Identifying and Managing Risk of Contact between Sierra Nevada Bighorn Sheep and Domestic Sheep* (Baumer *et al.* 2009; Risk Assessment). During this meeting, the land managers requested further assistance interpreting and applying the information provided in the Risk Assessment. They also expressed a need for guidance that would facilitate consistency in application of the Risk Assessment among the various agencies and jurisdictions. This guidance was requested within the context of recommendations 1, 2, and 8 provided in Section E of the *Recovery Plan for the Sierra Nevada Bighorn Sheep* (U.S. Fish and Wildlife Service 2007), which outlined a Recommended Strategy for Preventing Contact between Domestic Sheep or Goats and Sierra Nevada Bighorn Sheep.

Individuals representing the above-mentioned agencies met on February 19, 2009, to further discuss the information provided in the Risk Assessment and to develop recommendations for land managers to use when applying this information in their analyses of management options to prevent contact between domestic sheep and Sierra Nevada bighorn sheep. This document (Application Document) was developed as a result of this interagency coordination and provides recommendations specific to implementation of the Risk Assessment.

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<sup>1</sup> U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office, Ventura, California; <sup>2</sup> U.S. Fish and Wildlife Service, Nevada Fish and Wildlife Office, Reno, Nevada; <sup>3</sup> U.S. Forest Service, Inyo National Forest, Forest Headquarters, Bishop, California; <sup>4</sup> U.S. Forest Service, Humboldt-Toiyabe National Forest, Forest Headquarters, Sparks, Nevada; <sup>5</sup> Bureau of Land Management, Bishop Field Office, Bishop, California; <sup>6</sup> U.S. Forest Service, Inyo National Forest, White Mountain Ranger District, Bishop, California; <sup>7</sup> California Department of Fish and Game, Bishop, California; <sup>8</sup> Bureau of Land Management, California State Office, Sacramento, California.

After completion of the 2009 domestic sheep grazing season and a meeting between the U.S. Forest Service's Regional Forester (Region 4) and the U.S. Fish and Wildlife Service's Regional Director (Region 8) on November 23, 2009, further management coordination was recommended among the federal and state agencies to address domestic sheep grazing in proximity to Sierra Nevada bighorn sheep. As a result, the original Application Document has been revised herein to further clarify how to apply the Risk Assessment.

All participants understand that the Risk Assessment is dynamic and that future updates, based on additional Sierra Nevada bighorn sheep movement data and other pertinent information, will likely change the results. This understanding is essential in the context of recovery for Sierra Nevada bighorn sheep. For recovery to occur, Sierra Nevada bighorn sheep populations must increase in numbers, and populations must be distributed among the 12 herd units identified as essential for conservation of the species in the final recovery plan. These herd units were identified in the Sierra Nevada bighorn sheep recovery plan based on historic bighorn sheep locations and the availability of summer and winter range (U.S. Fish and Wildlife Service 2007). Therefore, the likelihood of contact between Sierra Nevada bighorn sheep and domestic sheep is predicted to increase over time as recovery goals are met. The analyses used in the Risk Assessment and this Application Document focus on the potential for contact between Sierra Nevada bighorn sheep and domestic sheep in the eastern Sierra Nevada.

Section E of the recovery plan recommended a strategy for preventing contact between domestic sheep (and goats) and Sierra Nevada bighorn sheep. It also addressed the possibility that development and use of the Risk Assessment could alter our understanding of the risk of contact between domestic sheep and Sierra Nevada bighorn sheep. It recommended that land managers incorporate use of the Risk Assessment into allotment specific analyses of management options to prevent contact. The Risk Assessment and this revised Application Document provide land managers additional tools for analyzing the risk of contact on domestic sheep allotments. Application of these tools may change our understanding of the risk of contact on certain allotments from that described in Section E of the recovery plan. The Risk Assessment, this Application Document, and the recovery plan are guidance documents that land managers should use along with any additional information from the published literature or Sierra Nevada bighorn sheep monitoring efforts in their decision-making processes to prevent contact between domestic sheep and the federally-listed, endangered Sierra Nevada bighorn sheep.

## APPLICATION OF THE RISK ASSESSMENT

*A Process for Identifying and Managing Risk of Contact between Sierra Nevada Bighorn Sheep and Domestic Sheep* (Baumer *et al.* 2009; Risk Assessment) identified the following five-step process for Risk Assessment implementation:

1. Determine the relative likelihood that a Sierra Nevada bighorn sheep will utilize habitat where domestic sheep are grazed;

2. Assess whether grazing domestic sheep in a specific allotment could result in contact with Sierra Nevada bighorn sheep;
3. Determine whether changes in the temporal (*e.g.*, seasonal closures) or spatial use of allotments would prevent contact between Sierra Nevada bighorn sheep and domestic sheep;
4. Determine whether implementing the grazing practices detailed in Section III of the Risk Assessment would prevent contact between Sierra Nevada bighorn sheep and domestic sheep; and
5. Monitor and verify whether grazing practices are being implemented and assess their effectiveness in reducing straying of domestic sheep.

Below, we describe a method for applying this five-step process on lands managed by the Inyo and Humboldt-Toiyabe National Forests and the Bureau of Land Management (Bishop Field Office). For more information on the five-step process, please refer to Section IV of the Risk Assessment.

**Step 1** - Determine the relative likelihood that a Sierra Nevada bighorn sheep will utilize habitat where domestic sheep are grazed.

Please refer to the Risk Assessment (Section II pages 3-6; Attachment 6; Figure 2; Table 1) for a more complete description including the outcome of this previously completed step. Briefly, a geographic information system (GIS) based model was developed that incorporated Sierra Nevada bighorn sheep habitat suitability and proximity to herd use areas to determine the relative likelihood of Sierra Nevada bighorn sheep use of any particular location within the modeled area.

First, a GIS layer of *habitat suitability* was developed to indicate habitat preferences based on elevation, slope, aspect, hillshade, distance to escape terrain, terrain ruggedness, and vegetation (forest-nonforest). The final habitat suitability layer combines the habitat variables and incorporates each based on its importance. This GIS layer, with thousands of pixels (*i.e.*, geographic parcels) each representing the habitat suitability of 30 meter x 30 meter cells, was applied across the eastern Sierra landscape. In order to determine the relative resistance to bighorn sheep movement for a particular portion of the landscape, the habitat suitability layer was inverted to create a *resistance to movement* layer. In this layer, each pixel now represents the lack of habitat suitability for bighorn sheep at each location.

Second, to determine the relative likelihood of contact between bighorn sheep and domestic sheep at any location, a measure of the actual or potential presence of bighorn sheep was needed for each location. To do that, all known locations of radio-collared bighorn sheep, including GPS, ground, and aerial telemetry locations, were used to create home ranges for each herd unit. Core areas of these home ranges were then delineated using 50 percent kernels to create a *core home range* layer. Only those locations within each core home range were then used as source points for indentifying potential movement paths for bighorn sheep.

Finally, a cost-weighted distance function was applied to the core home range layer, utilizing the resistance to movement layer, to create a *cost distance layer* specific to Sierra Nevada bighorn sheep. This calculates the cost of travel from one cell to the next, initiated at the core home range locations. In the resulting composite cost distance layer, the value of each pixel represents the cumulative cost associated with travel to that point from a core home range location by a Sierra Nevada bighorn sheep.

Because bighorn sheep will not travel indefinitely, the model used a maximum dispersal limit of 60 kilometers from core home range locations (based on travel distances of GPS collared Sierra Nevada bighorn sheep rams) (Sierra Nevada Bighorn Sheep Recovery Program 2004). The cost-weighted distance was calculated from the core home range locations to the maximum dispersal limit.

There are a few recognized limitations to the GIS-based model, including: 1) not all Sierra Nevada bighorn sheep rams are collared, therefore, distance and location data points collected over the modeled time period are limited in number, 2) the vegetation layer used to map habitat suitability was limited in resolution, and 3) while the model was based on the best available data, it cannot predict every outcome.

In addition to the process described above, which is carried over and utilized in this Application Document, the Risk Assessment provided an additional step that averaged all of the pixel values within the boundary of a given allotment. This averaged value was meant to represent the relative likelihood that a Sierra Nevada bighorn sheep would utilize a given allotment. In the Risk Assessment, this value is referred to as the Mean Inverse Weighted Distance (MIWD). Table 1 of the Risk Assessment lists all the allotments analyzed with their MIWD values. Values closer to 1 indicate a high likelihood of use by a Sierra Nevada bighorn sheep. Values closer to 0 indicate a low likelihood of use by a Sierra Nevada bighorn sheep.

The use of MIWD, as discussed above, estimates the mean relative likelihood of Sierra Nevada bighorn sheep use of a given allotment. However, averaging pixel values to obtain a single value for an allotment ignores the variability of pixel values across the allotment. Therefore, an allotment could have portions that are highly conducive to bighorn sheep use, but the allotment's MIWD value would not reflect this because it is an average of all pixels values within the allotment.

In addition, the Risk Assessment does not provide a threshold above which a Sierra Nevada bighorn sheep's use of an allotment would be considered too high a risk for contact. Such a threshold has been requested by land managers to assist in making grazing management decisions. The Application Document does not use the mean relative likelihood of Sierra Nevada bighorn sheep use of a given allotment (*i.e.*, MIWD) in determining risk of contact, but provides an alternative method in Step 2.

**Step 2** - Assess whether grazing domestic sheep in a specific allotment could result in contact with Sierra Nevada highhorn sheep.

The Risk Assessment provided an equation for determining a relative risk of contact between Sierra Nevada bighorn sheep and domestic sheep for each allotment based on the allotment's mean relative likelihood that a bighorn sheep would occur there and the dates and length of time the allotment would be grazed (*i.e.*, Relative Risk = MIWD X (number of grazing days + Julian Date; Section II, page 5). The resulting value provides a relative value, but not a threshold value for the risk of contact for each allotment.

After further evaluation of this equation, a few issues also became evident about whether this is an appropriate way to represent risk. These issues include: 1) uncertainty about how the variables relate to one another and whether some are more important than others, 2) equation variables are expressed using different scales, 3) the likelihood that a Sierra Nevada bighorn sheep would occur in an allotment is based on the mean likelihood which ignores the variability of risk across an allotment, and 4) the timing of use of an allotment is more influential in the equation than the bighorn sheep location information.

The equation is, therefore, inappropriate to use in determining whether use of an allotment crosses a threshold of acceptable risk of contact between domestic sheep and Sierra Nevada bighorn sheep. It may be appropriate to use the equation to make modifications to grazing seasons to reduce risk of contact for allotments located further away from Sierra Nevada bighorn sheep core population areas that have a low likelihood of Sierra Nevada bighorn sheep use (see Step 4). For allotments with a high likelihood of Sierra Nevada bighorn sheep use, employing the equation to make modifications to grazing seasons to reduce risk of contact is not appropriate. As a result of these concerns, it is recommended that this equation's role in the determination of the risk of contact between domestic sheep and Sierra Nevada bighorn sheep be diminished.

A more direct approach to assessing the level of risk of contact between domestic sheep and Sierra Nevada bighorn sheep by allotment is to determine whether an allotment or portion of an allotment crosses a threshold of acceptable risk. There are two parts to this analysis. One part is to determine a threshold of acceptable risk and the other is to determine whether this threshold is crossed in an allotment or portion of an allotment.

To determine a threshold of acceptable risk, the final GIS layer (as described in Step 1) was overlain with locations where Sierra Nevada bighorn sheep are known to have occurred. To reduce error and ensure spatial accuracy, only those locations collected using GPS were used, resulting in 6,719 Sierra Nevada bighorn sheep ram locations (2002-2007). Data from these years was utilized because this was the most up to date data available at the time the model and the Risk Assessment were completed. It is important to use a multi-year data set to capture the full range of potential bighorn sheep movement patterns under various conditions. Use of a smaller range of years would reduce the amount of interannual variability that is captured and would provide a narrower view of potential Sierra Nevada bighorn sheep use than is likely to occur.

After the GIS layer was overlain with the Sierra Nevada bighorn sheep location data, the pixel value for each individual ram location in the data set was recorded to determine the full range of pixel values that correspond to Sierra Nevada bighorn sheep locations. All pixels in the GIS layer that have values within this range have a high likelihood of Sierra Nevada bighorn sheep use. By mapping the location of all pixels with values within this range, it is possible to highlight all locations in the eastern Sierra that have a high likelihood of bighorn sheep use instead of examining the relative likelihood as an average over an entire allotment. California Department of Fish and Game's 2002 to 2007 Sierra Nevada bighorn sheep monitoring efforts provided sufficient data for this analysis.

Through the analysis described above, it was determined that the values for all the known locations of collared rams within this dataset ranged from 0.833 to 1.0. The lowest value (0.833) for a known bighorn sheep location may, therefore, be used as a threshold value, above which bighorn sheep use is highly likely. If domestic sheep are grazed in locations (*i.e.*, pixels) that have a high likelihood of Sierra Nevada bighorn sheep use, the potential for contact between domestic sheep and Sierra Nevada bighorn sheep exists and is predicted. Because the goal of the Risk Assessment is to prevent contact between the two species, values currently between 0.833 and 1.0 fall into a category of unacceptable risk. The locations of those areas that have a value between 0.833 and 1.0 and their relationship to domestic sheep grazing allotments are mapped in Figures 1 and 2. These predicted areas of potential contact (*i.e.*, areas with high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833) allow for identification of portions of allotments that are above the 0.833 threshold. This is critical to making sure that land managers do not underestimate risk on some portions of a given allotment. At this time, if the relative likelihood of a Sierra Nevada bighorn sheep being in an allotment or portion of an allotment is 0.833 or greater, a high/unacceptable risk of contact between the two species exists for that allotment or portion of an allotment. If the value is less than 0.833, a low risk of contact between the two species exists for that allotment or portion of an allotment. Areas adjacent to these high contact risk areas should employ best management grazing practices to ensure that domestic sheep do not move into areas of high contact risk (see Step 4).

Since most Sierra Nevada bighorn sheep are not collared, the identified range of the relative likelihood of a Sierra Nevada bighorn sheep being in a location provides a scientific approach to management given the uncertainty associated with observing and tracking the movements of a subset of the population. The 0.833 threshold is based on known locations of GPS collared Sierra Nevada bighorn sheep. Sierra Nevada bighorn sheep location data based on VHF and observational data (some with locations that would expand range of values) were not included. It is also possible that uncollared Sierra Nevada bighorn sheep have moved farther, and into a wider range of habitats, than is demonstrated by the mapped areas of potential contact (*i.e.*, areas with high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833). Due to these restrictions and uncertainty, the value 0.833 is considered a conservative threshold for evaluating the relative risk of contact on an allotment.



The current threshold of 0.833 is based on the best available data at this time. Based on a preliminary review, additional Sierra Nevada bighorn sheep GPS location data collected from 2007 to 2009 (but not yet included in the model) remain within the 0.833 and above values of habitat modeled. Over time, new Sierra Nevada bighorn sheep location data could change the threshold. The value will be at least 0.833 (unless a dramatic loss of a herd occurred), but it will likely become lower as Sierra Nevada bighorn sheep increase in number and expand geographically as is necessary for recovery.

Distances between domestic sheep grazing areas and bighorn sheep locations have been considered by others when evaluating the risk of contact and disease transmission, and distance buffers to separate the two species have been previously recommended. Guidance developed by the Bureau of Land Management (1998) recommended buffer distances up to 9 miles around native wild sheep habitat unless topographic features or other barriers minimized the risk of contact. Singer *et al.* (2001) recommended bighorn sheep be restored to areas that are greater than 14.3 miles from domestic sheep grazing areas. A number of other documents address the concerns associated with domestic sheep grazing near Sierra Nevada or other bighorn sheep habitats. These documents discuss the need for buffers but do not recommend specific distances, or they suggest effective separation through spatial or temporal measures to reduce the risk of contact between the two species (Onderka *et al.* 1988, Sweeney *et al.* 1994, Ward *et al.* 1997, Schommer and Woolever 2001, Western Association of Fish and Wildlife Agencies 2007, George *et al.* 2008, Miller *et al.* 2008, Clifford *et al.* 2009). While a specific distance is not recommended in this Application Document to prevent contact, it is recognized that the proximity between these two species relates to the risk of contact.

The likelihood of contact plays an important role in the risk of disease transmission between domestic sheep and Sierra Nevada bighorn sheep in the Sierra Nevada. Contact may result in the possible introduction of new pathogens from domestic sheep to Sierra Nevada bighorn sheep that may cause pneumonia. There is concern that this could lead to the loss of entire bighorn sheep herds in the Sierra Nevada.

Clifford *et al.* (2009) developed a spatially explicit disease transmission model to quantitatively assess the risk of respiratory disease transmission from domestic sheep to Sierra Nevada bighorn sheep. This model was used to predict the impacts of a respiratory disease outbreak within and among populations in the Northern, Central, and Southern Recovery Units. We acknowledge several of the study's limitations. These include: 1) disease transmission data was from enclosures or experimental situations, 2) all available Sierra Nevada bighorn sheep location data was not included which could have increased home range size, 3) future Sierra Nevada bighorn sheep movements based on growth or exploration were not modeled, and 4) quantifying husbandry practices that may have increased contact risk, such as grazing estrous domestic sheep females, was not possible. Clifford *et al.* (2009) reported that the most frequently predicted levels of population mortality due to disease (33 to 76 percent in the North; 45 to 77 percent in the Central) were consistent with other estimates of mortality ranging from 28 percent to 80 percent reported in respiratory disease outbreaks of free-ranging bighorn sheep populations located elsewhere (with or without suspected contact with domestic sheep)

(Festa-Bianchet 1988, Ryder *et al.* 1992, Cassirer *et al.* 1996, Enk *et al.* 2001, George *et al.* 2008).

Because the current range wide population of this species is less than 400 individuals, the loss of an entire or almost entire Sierra Nevada bighorn sheep herd(s) due to disease transmission would significantly impact recovery efforts for this species.

**Step 3** - Determine whether changes in the temporal (*e.g.*, seasonal closures) or spatial use of allotments would prevent contact between Sierra Nevada bighorn sheep and domestic sheep.

Land managers should also consider the following criteria when evaluating whether an allotment or portion of an allotment identified as having a high/unacceptable risk of contact using Step 2 (*i.e.*, within the areas of potential contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833) may remain open and still ensure the prevention of contact between Sierra Nevada bighorn sheep and domestic sheep (*i.e.*, allotment specific criteria – see below).

If none of the criteria listed below applies to a given allotment, the allotment or portions of the allotment equal to or greater than the 0.833 threshold should not be grazed by domestic sheep to prevent contact between domestic sheep and Sierra Nevada bighorn sheep. If one or more of the criteria listed below apply to a given allotment, an allotment specific evaluation should be completed to determine whether the site-specific criteria provide sufficient barriers to Sierra Nevada bighorn sheep movement to prevent contact.

### **Criteria**

- 1) Allotments or portions of allotments within the predicted areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833; Figures 1 and 2) that are separated from occupied Sierra Nevada bighorn sheep habitat by towns, highly developed recreation areas, or other human developments that inhibit bighorn sheep movement.
- 2) Allotments or portions of allotments within the predicted areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833; Figures 1 and 2) that are separated from occupied Sierra Nevada bighorn sheep habitat by large contiguous forested areas that inhibit bighorn sheep movement.
- 3) Allotments or portions of allotments within the predicted areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833; Figures 1 and 2) that are east of the U.S. Highway 395 management boundary recommended in Section II-E of the final *Recovery Plan for Sierra Nevada Bighorn Sheep* (U.S. Fish and Wildlife Service 2007).
- 4) Allotments or portions of allotments within the predicted areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact; modeled areas of likely bighorn

sheep use equal to or greater than 0.833; Figures 1 and 2) that are separated from occupied Sierra Nevada bighorn sheep habitat by major bodies of water (*e.g.*, Mono Lake, Crowley Lake) that inhibit bighorn sheep movement.

For allotments or portions of allotments that meet one or more of the four criteria listed above, land managers may determine that full closure is not required to prevent contact between domestic sheep and Sierra Nevada bighorn sheep. After allotment specific analysis, the responsible land management agency may determine that a given allotment that meets one or more of the above criteria does not require seasonal or spatial restrictions to prevent contact. Conversely, allotment specific analysis may reveal that an allotment that meets one or more of the above criteria does require seasonal and/or spatial restrictions to prevent contact. In such a case, seasonal closure or closure of a portion of the allotment would be a suitable alternative to full closure if the agency determines that grazing under these restrictions would prevent contact between domestic sheep and Sierra Nevada bighorn sheep. Allotment specific seasonal closure periods should be determined by the responsible land management agency in cooperation with the affected permittee and in coordination and consultation, if appropriate, with the U.S. Fish and Wildlife Service.

In addition to the four criteria listed above, land managers may use the equation (Relative Risk = MIWD X (number of grazing days + Julian Date) provided in Section II of the Risk Assessment to quantify the predicted change in the relative risk that would occur as a result of temporal and/or spatial restrictions for a given allotment or allotment subunit. Use of the equation may provide a useful decision-making tool if the land manager determines that seasonal and/or spatial restrictions are needed, but decision makers must keep in mind the equation limitations discussed in Step 2.

If land managers determine, through the allotment specific analysis process described above, that contact between domestic sheep and Sierra Nevada bighorn sheep cannot be prevented on a given allotment, the allotment or portions of the allotment should not be grazed by domestic sheep.

**Step 4 -** Determine whether implementing the grazing practices detailed in Section III of the Risk Assessment would prevent contact between Sierra Nevada bighorn sheep and domestic sheep (*i.e.*, prevent domestic sheep from straying into areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact with Sierra Nevada bighorn sheep)).

The Risk Assessment indicates that land managers can alleviate some risk of contact between domestic sheep and Sierra Nevada bighorn sheep through implementation of best management grazing practices. However, when evaluating the risk of contact, both domestic sheep movements and Sierra Nevada bighorn sheep movements must be considered. Land managers should not regard the implementation of best management grazing practices as an appropriate means of preventing contact between domestic sheep and Sierra Nevada bighorn sheep on an allotment or portion of an allotment where the analysis described above has determined that there is a high/unacceptable risk of contact

(*i.e.*, modeled areas of likely bighorn sheep use are equal to or greater than 0.833). These best management grazing practices, as detailed in Section III of the Risk Assessment, are designed primarily to keep domestic sheep from straying from the herd and/or allotment, to detect domestic sheep that have strayed from the herd and/or allotment, and to reduce predation on domestic sheep within an allotment. They are not designed to prevent Sierra Nevada bighorn sheep from entering an allotment and coming into contact with domestic sheep.

Herding and guard dogs have traditionally benefitted herders by keeping domestic sheep together and reducing predation. While they may have some potential to keep Sierra Nevada bighorn sheep from coming into contact with domestic sheep on an allotment, there is currently no scientific literature or other information that indicates or supports the assertion that herding or guard dogs can effectively prevent bighorn sheep from coming into contact with domestic sheep. These grazing practices are, therefore, never appropriate as stand-alone mitigation for use on allotments or portions of allotments within the predicted areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833) (Figures 1 and 2).

The appropriate use of best management grazing practices is to keep domestic sheep from straying out of open allotments where there is a low risk of contact and into areas where there is a high risk of contact with Sierra Nevada bighorn sheep. As described in the Risk Assessment, the only method to ensure the prevention of contact between domestic sheep and Sierra Nevada bighorn sheep is to avoid the use of overlapping ranges through temporal and/or spatial separation.

The allotment specific application of the best management grazing practices recommended in Section III of the Risk Assessment should be determined by the responsible land management agency in cooperation with the affected permittee and in coordination and consultation, if appropriate, with the U.S. Fish and Wildlife Service.

**Step 5 - Monitor and verify whether grazing practices are being implemented and assess their effectiveness in reducing straying of domestic sheep.**

Land managers should monitor and verify that livestock producers are appropriately implementing best management grazing practices as discussed in Section III of the Risk Assessment on those allotments where they are applied (Step 4). For those allotments where the best management grazing practices are required, land managers should compile all monitoring and reporting information from both permittees and agency personnel on an annual basis and evaluate whether these practices are being fully and effectively implemented.

## RESULTS OF RISK ASSESSMENT APPLICATION

The predicted areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833)

between Sierra Nevada bighorn sheep and domestic sheep (Figures 1 and 2), determined through application of Step 2, overlap 27 domestic sheep allotments or allotment subunits (Table 1, Figure 2). Of those, eight are vacant to prevent contact between domestic sheep and Sierra Nevada bighorn sheep. Five currently permitted allotments or allotment subunits are entirely within the predicted areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833) (Tamarack, Cameron Canyon, Dunderberg, Rock Creek – Hilton Unit, and Sherwin Deadman 1). Only a portion of the predicted areas of potential contact overlaps the remaining 13 allotments (Table 1, Figure 2). Table 1 identifies the allotments that overlap the predicted areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833). Table 1, column 6, indicates the mean relative likelihood that a Sierra Nevada bighorn sheep would use a given allotment. Table 1, column 7, indicates the maximum relative likelihood that a Sierra Nevada bighorn sheep would use any point within a given allotment.

## RECOMMENDATIONS

We recommend that the Humboldt-Toiyabe and Inyo National Forests and the Bureau of Land Management (Bishop Field Office) analyze all of their respective allotments that overlap the predicted areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833) between domestic sheep and Sierra Nevada bighorn sheep (Table 1, Figures 1 and 2) as outlined in Steps 2 and 3.

If the responsible land management agency determines that a given allotment, or portion of an allotment, does not meet one or more of the criteria identified in Step 3, we recommend that the allotment, or portion of the allotment, identified as having a high/unacceptable risk of contact not be grazed by domestic sheep to prevent contact between domestic sheep and Sierra Nevada bighorn sheep. There is uncertainty associated with determining when contact may occur and the likely adverse effects to Sierra Nevada bighorn sheep populations that could result from a contact related disease outbreak. Therefore, it is recommended that any currently permitted allotment, or portion of an allotment, identified as having a high risk/unacceptable risk of contact as a result of the above analysis, be closed on either a temporary non-use or emergency basis until the responsible land management agency determines whether permanent closure to domestic sheep grazing is warranted.

If the responsible agency determines that a given allotment meets one or more of the criteria identified in Step 3, we recommend that the agency determine whether temporal and/or spatial restrictions are necessary to prevent contact through the appropriate agency analysis and decision making process. In instances where domestic sheep could stray from an open allotment into an areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833), we recommend the implementation of best management grazing practices from Section III of the Risk Assessment as outlined in Steps 4 and 5.

The Risk Assessment, this revised Application Document, and the recovery plan are guidance documents that land managers should use along with any additional information from the published literature or Sierra Nevada bighorn sheep monitoring efforts in their decision-making process to prevent contact between domestic sheep and the federally-listed, endangered Sierra Nevada bighorn sheep. The decision tree provided below may be helpful when evaluating the allotments.

As stated in the Risk Assessment, the model will be updated by the California Department of Fish and Game in coordination with land management agencies as new information is collected on bighorn sheep movement and domestic sheep allotment management. The model should be rerun when new information (*e.g.*, changes in bighorn sheep distribution/movement, habitat conditions and/or domestic sheep grazing regimes) is available. At a minimum, we recommend that Sierra Nevada bighorn sheep location data be reviewed biennially and compared to the 0.833 threshold. If this new location data indicates a substantial shift of bighorn sheep habitat use and therefore changes the risk of contact, the model should be updated to incorporate this new data and new model run outputs made available to agencies. Model updates will be contingent on funding by state and federal agencies or other sources.

## Decision Tree

### **A. Assess whether domestic sheep in an allotment could contact bighorn sheep**

1. Does the allotment or portion of the allotment overlap modeled areas of likely bighorn sheep use equal to or greater than 0.833 as indicated in Table 1?

Yes. The allotment or portion of the allotment equal to or greater than 0.833 should not be grazed by domestic sheep and closure of the allotment should be considered, unless it meets one or more of the four criteria in Step 3.

No. Domestic sheep grazing may be permitted. Best management grazing practices should be implemented in areas where domestic sheep might stray off of a low risk allotment into a high risk allotment. Go to C.

### **B. Determine if the allotment meets one of the Step 3 criteria and whether changes in temporal or spatial use of the allotment would prevent contact**

1. Does the allotment meet one or more of the criteria in Step 3?

Yes. The responsible land management agency may determine that full closure is not required to prevent contact. The equation in Step 2 may be used to determine what changes in temporal and/or spatial restrictions would reduce the risk of contact to a low level. Go to B 2. Also go to C.

No. The allotment or portion of the allotment that overlaps modeled areas of likely bighorn sheep use is equal to or greater than 0.833. The allotment or portion of the allotment should not be grazed by domestic sheep and closure of the allotment should be considered.

2. Will changes in temporal or spatial use of the allotment prevent contact?

Yes. Domestic sheep grazing may be permitted under temporal and/or spatial restrictions.

No. The allotment should not be grazed by domestic sheep.

### **C. Determine whether best management grazing practices would prevent contact**

1. Will the use of best management grazing practices prevent contact?

Yes. The allotment or portion of an allotment is less than 0.833 and/or meets one or more of the Step 3 criteria. The allotment may be grazed by domestic sheep with implementation of best management grazing practices. Also go to D.



No. The allotment or portion of the allotment is equal to or greater than 0.833 and none of the Step 3 criteria apply. The allotment or portion of the allotment should not be grazed by domestic sheep and closure of the allotment should be considered.

**D. Monitor and verify whether grazing practices are being implemented effectively**

If domestic sheep grazing is permitted and grazing practices are implemented to keep domestic sheep from straying off of a low risk allotment into a high risk allotment, monitoring and reporting information should be compiled annually and evaluated.

## TABLES AND FIGURES

**Table 1.** Allotments that overlap the predicted areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact; modeled areas of likely bighorn sheep use equal to or greater than 0.833) between Sierra Nevada bighorn sheep and domestic sheep described in Step 2. The Allotment Mean Likelihood of Use values are taken from the Risk Assessment. The values represent the mean likelihood that a Sierra Nevada bighorn sheep will use an allotment. The Allotment Maximum Likelihood of Use values represent the maximum likelihood that a Sierra Nevada bighorn sheep will use a location within an allotment.

Allotment Name	Jurisdiction <sup>a</sup>	Status	Total Permitted Days	Permitted Julian Day	Allotment Mean Likelihood of Use	Allotment Maximum Likelihood of Use
Alger's Lake	INF	Vacant	NA <sup>b</sup>	NA	0.929	0.966
Bloody Canyon	INF	Vacant	NA	NA	0.936	0.974
Cameron Canyon	HTNF	Permitted	95	289	0.911	0.949
Dog Creek	BLM	Permitted	153	305	0.881	0.949
Dunderberg	HTNF	Permitted <sup>c</sup>	95	274	0.970	0.997
Green Creek	BLM	Permitted	153	305	0.852	0.911
Green Creek	HTNF	Vacant	NA	NA	0.929	0.960
Horse Meadow	INF	Vacant	NA	NA	0.937	0.963
Jordan Basin	HTNF	Vacant	NA	NA	0.971	0.999
June Lake (East)	INF	Permitted	62	244	0.800	0.864
June Lake (West)	INF	Vacant	NA	NA	0.836	0.907
Little Mormon	BLM	Permitted	153	305	0.805	0.864
Little Round Valley 1	BLM	Permitted	14	292	0.850	0.873
Little Round Valley 3	BLM	Permitted	14	292	0.831	0.840
McGee	INF	Permitted <sup>d</sup>	92	251	0.903	0.952
Rancheria Gulch	BLM	Permitted	153	305	0.784	0.932
Rickey (South)	HTNF	Permitted	NA	NA	0.827	0.848
Rock Creek 1 (West)	INF	Vacant	NA	NA	0.864	0.906
Rock Creek 2 (Highway)	INF	Vacant	NA	NA	0.865	0.885
Rock Creek 3 (East)	INF	Permitted	92	243	0.819	0.868
Rock Creek 4 (Hilton)	INF	Permitted	66	227	0.860	0.876
Sherwin/Deadman 1 (Mammoth)	INF	Permitted	87	274	0.915	0.931
Sherwin/Deadman 2 (Sawmill)	INF	Permitted	87	274	0.844	0.917
Sherwin/Deadman 4 (Smokey Bear)	INF	Permitted	87	274	0.794	0.882
Summers Meadow S&G	HTNF	Permitted	30	305	0.855	0.885
Tamarack	HTNF	Permitted	95	289	0.912	0.958
Volcanic Tablelands	BLM	Permitted	46	167	0.716	0.871

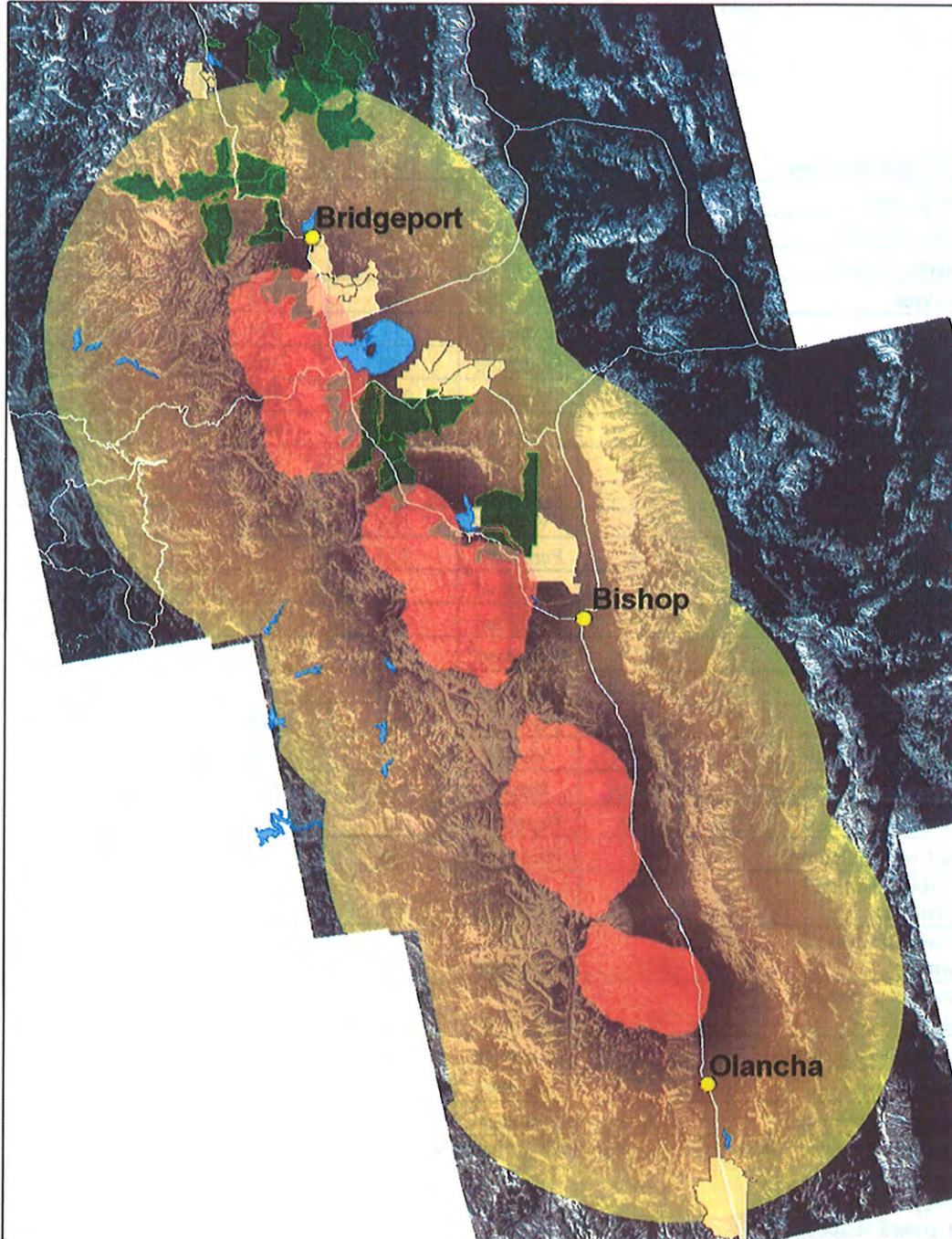
<sup>a</sup> Bureau of Land Management (BLM), Humboldt-Toiyabe National Forest (HTNF), Inyo National Forest (INF).

<sup>b</sup> Not applicable (NA).

<sup>c</sup> Not grazed in 2007-2009.

<sup>d</sup> Closed since finalization of original Application Document

**Figure 1** – Red areas are the mapped locations that have Likelihood of Use values between 0.833 and 1 and are considered the predicted areas of potential contact (*i.e.*, areas with a high/unacceptable risk of contact). Green allotments are U.S. Forest Service domestic sheep allotments. Beige allotments are Bureau of Land Management domestic sheep allotments. Allotments are mapped over the Risk Assessment’s Sierra Nevada bighorn sheep Likelihood of Use layer (*i.e.*, brown and yellow layer) and the Risk Assessment’s Sierra Nevada bighorn sheep ram habitat suitability layer (*i.e.*, black and white layer).





**Figure 2** – Labeled allotments overlap the predicted areas of potential contact in red (*i.e.*, areas with a high/unacceptable risk of contact) between Sierra Nevada bighorn sheep and domestic sheep.



## LITERATURE CITED

- Baumer, A., N. East, J. Echenique, M. Haworth, M. Leinassar, C. Papouchis, T. Stephenson, D. Weaver, and G. Wilson. 2009. A process for identifying and managing risk of contact between Sierra Nevada bighorn sheep and domestic sheep. February 2009. 37 pp.
- Cassirer, E. F., L. E. Oldenburg, V. L. Coggins, P. Fowler, K. Rudolph, D. L. Hunter, and W. J. Foreyt. 1996. Overview and preliminary analysis of a bighorn sheep dieoff-Hells Canyon 1995-96. Proceedings of the Biennial Symposium Northern Wild Sheep and Goat Council 10:78-86.
- Clifford, D. L., B. A. Schumaker, T. R. Stephenson, V. C. Bleich, M. L. Cahn, B. J. Gonzales, W. M. Boyce, and J. A. K. Mazet. 2009. Assessing disease risk at the wildlife-livestock interface: a study of Sierra Nevada bighorn sheep. Biological Conservation 142:2559-2568.
- Enk, T. A., H. D. Picton, and J. S. Williams. 2001. Factors limiting a bighorn sheep population in Montana following a dieoff. Northwest Science 75:280-291.
- Festa-Bianchet, M. 1988. A pneumonia epizootic in bighorn sheep, with comments on preventive management. Biennial Symposium of the Northern Wild Sheep and Goat Council 6:66-76.
- George, J. L., D. J. Martin, P. M. Lukacs, and M. W. Miller. 2008. Epidemic pasteurellosis in a bighorn sheep population coinciding with the appearance of a domestic sheep. Journal of Wildlife Diseases 44:388-403.
- Miller, M. W., D. P. Knowles, and M. S. Bulgin. 2008. Pasteurellosis transmission risks between domestic and wild sheep. CAST Commentary QTA 2008-1. Council for Agricultural Science and Technology, Ames, Iowa. 8 pp.
- Onderka, D. K., S. A. Rawluk, and W. D. Wishart. 1988. Susceptibility of Rocky Mountain bighorn sheep and domestic sheep to pneumonia induced by bighorn and domestic livestock strains of *Pasteurella haemolytica*. Canadian Journal of Veterinary Research 52:439-444.
- Ryder, T. J., E. S. Williams, K. W. Mills, K. H. Bowles, and E. T. Thorne. 1992. Effect of pneumonia on population size and lamb recruitment in Whiskey Mountain bighorn sheep. Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council 8:136-146.
- Schommer, T., and M. Woolever. 2001. A process for finding management solutions to the incompatibility between domestic and bighorn sheep. Wallowa-Whitman National Forest, Baker City, Oregon. 20 pp., plus appendices.

- Sierra Nevada Bighorn Sheep Recovery Program. 2004. Sierra Nevada bighorn sheep recovery and domestic livestock: preliminary risk assessment of disease in the Eastern Sierra. California Department of Fish and Game, Bishop, California. 16 pp., plus appendices.
- Sweeney, S. J., R. M. Silflow, and W. J. Foreyt. 1994. Comparative leukotoxicities of *Pasteurella haemolytica* isolates from domestic sheep and free-ranging bighorn sheep (*Ovis canadensis*). *Journal of Wildlife Diseases* 30(4):523-528.
- U.S. Fish and Wildlife Service. 2007. Recovery Plan for the Sierra Nevada Bighorn Sheep. Sacramento, California. xiv + 199 pp.
- Ward, A. C. S., D. L. Hunter, M. D. Jaworski, P. J. Benolkin, M. P. Dobel, J. B. Jeffress, and G. Tanner. 1997. *Pasteurella* spp. in sympatric bighorn and domestic sheep. *Journal of Wildlife Diseases* 33:544-557.
- Western Association of Fish and Wildlife Agencies. 2007. Recommendations for domestic sheep and goat management in wild sheep habitat. Wild Sheep Working Group, Initial Committee. 21 pp., plus appendices.



# United States Department of the Interior

## Pacific Southwest Region FISH AND WILDLIFE SERVICE

Reno Fish and Wildlife Office  
1340 Financial Blvd., Suite 234

Reno, Nevada 89502

Ph: (775) 861-6300 ~ Fax: (775) 861-6301



October 16, 2015  
File No. 2015- CPA-0104

Ms. Wendy Sugimura  
Mono County Community Development  
Post Office Box 347  
Mammoth Lakes, California 93546

Subject: Mono County General Plan Update and Other Associated Documents

Dear Ms. Sugimura:

This letter is in response to Mono County's update of the Mono County General Plan and other associated documents. Specifically, Mono County is updating the Mono County General Plan, the Regional Transportation Plan, and three elements of the Integrated Waste Management Plan. This is considered a "project" as defined in the California Environmental Quality Act (CEQA) guidelines; therefore, a draft environmental impact report (EIR) has also been prepared to analyze the potential environmental effects associated with implementation of the project. The project includes goals, objectives, policies, actions, implementation programs, regulations and ordinances, and the repeal of a specific plan. We are providing our comments under the authorities of the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et seq.*), Migratory Bird Treaty Act of 1918, as amended (MBTA; 16 U.S.C. 703 *et seq.*), and other authorities of the Department of Interior.

### **Bi-State Distinct Population Segment of the Greater Sage-Grouse (*Centrocercus urophasianus*; sage-grouse)**

On April 21, 2015, we announced the withdrawal of our proposed rule to list the Bi-State distinct population segment of sage-grouse as threatened under the ESA. Our decision was largely predicated on conservation commitments provided by our partners in the Bi-State area, primarily through the Bi-State Action Plan, and further by needed changes to existing regulatory mechanisms. Mono County has been an active partner in conservation of sage-grouse in the Bi-State area and plays an important role in both specific conservation efforts as well as through General Plan updates, which can more broadly influence conservation of the species by reducing conflicts among multiple user groups. We are encouraged by the draft 2015 General Plan update and believe this regulatory mechanism will facilitate long-term conservation of sage-grouse in



the area. We recognize the General Plan tends to be a fairly general or conceptual document and we encourage you to remain cognizant of the important role the General Plan will play in conservation as you move toward implementation and interpretation of the document in future years with respect to evaluating site specific developments.

More specifically, we would like to commend you on several aspects of the General Plan that we believe will be instrumental in long-term conservation of the species through reducing site specific impacts as well as limiting landscape scale concerns such as fragmentation. As delineated in the Bi-State Action Plan, the County continues to move toward the elimination of the Benton Crossing Landfill. We consider this to be extremely important and applaud your resolve to manage this specific stressor. Additionally, we strongly support your decision to withdraw the previous Conway Ranch Management Plan and designate this area as open space. While we continue to have concerns over livestock grazing in the area (*see* Sierra Nevada Bighorn Sheep *section below*), we believe this decision is a strong move in the right direction. Finally, we consider many of the Land Use and Conservation/Open Space Elements intended to contain growth in existing communities; limit habitat disturbance outside of communities; preserve open space; and afford deference to sage-grouse habitat during discretionary permit review will greatly enhance the Bi-State area Partners' abilities to maintain individual sage-grouse populations and the connectivity among them.

Finally, we have several comments pertaining to specific items delineated in the proposed project. We request these comments be given careful consideration.

#### Common Ravens

Common ravens (*Corvus corax*) can have a significant impact on nesting success of sage-grouse and populations of the species can be artificially inflated in areas where anthropogenic foods subsidies are apparent. It appears that vehicle collisions with deer is a concern within the county and several actions are identified to minimize this safety issue. Assuming these actions will not be 100 percent effective, we encourage you to explore ways to collect and dispose of carcasses, thereby removing them as potential food sources for common ravens. Similarly, ranch operations will frequently dispose of dead animals by simply hauling them to a remote corner of the ranch property and leaving the carcasses exposed on the ground (i.e., "bone yards"). Actions (as allowed by law) that eliminate or restrict disposal of dead livestock in a manner that makes their carcasses available to common ravens should also be adopted.

#### Communication Towers

Cellular towers have been implicated to negatively affect sage-grouse populations and devices intended to limit perching and nesting by sage-grouse predators on these structures are generally ineffective. Several actions in the Project identify the need for additional cellular towers to facilitate communication and improve safety in the County. While we recognize this need, we encourage you to be deliberative in placement of this infrastructure and to the greatest extent possible restrict placement in sage-grouse habitat.

Roads

The Regional Transportation Plan identified an interest in improving State Route 270 and the Cottonwood Canyon Road in the Bodie Hills. While we are unsure at this time as to the benefit or cost of this specific action on sage-grouse, increased vehicle traffic in general has been shown to negatively affect sage-grouse populations. Therefore, we encourage you to fully consider and discuss with Bi-State partners any actions that would increase vehicle traffic in the Bodie Hills.

Non-native Grass

We have significant concerns with nonnative annual grasses, such as cheatgrass (*Bromus tectorum*) and red brome (*Bromus rubens*), due to the substantial negative impacts these species can have on native sagebrush (*Artemisia* sp.) habitats. We would strongly encourage Mono County, via the General Plan or other appropriate mechanism, to assist private land owners in addressing these invasive weed concerns.

EIR

We recommend fulfilling your commitment identified in the alternatives section of the EIR (p 6-14) to incorporate the additional proactive conservation measures identified in Alternative 3 into the proposed project at this time; including those actions described in Table 6-2 pertaining to enhancement of Bi-State greater sage-grouse habitat such as fence design and density; conservation easements; limiting the significance of impacts; and closing county roads during the breeding season.

**Lahontan Cutthroat Trout (*Oncorhynchus clarkii henshawi*)**

In the Draft Land Use Element section (p. II-133), Action 24.F.1.a. states that Witcher and Birch Creeks were identified by the California Department of Fish and Wildlife (CDFW) as locations for the reintroduction of Lahontan cutthroat trout. We would like to clarify that these two streams are located outside of the native range of Lahontan cutthroat trout and not considered streams needed for recovery of the species. The U.S. Fish and Wildlife Service (Service) works collaboratively with CDFW to introduce Lahontan cutthroat trout into locations that contribute to the recovery of the species and we have not had any discussions with CDFW regarding the introduction of Lahontan cutthroat trout to Witcher and Birch Creeks.

The following recovery waters on the Humboldt Toiyabe National Forest within the Walker River watershed contain all the self-sustaining stream populations of Lahontan cutthroat trout in Mono County: 1) Slinkard Creek, 2) Mill Creek, 3) Silver Creek, 4) Wolf Creek, 5) Murphy Creek, and 6) By-Day Creek. Another out-of-basin stream is O'Harrel Creek which is located northeast of Crowley Lake on the Inyo National Forest. In addition to these self-sustaining stream populations, Table 1 below identifies the lakes and stream segments that are stocked with Lahontan cutthroat trout by CDFW; however, waters stocked by Lahontan cutthroat trout can change.

**Table 1.** Waterbodies stocked by CDFW with Lahontan cutthroat trout

County	Landowner	Waterbody Name
Mono	Inyo NF	June Lake
Mono	Inyo NF	McCleod Lake
Mono	Inyo NF	Silver Lake
Mono	Inyo NF	Steelhead Lake
Mono	City of LA	Crowley Lake
Mono	Inyo NF	Gull Lake
Mono	unknown	WF Walker River section 2
Mono	HTNF	WF Walker River section 3
Mono	HTNF	EF Walker River below Bridgeport Res.
Mono	HTNF	Bridgeport Reservoir
Mono	HTNF	Kirmen Lake
Mono	HTNF	Lane Lake
Mono	HTNF	Roosevelt Lake

### Sierra Amphibians

We appreciate your recognition in Policy 2.A.13. that certain lakes and streams in the backcountry may be more appropriate for the conservation of sensitive, threatened or endangered species, such as the federally-listed as endangered Sierra Nevada yellow-legged frog (*Rana sierrae*) and federally-listed as threatened Yosemite toad (*Anaxyrus canorus*), as identified in Policy 2.A.13. Please note that critical habitat for Sierra Nevada yellow-legged frog and Yosemite toad are expected to publish in the Federal Register in the near future. As recovery efforts advance for this species, we look forward to working with the County.

### Sierra Nevada Bighorn Sheep (*Ovis canadensis sierrae*; Sierra bighorn)

In the Draft Land Use Element section (pp. II-9, II-10, II-79, II-81), there are discussions about supporting historical uses in the Mono Basin, including domestic sheep grazing. Currently, domestic sheep grazing occurs on both the Conway and Mattly Ranches. These two properties are located less than 0.5 miles from the Mt. Warren herd unit. The Mt. Warren herd unit is identified as an “essential herd unit” or a herd unit that is most likely to support the recovery of the subspecies in the U.S. Fish and Wildlife Service’s Recovery Plan for the Sierra Nevada Bighorn Sheep (2007).

On June 17, 2014, we sent a letter to the Mono County Board of Supervisors on the draft Grant Deed of Conservation Easement Conway and Mattly Ranches indicating our concerns regarding domestic sheep grazing on these two properties. As stated in that letter, the Conway and Mattly Ranch properties are located within a predicted area of potential contact which indicates that there is a high risk of Sierra bighorn coming into contact with domestic sheep. Disease transmitted by domestic sheep was one threat identified in the final rule to list Sierra bighorn as

endangered (65 FR 20) and is considered the primary factor leading to the decline and extirpation of bighorn sheep across western North America. Consequently, we remain concerned about the continued grazing of domestic sheep in areas adjacent to habitat occupied by Sierra bighorn.

The Sierra bighorn population has been steadily increasing since it was listed; however, disease events still pose a threat to the subspecies and the effects can last for decades. Due to the potential impact to the Sierra bighorn population from domestic sheep grazing, we recommend including Sierra bighorn in Wildlife Resources section 4.5.2.6 (Section in original document should be corrected to 4.4.2.6) and discussing the potential impacts to the species. Including Sierra bighorn in this discussion would be consistent with Policy 24.F.3. (Protect wildlife and native plants, especially rare and endangered species) and Action 24.F.3.e. (Support the CDFW's continuing program to reintroduce native game species (bighorn sheep)), which were both identified in the Draft Land Use Element with Edits section of the General Plan Update (p. II-134).

We look forward to continuing discussion and collaboration toward solutions to this concern.

#### **Sierra Nevada Red Fox (*Vulpes vulpes necator*)**

We recommend updating information related to the Sierra Nevada red fox. As of October 8, 2015, the Sierra Nevada distinct population segment was determined to be warranted but precluded from listing under the ESA (80 FR 60990). As a result, the Service considers this subspecies to be a candidate species under the ESA. This population occurs near Sonora Pass in Mono, Tuolumne, and Alpine Counties. We recommend that the second paragraph and Table 4.4-7 under the Biological Resources section on pages 4.4-22 and 4.4-24, respectively, be modified to reflect this new information.

#### **Migratory Birds**

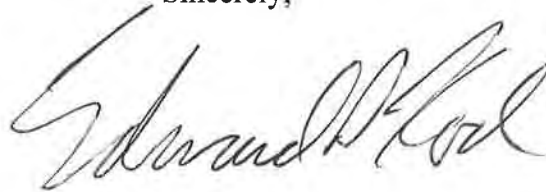
Migratory birds are a public trust resource of the Service and are protected by the Migratory Bird Treaty Act. You can find a list of species protected by the Migratory Bird Treaty Act at 50 Code of Federal Regulations 10.13. The Migratory Bird Treaty Act prohibits the "take" or possession of migratory birds; "take" under this law means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempts to do so (50 Code of Federal Regulations 10.12).

The Migratory Bird Treaty Act is a strict liability statute, meaning that proof of intent, knowledge, or negligence is not an element of a violation of this statute. The statute's language is clear that an action resulting in the "taking" of an individual of a protected species is a violation of this law. The Migratory Bird Treaty Act does not specifically authorize the incidental take of migratory birds; consequently, the Service does not issue permits authorizing such take.

The Service carries out its mission to protect migratory birds by fostering relationships with entities that have taken effective steps to avoid take, by encouraging others to implement measures to avoid take, and through investigations and enforcement when appropriate. We encourage you to work closely with the Service to identify available protective measures when developing project plans to safeguard wildlife and to implement those measures where applicable. Examples of recommended conservation measures can be found here: <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>.

We appreciate the opportunity to provide comments on the updated General Plan. If you have any questions regarding this letter, please contact me at (775) 861-6300 or Erin Nordin, of my staff, at (760) 872-5020 or [Erin\\_Nordin@fws.gov](mailto:Erin_Nordin@fws.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Edward D. Koch". The signature is written in a cursive style with a large, sweeping initial "E".

Edward D. Koch  
Field Supervisor

References

U.S. Fish and Wildlife Service (Service). 2007. Recovery Plan for the Sierra Nevada Bighorn Sheep. Sacramento, California. xiv + 199 pages.



# United States Department of the Interior

Pacific Southwest Region  
FISH AND WILDLIFE SERVICE

Reno Fish and Wildlife Office  
1340 Financial Blvd., Suite 234  
Reno, Nevada 89502

Ph: (775) 861-6300 ~ Fax: (775) 861-6301



June 17, 2016  
File No. 2016-CPA-0077

Board of Supervisors  
Mono County  
P. O. Box 715  
Bridgeport, California 93517

Dear Mono County Board of Supervisors:

Subject: Comments on the April 2016 Draft Conway Ranch Strategic Facility Plan

Thank you for providing a public process in the development of a strategic plan to guide future activities, maintenance, and development of the Conway Ranch property. We commend Mono County's efforts to develop a plan that maintains and enhances the conservation, economic, recreation and cultural values that are present on Conway and Mattly Ranches. We have reviewed the draft Conway Ranch Strategic Facility Plan (Plan) dated April 2016 and would like to take this opportunity to share our general comments on the Plan.

The Plan identifies the master vision for grazing Mattly and Conway Ranches to include domestic sheep. We request the Plan be changed to simply identify livestock grazing as the master vision for the property. As we have communicated in previous letters and discussions, we remain concerned with the potential effects of domestic sheep grazing on Mattly and Conway Ranches to the state and federally endangered Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*; Sierra bighorn).

Our main concern is the potential for disease transmission, specifically pneumonia, between domestic sheep and Sierra bighorn due to the proximity of Mattly and Conway Ranches to the Mt. Warren herd unit. The Mt. Warren herd unit was identified in the 2007 Sierra Nevada Bighorn Sheep Recovery Plan (Service 2007) as a herd unit essential for the recovery of the subspecies and it is also designated critical habitat. The California Department of Fish and Wildlife (CDFW), our partner in recovering the Sierra bighorn, has been successful in increasing the abundance and distribution of Sierra bighorn through augmentations and translocations. These efforts have been necessary in order to ensure the persistence of the subspecies throughout its historic range. A disease outbreak in the Mt. Warren herd unit would not only affect animals



occupying this area but it could also spread to animals in the surrounding area known as the Northern Recovery Unit. Currently, there are two other herds located in the Northern Recovery Unit, one of which is a newly introduced herd located in Yosemite National Park. Presently, we do not think that the current management of Mattly and Conway Ranches provides for the effective separation of domestic sheep and Sierra bighorn. This lack of effective separation limits our ability to recover Sierra bighorn.

The Plan also states that the current grazing lease expires in November 15, 2017, and that domestic sheep grazing may continue “unless it is prohibited through federal action, on North Conway Ranch, South Conway Ranch, and Mattly Ranch, with appropriate seasonal restrictions and BMPs applied.” We request that Mono County remove this language from the Plan because it is inconsistent with the U.S. Fish and Wildlife Service’s authority under the Endangered Species Act of 1973, as amended (ESA; 50 CFR §402.13).

As a result, we request an opportunity to meet in person to provide more detailed information on our concerns and authorities under the ESA. We are also hoping to arrange a meeting with F.I.M. Corporation to provide an opportunity for information sharing as well. If you have any questions regarding our comments or to arrange a meeting, please contact me or Lee Ann Carranza at (775) 861-6300.

Sincerely,



Edward D. Koch  
State Supervisor

ccs:

Tony Dublino, Mono County, South County Office, Mammoth Lakes, California  
F.I.M. Corporation, Smith, Nevada

Dr. Tom Stephenson, Senior Environmental Scientist, California Department of Fish and  
Wildlife, Inland Deserts Region, Bishop, California

Literature Cited

U.S. Fish and Wildlife Service. 2007. Recovery Plan for the Sierra Nevada Bighorn Sheep. Sacramento, California. xiv + 199 pages.



# United States Department of the Interior

Pacific Southwest Region  
FISH AND WILDLIFE SERVICE

Reno Fish and Wildlife Office  
1340 Financial Blvd., Suite 234  
Reno, Nevada 89502

Ph: (775) 861-6300 ~ Fax: (775) 861-6301



December 12, 2016  
File No. 2016-CPA-0077E

Board of Supervisors  
Mono County  
P. O. Box 715  
Bridgeport, California 93517

Subject: Conway/Mattly Ranch Item for December 13, 2016 Board of Supervisors Meeting

Dear Honorable Mono County Board of Supervisors:

Thank you for notifying our office of the Conway/Mattly Ranch agenda item for tomorrow's Board of Supervisors Meeting. The agenda item is identified as Item 13/Regular Agenda: Presentation Regarding Conway/Mattly Ranch Public Outreach and Authorization for Request for Proposals for Grazing Lease. Although our office has great interest in this topic due to the potential effects of domestic sheep grazing on Mattly and Conway Ranches to the state and federally endangered Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*; Sierra bighorn), we are not able to attend the meeting in person.

As stated in our June 17, 2016 comment letter on the April 2016 draft Conway Ranch Strategic Facility Plan, we request the County simply identify livestock grazing as the master vision for Conway/Mattly Ranches as opposed to limiting consideration to only domestic sheep operations.

Since the current grazing lease expires on November 15, 2017, we appreciate the interest and need for the County to pursue this matter expeditiously; however, we respectfully request the County reschedule this discussion in order for us and California Department of Fish and Wildlife (CDFW) to identify other options of consideration by the Board and to be able to attend the meeting in person. Please note, we would also like to work together in helping craft language for any future Request for Proposals for livestock grazing on Mattly and/or Conway Ranches.

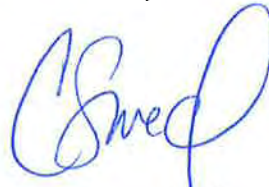
Our main concern is the potential for disease transmission, specifically pneumonia, between domestic sheep and Sierra bighorn due to the proximity of Mattly and Conway Ranches to the Mt. Warren herd unit. The Mt. Warren herd unit was identified in the 2007 Sierra Nevada Bighorn Sheep Recovery Plan (Service 2007) as a herd unit essential for the recovery of the subspecies and it is also designated critical habitat. Our partner in recovering the Sierra bighorn, CDFW, has been successful in increasing the abundance and distribution of Sierra bighorn

through augmentations and translocations. These efforts have been necessary in order to ensure the persistence of the subspecies throughout its historic range. A disease outbreak in the Mt. Warren herd unit would not only affect animals occupying this area but it could also spread to animals in the surrounding area known as the Northern Recovery Unit. Currently, there are two other herds located in the Northern Recovery Unit, one of which is a newly introduced herd located in Yosemite National Park.

I believe that recovery of Sierra bighorn is a shared goal among the County, CDFW and the Service. The Service believes that recovery of this species is within reach. However, presently the current management of Mattly and Conway Ranches does not provide for the effective separation of domestic sheep and Sierra bighorn. This lack of effective separation limits our ability to recover Sierra bighorn and puts the recovery effort within the Northern Recovery Unit at risk.

Although Lee Ann Carranza, Assistant Field Supervisor, reached out to the County and F.I.M. Corporation to offer a meeting in which to facilitate information sharing on the subject, we have not scheduled any meetings. However, we remain interested and our offer to meet remains. Ideally such a meeting would include CDFW. If you have any questions regarding our comments or would like to arrange a meeting, please contact me or Lee Ann Carranza at (775) 861-6300.

Sincerely,



Carolyn Swed,  
Acting Field Supervisor

ccs:

Tony Dublino, Mono County, South County Office, Mammoth Lakes, California  
F.I.M. Corporation, Smith, Nevada

Dr. Tom Stephenson, Senior Environmental Scientist, California Department of Fish and  
Wildlife, Inland Deserts Region, Bishop, California

Literature Cited

U.S. Fish and Wildlife Service. 2007. Recovery Plan for the Sierra Nevada Bighorn Sheep. Sacramento, California. xiv + 199 pages.



**OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS**

**REGULAR AGENDA REQUEST**

Print

**MEETING DATE**    March 7, 2017

**TIME REQUIRED**

**SUBJECT**                    Closed Session--Human Resources

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

**AGENDA DESCRIPTION:**

(A brief general description of what the Board will hear, discuss, consider, or act upon)

CONFERENCE WITH LABOR NEGOTIATORS. Government Code Section 54957.6. Agency designated representative(s): Stacey Simon, Leslie Chapman, Dave Butters, Janet Dutcher, and Anne Larsen. Employee Organization(s): Mono County Sheriff's Officers Association (aka Deputy Sheriff's Association), Local 39--majority representative of Mono County Public Employees (MCPE) and Deputy Probation Officers Unit (DPOU), Mono County Paramedic Rescue Association (PARA), Mono County Public Safety Officers Association (PSO), and Mono County Sheriff Department's Management Association (SO Mgmt). Unrepresented employees: All.

**RECOMMENDED ACTION:**

**FISCAL IMPACT:**

**CONTACT NAME:**

**PHONE/EMAIL:** /

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
***PRIOR TO 5:00 P.M. ON THE FRIDAY  
32 DAYS PRECEDING THE BOARD MEETING***

**SEND COPIES TO:**

**MINUTE ORDER REQUESTED:**

YES  NO

**ATTACHMENTS:**

<p><a href="#">Click to download</a></p> <p>No Attachments Available</p>
--

**History**

Time

Who

Approval



**OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS**

**REGULAR AGENDA REQUEST**

Print

**MEETING DATE** March 7, 2017

**Departments: County Counsel**

**TIME REQUIRED**

**SUBJECT** Closed Session - Existing Litigation

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

**AGENDA DESCRIPTION:**

(A brief general description of what the Board will hear, discuss, consider, or act upon)

CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION. Paragraph (1) of subdivision (d) of Government Code section 54956.9. Name of case: Czeschin v. County of Mono; administrative citation appeal (Mono County Superior Court Case No. CV 170001).

**RECOMMENDED ACTION:**

**FISCAL IMPACT:**

**CONTACT NAME:** Anne Larsen

**PHONE/EMAIL:** 760 924-1707 / alarsen@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

**SEND COPIES TO:**

**MINUTE ORDER REQUESTED:**

YES  NO

**ATTACHMENTS:**

<p><a href="#">Click to download</a></p> <p>No Attachments Available</p>
--

**History**

Time	Who	Approval
3/1/2017 5:08 AM	County Administrative Office	Yes



2/28/2017 4:35 PM

County Counsel

Yes

2/24/2017 1:48 PM

Finance

Yes



OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**TIME REQUIRED**

**SUBJECT** Closed Session - Real Property  
Negotiations

**PERSONS  
APPEARING  
BEFORE THE  
BOARD**

---

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

CONFERENCE WITH REAL PROPERTY NEGOTIATORS. Government Code section 54956.8. Property: Sierra Center Mall, Mammoth Lakes. Agency negotiators: Leslie Chapman, Janet Dutcher, Tony Dublino, Stacey Simon. Negotiating parties: Mono County and Highmark Mammoth Investments, LLC. Under negotiation: Price and terms of payment.

---

### RECOMMENDED ACTION:

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### FISCAL IMPACT:

---

### CONTACT NAME:

**PHONE/EMAIL:** /

---

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

### SEND COPIES TO:

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### MINUTE ORDER REQUESTED:

YES  NO

---

### ATTACHMENTS:

[Click to download](#)

No Attachments Available

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History

Time

Who

Approval



OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Public Works; CAO**

**TIME REQUIRED** 2.5 hours (15 minute presentation;  
2.25 hour discussion) **PERSONS APPEARING BEFORE THE BOARD** Tony Dublino

**SUBJECT** Direction to Staff re Conway Ranch  
Request for Grazing Proposals

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Presentation by Tony Dublino regarding potential issuance by County of a Request for Proposals for Grazing at Conway Ranch.

### RECOMMENDED ACTION:

Receive presentation and provide direction to staff regarding the issuance of an RFP for grazing on Conway Ranch, including, but not limited to, one of the following options: 1. Direct staff to prepare RFP for sheep grazing at Conway and Mattly Ranch. Any such proposal will require indemnification as well as applicant funding of any necessary CEQA. Once prepared, present to Board for approval, posting and publishing. 2. Direct staff to prepare RFP for cattle grazing at Conway and Mattly Ranch. Any such proposal will require indemnification as well as applicant funding of any necessary CEQA. Once prepared, present to Board for approval, posting and publishing. 3. Do not direct staff to prepare an RFP – allow current grazing lease to expire without subsequent lease in place.

### FISCAL IMPACT:

None at this time.

**CONTACT NAME:** Tony Dublino

**PHONE/EMAIL:** 760.932.5453 / tdublin@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

**SEND COPIES TO:**

### MINUTE ORDER REQUESTED:

YES  NO

### ATTACHMENTS:

[Click to download](#)

[Staff Report](#)

[Public Correspondence Received](#)

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### History

<b>Time</b>	<b>Who</b>	<b>Approval</b>
3/1/2017 4:50 AM	County Administrative Office	Yes
2/28/2017 4:43 PM	County Counsel	Yes
3/1/2017 5:30 PM	Finance	Yes



# MONO COUNTY DEPARTMENT OF PUBLIC WORKS

---

Post Office Box 457 • 74 North School Street • Bridgeport, California 93517  
(760) 932-5440 • Fax (760) 932-5441 • [monopw@mono.ca.gov](mailto:monopw@mono.ca.gov)

Jeff Walters, Public Works Director

Garrett Higerd, PE  
County Engineer

**Date:** February 21<sup>st</sup>, 2017  
**To:** Honorable Board of Supervisors  
**From:** Tony Dublino, Environmental Services Manager  
**Subject:** Conway Ranch Grazing Request for Proposals (RFP)

**Recommended Action:** Receive presentation and provide direction to staff.

1. Direct staff to prepare RFP for sheep grazing at Conway and Mattly Ranch. Any such proposal will require indemnification as well as applicant funding of any necessary CEQA. Once prepared, present to Board for approval, posting and publishing.
2. Direct staff to prepare RFP for cattle grazing at Conway and Mattly Ranch. Any such proposal will require indemnification as well as applicant funding of any necessary CEQA. Once prepared, present to Board for approval, posting and publishing.
3. Do not direct staff to prepare an RFP – allow current grazing lease to expire without subsequent lease in place.

**Fiscal Impact:** None at this time.

**Discussion:** The County's Conway and Mattly Ranches (CR) are grazed by domestic sheep under a lease agreement that expires in November of 2017.

The lease generates approximately \$19,000 per year in revenue from the lessee FIM Corporation, and the County pays FIM Corporation \$6,000 per year for "Irrigation Specialist" Services for meadow irrigation, resulting in a net revenue of approximately \$13,000 per year for grazing-related activities at CR.

The current lessee FIM has consistently expressed interest in continuing to graze sheep at CR, and would like to extend the lease. However, as a government agency, the County must engage in a Request for Proposals (RFP) or bid process under its own rules (Mono County Code section 3.050.020 and 030) and under State law (Government Code section 25537.)

And grazing at CR is not without controversy. Specifically, interested parties and wildlife agencies have raised potential environmental impacts to special status species such as Bi-State Sage Grouse and Sierra Nevada Bighorn Sheep.

Under state law, the County must review the impacts of any proposed grazing activities under the California Environmental Quality Act before committing itself to a final course of action, and adopt any necessary mitigation measures.

Recommended Actions 1 or 2 would provide direction for staff to develop a thoroughly mitigated RFP for a given type of livestock, and bring the final RFP back to the Board for approval. Under these recommended actions, any RFP would require respondents to fund the requisite CEQA effort, as well as indemnify the County against any associated litigation.

### History

The County acquired Conway Ranch through a variety of grant funds in 1998. Shortly thereafter, the County resolved (R00-29) to lease parts of the Conway Ranch for the purpose of sheep grazing. A request for proposal process initiated, and was won by FIM Corporation.

During the ensuing years, sheep grazing on Conway become a regular activity during the summer and fall. Grazing activities have been controlled by a series of five-year leases, the most recent of which will expire in November 2017. The leases include terms and conditions, and those terms and conditions have generally been upheld and the overall impact of the sheep on Conway Ranch has been minimal. The meadows are in good to excellent condition, the livestock is light on the land, and each spring there is little sign of their presence from the preceding grazing season.

Despite the absence of significant physical environmental impacts, the presence of domestic sheep on Conway Ranch has become a critical concern for wildlife agencies involved with the recovery of Sierra Nevada Bighorn Sheep (SNBS) due to the issue of disease transmission between domestic sheep and SNBS.

This is a highly controversial matter that has been debated in front of the Mono County Board numerous times. In 2007, during a debate on the designation of critical habitat the Board (R07-81) took issue with the taxonomy of SNBS, and requested that federal grazing allotments be removed from the critical habitat designation, in an effort to preserve the County's agriculture and grazing economy (all those allotments have since been closed to grazing). Conway Ranch was not mentioned in the Board's 2007 Resolution.

In the last five years, the Board has heard comments on the subject of disease transmission from many agencies and individuals as CR planning efforts and the creation of the Conservation Easement have moved through the public process.

Through the process creating the CR Conservation Easement, references to 'sheep grazing' were changed to a more generic 'livestock grazing,' largely in deference to the concerns over disease transmission.

Throughout 2016, public outreach relating to Conway generated the concept that grazing activities at Conway should continue, thus giving rise to the item today.

### Today's Recommended Actions

Leading up to today's item, the County distributed a Request for Letters of Intent from grazing operators that would generally describe their approach to grazing and proposed mitigations at CR. The County received seven responses. Two were from sheep operators, and five were from cattle operators.

County staff met with USFWS and CADFW to discuss the various mitigations proposed in the letters, to obtain a sense of whether those mitigations would result in less than significant

impacts to Bi-State Sage Grouse and/or SNBS. Agency representatives did not offer conclusive input regarding proposed cattle mitigations and whether they would effectively eliminate potential impact to Bi-State Sage Grouse, but did state that the mitigations proposed for sheep grazing would not mitigate risk of disease transmission to SNBS, and suggested that no mitigations whatsoever could mitigate that potential impact.

The Recommended Actions reflect what staff believes are the most commonly held public opinions about what should happen at CR in the future – that is, sheep grazing, cattle grazing, or no grazing.

The Conservation Easement for Conway Ranch allows all three of these recommended actions. It does not require the County to graze livestock, but permits livestock grazing. The Easement primarily requires the County maintain conservation values, which will greatly influence grazing activities as well as non-grazing activities. Any activities conducted on CR must comply with the Conservation Easement, which can be viewed in its entirety at the following web address:

<http://www.monocounty.ca.gov/facilities/page/conway-ranch-conservation-easement>

If you have any questions regarding this item, please contact me at (760) 932-5453.

Respectfully submitted,

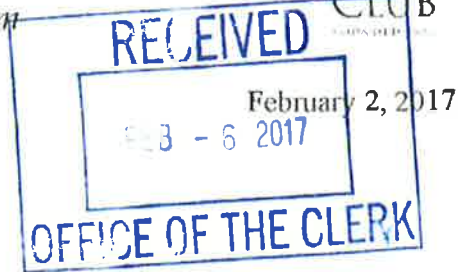


Tony Dublino  
Environmental Services Manager





Range of Light Group  
Toiyabe Chapter, Sierra Club  
Counties of Inyo and Mono, California  
P.O. Box 1973, Mammoth Lakes, CA, 93546  
Rangeoflight.sc@gmail.com



Mono County Board of Supervisors  
PO Box 715  
Bridgeport, CA 93517

RE: Conway Ranch Sheep Grazing Renewal

To: The Honorable Mono County Board of Supervisors:

The Sierra Club Range of Light Group and its 394 members have a deep and active interest in the health of the Eastern Sierra's lands, waters and wildlife. Our Executive Committee met recently and discussed the issues related to the management and protection of the Conway and Mattly Ranch properties.

Our group strongly encourages the Mono County Board of Supervisors to support the purpose and intent of both the Endangered Species Act and the Sierra Nevada Bighorn Sheep Recovery Plan by not renewing the lease for domestic sheep grazing on Conway and Mattly Ranch properties. There is a large body of evidence published in the peer-reviewed literature that documents the fatal health risk that domestic sheep pose to the Sierra Nevada Bighorn Sheep. We urge the Board to acknowledge the science and support the state and federal agency experts who ask for sheep grazing on these properties to end. We believe the best use of this property is to manage it to emphasize the protection and conservation of wildlife and wildlife habitat while retaining the pastoral viewshed that is highly valued by the community and the public. If the County continues grazing, we encourage the County to consider livestock other than domestic sheep or goats.

We hope you give the CDFW and USFW staff a chance to give a presentation on the current science and research data to the Board and the public before determining whether an RFP for grazing is warranted.

Sincerely,

Lynn Boulton, Chair  
Range of Light Group

# Conway/Matley Ranch

Mono County, California

Legal description of sustainable agriculture in the United States,[U.S. code Title 7, Section 3103]: states

Sustainable agriculture means an integrated system of plant and animal production practices having a site specific application that will over the long term:

Satisfy human food and fiber needs

Enhance environmental quality and natural resources based on which the agriculture economy depends

Makes the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate natural biological cycles and controls

Enhance the quality of life for farmers and society as a whole

The history of the Conway/Matley ranch is tied to sheep and as was presented in a proclamation that USED to hang in the courthouse in Bridgeport, California. I feel it is necessary to highlight a few issues to get a full understanding of the issues.

## History of sheep in California

The first sheep came to the United States in 1496, on the second voyage of Christopher Columbus. The first to the Sierras came at about 1800. The start however, was in 1769 when Franciscan Fathers of the early Spanish Colony commenced raising sheep at their missions. By 1819, the total on 19 mission ledgers showed a record population of 186,233 sheep. When California became a state in 1850, there were less than 20,000 sheep in the entire state. This changed again during the gold rush and the need to feed the hungry miners. They, at one was paying from \$7 to \$16 per sheep. Large numbers of sheep were brought in to furnish mutton, the peak in 1856, when more than 200,000 sheep were driven in

to California and Nevada from New Mexico, the Midwest, and from Mexico. According to "historical" documents, the sheep were easy to handle, they had an abundance of pasture, extremely hardy and disease was "uncommon". In 1865, a writer pointed out that there was vast pastures on both sides of the Sierra Nevada where herds could be grazed. He suggested that the "sheepmen" follow the old Spanish trail. The use of the Sierra was the main factor in developing the sheep industry. They found that taking if they took lean and weak sheep taken into the hills and high pastures to graze they returned fat and strong. The herders followed the range across the range to the south end of INYO county, then along the eastern edge of the Sierra, re-crossing the crest to the west side in the vicinity of Yosemite Valley and sometimes as far north as Lake Tahoe, then back along the foothills to the central valley and winter lambing grounds. It was during these days that a penniless young man by the name of John Muir, took, on June 3, 1869, 2050 sheep into the Southern Inyo. Working as a shepherd for \$30.00 a month, with an assistant, a few dogs and a rifle, he started across the Sierra. He began to gradually move the sheep higher and higher and thru successive belts of forests as the snow melted, stopping for weeks at a time at the best meadows. He mapped and documented the Sierra on his summer as a shepherd. He was so taken by the Sierra that he became an advocate for their preservation. In 1903, after much correspondence, President Theodore Roosevelt, agreed to a visit and camping trip to view for himself, John Muir's mountains. He wrote in his journals about John Muir and their 4 day camping trip. The President wrote this: I was interested and a little surprised to find that, unlike John Burroughs, John Muir did not like birds, their songs of even most animals. What he like was the geology , the rocks, the canyon and the ruggedness of the Sierra Mountains. He climbed a number of mountains including Cathedral Peak, Dana Peak and hiked the old Indian trail down Bloody Canyon to Mono Lake. In John Muirs mind, the animals were a detriment to the natural world. He however wanted to save "HIS" home, The Sierra, from man.

### Disease Transmission

Dr. John Boyntons letter told a lot about the cattle industry and the destruction that they can cause to land and riparian areas, and how they can affect the water

quality. The USFWS says that disease transmission between domestic and wild bighorn sheep is a possibility. What they do not tell you, however, is that the pneumonia between the two species can only be done by the exchange of fluids. They have to touch noses. In the 248 years that domestic sheep have been in Nevada and California, there have NEVER been any documented cases of disease transmission in the wild. There have been die-offs where there were NO domestic sheep in the area. The facts about disease transmission is one that will NEVER be won. Scientist and Doctors from all walks of life and from all over the country, have been studying the prospect of transmission for decades. The USFWS and CDFW, will never change their story on the issue, regardless of how many other reports are done. They have an agenda. There have been studies done in Idaho, Wyoming and Colorado, where the bighorn are captured, transported, tagged and placed in tiny 10x10 corrals with domestic sheep. It is true the in the case of the bighorn, they died. Yes, they had pneumonia. WALA, the "best available science" proves that disease transmission is possible. The USFWS have the "proof" they need to make things happen, and at this point it cannot be dis-proven. What you do not see however is the actual necropsy report of the death of the bighorn, in total. The necropsy will find that although the bighorn died from pneumonia, it was the DNA of it's own system that killed it, not the domestic. When a bighorn is stressed its natural immune system fails and the bighorn can get pneumonia from the pathogens it carries in its lungs. The whole of the issue is the "he said, she said" situation. No side will win. Both sided have their own proof and evidence. Especially the bighorn. Their own documents in the recovery plan , clearly shows in the maps that the Northern Unit has very little suitable habitat.[maps included] This does not mean that we all have to buy into what they say is fact. I find it ironic that one of the studies that CDFW highlights in their research { California Department of Fish and Game, 2009}, was co-written by sheep men and women. Joe Echinique, Nancy East, Amy Baumer, Marcy Haworth, Marianne F. Leinassar, Chris Popouchis, Tom Stephenson, DianeWeaver and Genny Wilson.

Marianne F. Leinassar is the President of FIM corporation, and the daughter if Fred Fulstone, the very people whom you are trying to kick off the Conway/Matley. Funny huh.

To find a leasee, who, if cattle are preferred, would be able to absorb the cost to do all the necessary changes to the property, would be rare. To install the fences needed to do proper rotation, to fence off the water supply to insure water quality, to fence off the watering facilities that would be needed to be added, could be a challenge. The sage grouse issue of NO fences would also cause a problem as well as the mule deer corridor. To get all the necessary changes through the ESLT easement would be another. The property is not big enough to have the necessary AUMs to make it profitable for anyone.

There are ways to keep sheep on the property IF it necessary, which FIM has done in the past. They have changed season of use to earlier in the season, so as not to be there when the bighorn are in RUT. They have made all changes that the county have imposed. The Conway/Matley ranches are the only losers in this situation. The easement is forever, not until next year or 10 years down the road. There are No easy fixes here, and no MONEY to fix them either.

Thank you for your time on this matter, Marilyn "MAX" Symonds, 1-15-2017

330 W. Nye Ln. #1 Carson City, Nevada 89706 1-775-430-2380

## Conway/Matley Ranch

### Mono County, California

The problems on the Conway/Matley Ranches, unfortunately cannot and will not ever be solved. In reality the property cannot be returned to its previous glory, because simply there is not enough MONEY. The meadows will not look the way they did in the 50s and 70s. Time and circumstances have changed too much and there are too many restrictions now. If it were only one problem for the ranches maybe there would be a chance. Unfortunately that is not the case. The largest issue, if there were only one, would be as I said above, if financial. The County does not have the resources to fix and maintain all the issues. The water situation is maybe the biggest problem, because there is no way to deliver the 6cfs of water that is due to them for the ranch. The ditches would require not only re-aligning the ditch, but repairing many places on the ditch on the Chichester portion and on the Webb portion. The BLM/FS portion not only needs to be cleared but also repaired just to get the water down to the ranch, not to mention all the work on the existing gates on the Virginia Creek side. There are many gates that need repaired on the ranch and more that need to be added in order to get the water distributed to the places on the ranch where it will be beneficial. The existing ditches need to be cleaned and maintained each year. FIM Corporation and NRCS in 2015 did a day trip to Conway Summit to research what could be done and what it would cost to repair only that part of the ditch. NRCS said that the things that needed to be done are considered as maintenance and they could not do them at this time. Mr Webb would not allow FIM on

his property to maintain or repair work to the ditch from the moles and ground squirrels that had burrowed into the sides of the ditch banks causing the ditch to flood onto the Virginia Lakes road and onto Conway Summit road at 395. The ranch itself, {CONWAY}, is in desperate need of plowing and re-seeding the grasses in the irrigated meadow that are on the property. The grasses are so old they are RANK, which means nothing wants to eat the grass because it is very tough. Like sawgrass. The historical buildings need to be at least stabilized to secure their future. When you take into consideration the sage grouse and bighorn sheep issues, you have a huge mess. The restrictions which have been introduced for these wildlife, will have to be taken into consideration before anything can be done, IF the money could be found. The next issue for the ranches would be the conservation easement itself, and the restrictions from it. The Federal Government wants their way, the State of California wants their way, and the County is tied up in litigation. Where is the answer for Conway/Matley? FIM Corporation has spent over \$25,000. of their own money repairing and maintaining the ditches and waterways since they started leasing the ranches. They pay a hefty lease each year and it is going UP each year. You asked for EIS money, ditch work, and maintenance be burdened on the lease. That is not right. The BOS is seeking bids for the lease of the property and is considering cattle to graze instead of sheep because they have been told that there is a huge risk to the bighorn sheep that have been located in the Lundy Canyon area. The disease transmission issue with bighorn has been the source of litigation for over 30 years and will not be resolved anytime soon. The issues could be argued from both sides because there are as many doctors and scientist that side with the governments as there are that














say the claims they have are false. I have personally done research on both sides of the issue and know from my own research that there is not a clear answer. The only answer at this time, is that the State and Federal governments have an agenda, they have been told what they have to do, and they want it done, their way. The money that FIM pays to the County has to be used to pay the maintenance fees to ESLT for the easement, so there is not monetary value for the County. FIM does what it can with what they have to work with, but for the good of the property it may not be enough. They are only able to get about 2cfs of water to the property instead of the 6 it is supposed to use. This is in violation of the Walker River Water Authority, and the 6cfs is not going to beneficial use as intended, because it cannot make it to the ranch. Under the present condition and restrictions there will never be able to achieve the "desired conditions". Even if the County were able to find the money to make ALL the repairs and modifications needed to get the proper water, and grasses in, who would do the maintenance and upkeep. The county is looking to maybe put cattle on the property, and that is an option, but when you add in the fences needed, the watering areas needed and the water quality issues involved, it may not be feasible at all. The amount of AUM's would not offset the cost to do the EIS and the modifications. The benefit just is not there financially. The loser in this whole ball game, is of course is the Conway/Matley ranches. They are the ones that are in the middle of this mess, and there is no clear way out. With the easement in place, it would even be almost impossible to sell the property, because the easement is FOREVER. The restrictions are FOREVER and the wildlife issues are basically FOREVER. Not a lot of solutions here. I personally have spent, hundreds of hours and days researching the die-off of bighorn sheep,

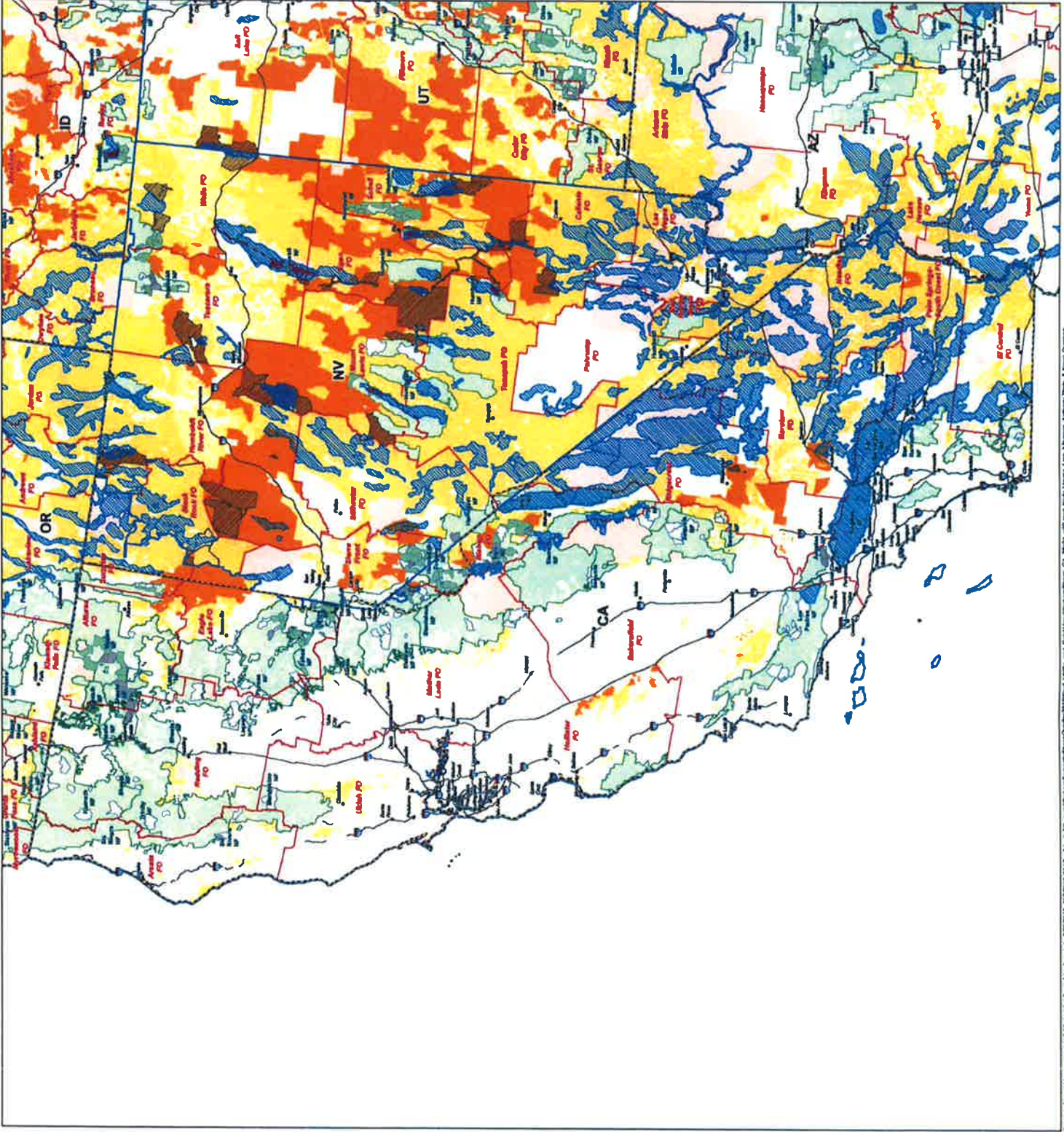
disease transmission issues between domestic and wild sheep, the issues surrounding sage grouse, bighorn and mule deer. I have analyzed the situation from all the angles and there is really no answer for MONO COUNTY. You can't even use the historical value, because of All the restrictions that have been imposed. Mono County has virtually built themselves into a corner and the walls are too thick to get out.

# California Bighorn Sheep Occupied Habitat and Domestic Sheep Grazing Allotments

**DRAFT**  
2/20/2012

## Legend

-  Western Association of Fish and Wildlife Agencies: Bighorn Sheep Occupied Habitat
-  Areas of Overlap Between Bighorn Sheep Occupied Habitat and Billed Bluff Domestic Sheep-Goat Grazing
-  Areas of Overlap Between Bighorn Sheep Occupied Habitat and Active FS Domestic Sheep/Goat Allotments
-  Bureau of Land Management (BLM) Domestic Sheep/Goat Grazing
-  BLM Grazing Pile: Included Sheep or Goat Use with All or Part of Allotment/Pasture (Includes Trailing Type Use)
-  BLM Term Grazing Authorizations: Included Sheep or Goat Use with All or Part of Allotment/Pasture (Does Not Include Trailing Type Use)
-  US Forest Service Lands (FS) Domestic Grazing Allotments
-  FS: Sheep Driveways (AZ only)
-  FS: Domestic Grazing Allotments: Sheep/Goats Present (active)
-  FS: Domestic Grazing Allotments: Sheep/Goats Not Present (vacant)
-  FS: Domestic Grazing Allotments: Cells Not Present (vacant)
-  Land Ownership/Administrative Boundaries
-  FS Regional Boundaries
-  BLM State Office Boundaries
-  BLM Field Office Boundaries
-  FS Administrative Boundaries
-  DOI: BLM Managed Lands
-  All Other Federal Lands



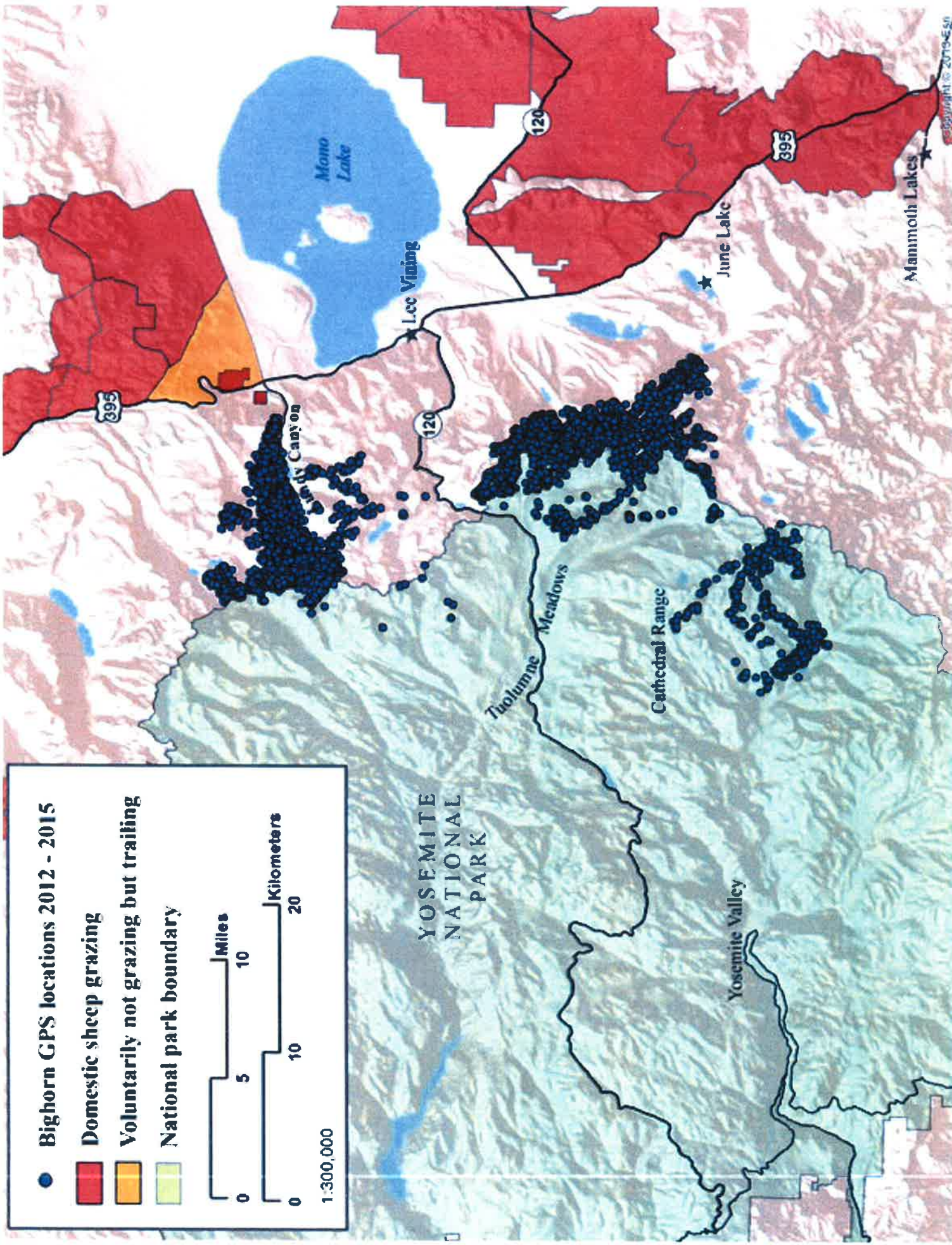
The BLM issued grazing permits and allotted domestic sheep or goat use on the grazing year (2011-2012). All BLM allotments are shown in green on this map, with the BLM managed allotments shown in green with a red outline. All other allotments are shown in yellow with a red outline. Data do not include existing public land with BLM grazing permits.

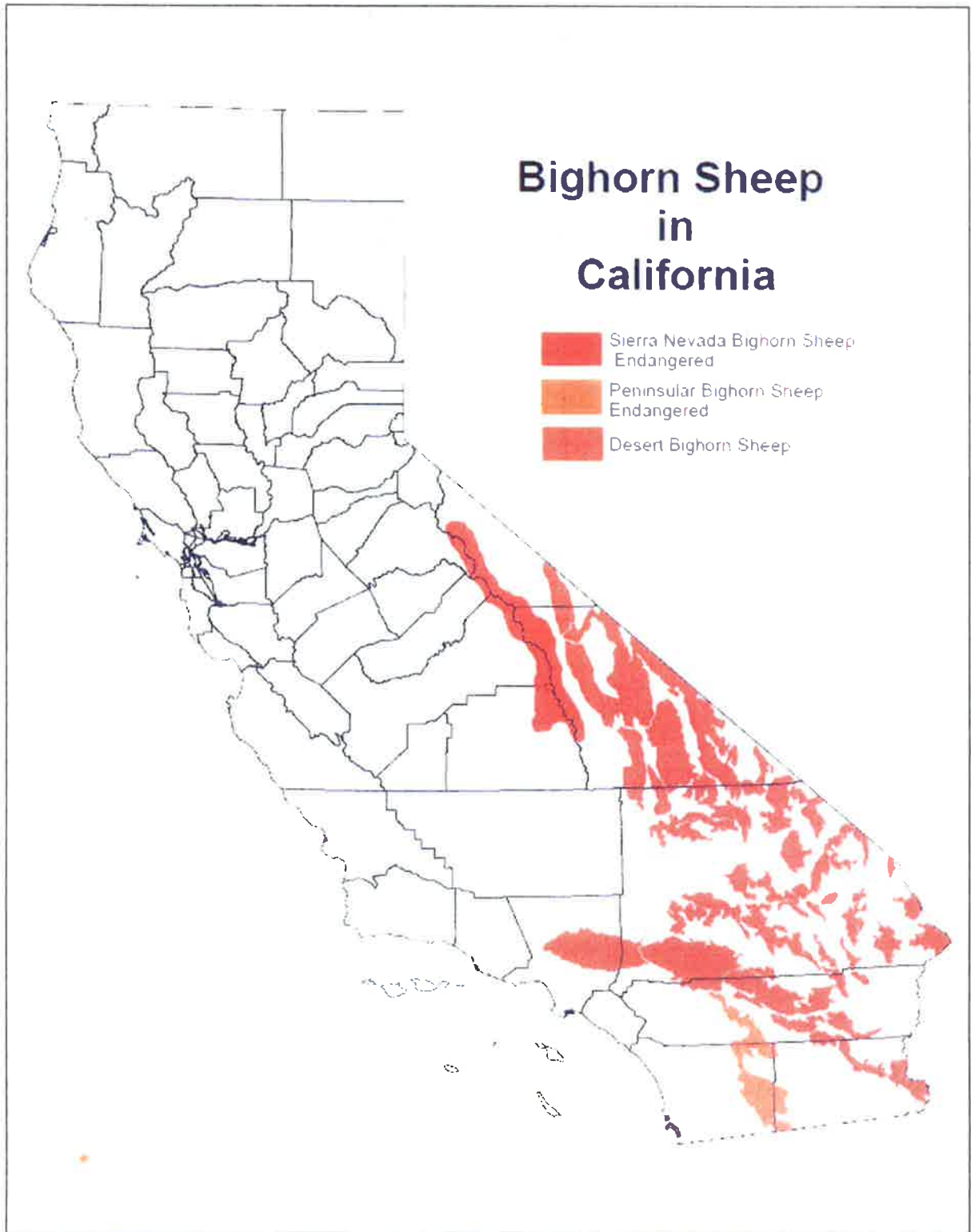
Under existing authorizations (from 1911 to 1996), the BLM authorized domestic sheep or goat use within all or part of the allotments. Data do not include existing public land with BLM grazing permits.

The map was prepared using data from the Bureau of Land Management (BLM) and the U.S. Department of the Interior. The map is for informational purposes only and does not constitute a guarantee, warranty, or endorsement of the accuracy, completeness, or reliability of the information provided. The map is subject to change without notice. The map is not to be used for navigation or other purposes. The map is the property of the Bureau of Land Management and is not to be reproduced or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of the Bureau of Land Management.



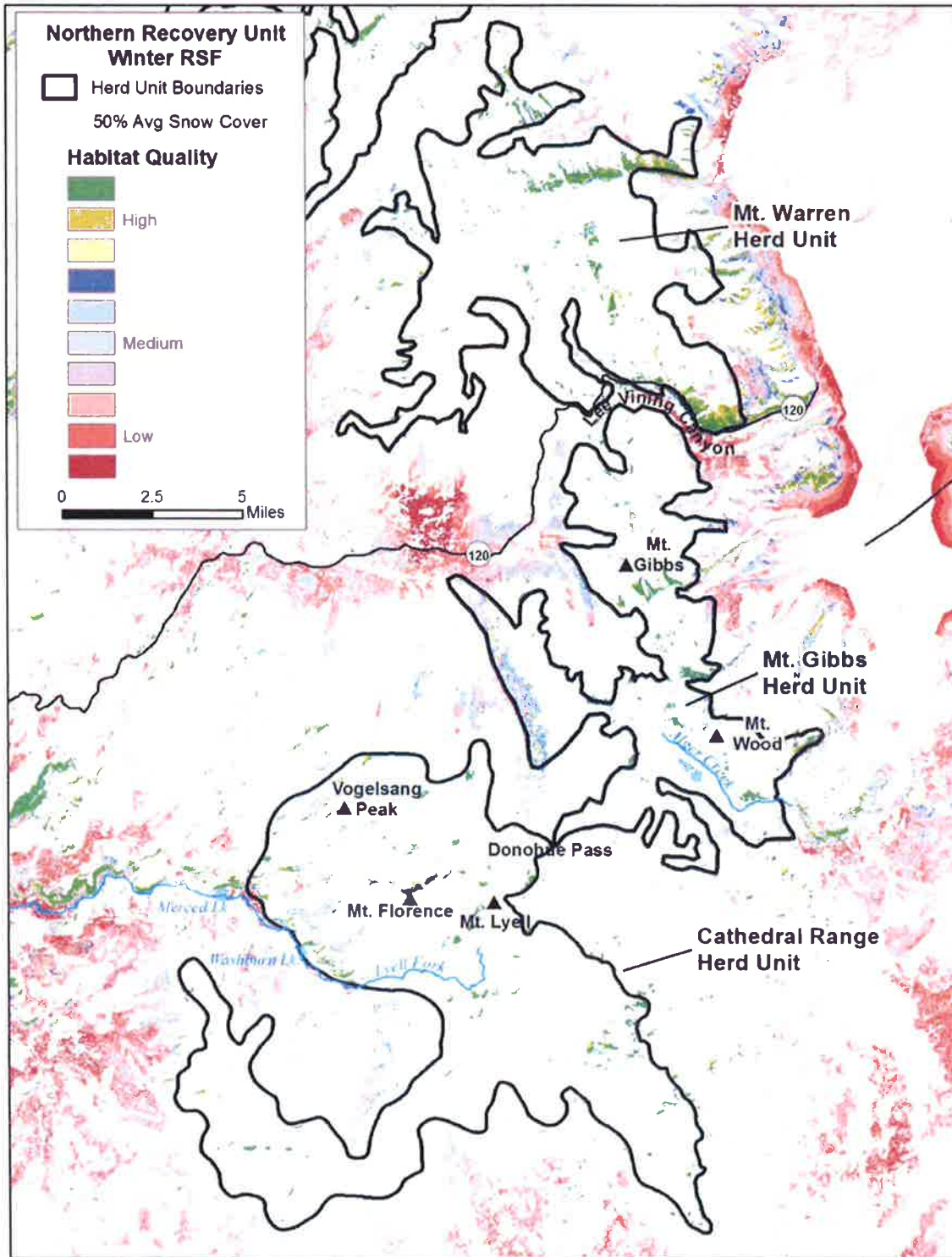




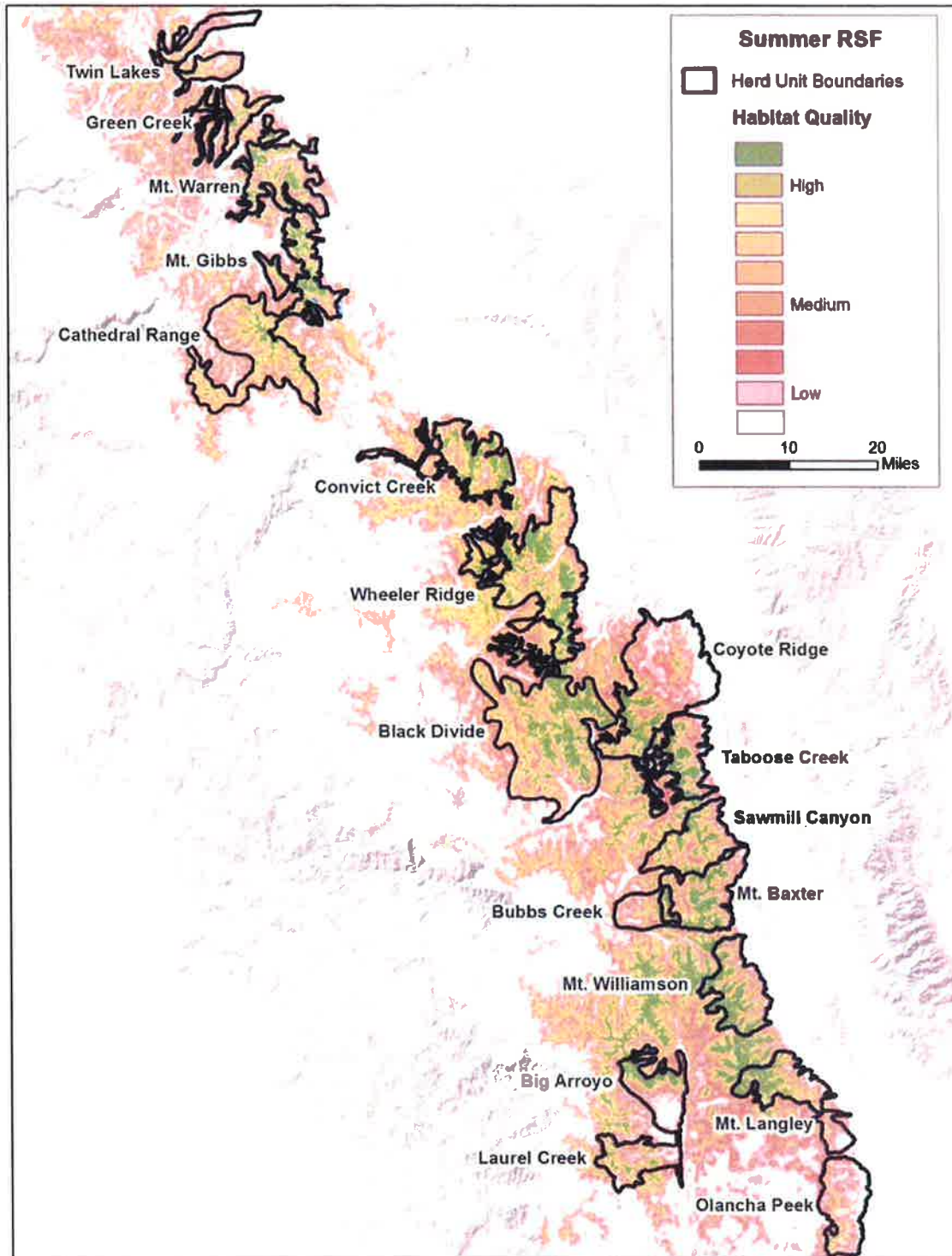




Map 6

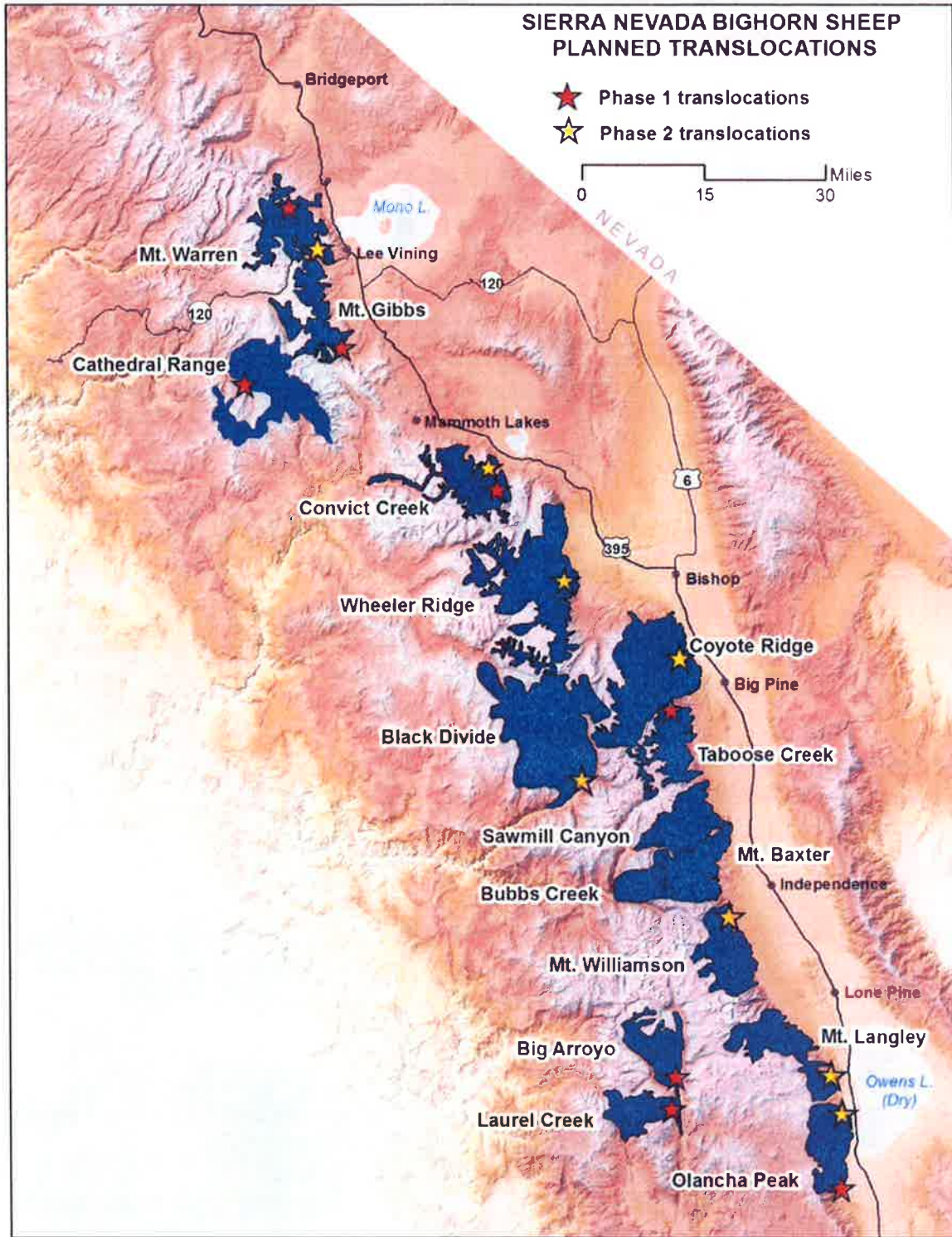


Map 5





Map 3



**TO: Mono County Board of Supervisors**  
**FROM: Dr. Dale Matson**  
**REGARDING: Sheep Grazing On Conway Ranch**  
**DATE: 02-11-17**

**Dear Supervisors,**

**While I am a resident of Fresno County, Bighorn Sheep are of great interest and concern for me. Bighorn Sheep also live on the western slopes of eastern Fresno County in the Sierra Nevada Mountains. What puts bighorn sheep at risk in the Eastern Sierra could put the Fresno County sheep at risk also. Many of these sheep reside in Kings Canyon National Park, a large part of KCNP being in Fresno County. I have spent weeks backpacking in the higher elevations solely for the purpose of photographing these magnificent, scarce and elusive sheep.**

**These endangered sheep live on the razor's edge between being reestablished and becoming extinct. The two biggest impediments to their flourishing are predation by mountain lions and the spread of disease from domestic sheep and goats. The Sierra Nevada Bighorn Sheep have no immunity and deadly pathogens carried by domestic sheep and goats quickly spreads through a SNBS herd unit. The Conway/Mattley Ranch near Lee Vining is close to both the Mt. Warren and Mt. Gibbs herd units.**

**These sheep need advocates especially because they are endangered. The mountain lion, which is an apex predator and has no natural enemies, has "Protected" status in California even though it is neither endangered nor a threatened species.**

**I have included a link to a blog article I wrote after visiting the Mt. Gibbs herd on a Mono Lake Committee Field Seminar last September. We had to climb to 11,000' just to get close enough for photographs of the sheep with telephoto lenses. We also visited the Lundy Canyon area the following day.**

**[http://midsierramusing.blogspot.com/2016/09/the-mono-lake-committee-field-seminar\\_13.html](http://midsierramusing.blogspot.com/2016/09/the-mono-lake-committee-field-seminar_13.html)**

**I also had the good fortune of getting close enough to a group of SNBS from the Mt. Langley herd to take close up photographs of these magnificent animals. It was one of the best experiences I have had in my 70 plus years of life. I wrote about this rare opportunity last year also on my blog including some of the closest photographs ever of these sheep. I think the photographs do a lot in explaining the difficult life they lead. They are both hardy and fragile. In the last photograph you can see evidence of a mountain lion attack on the young ram.**

**<http://midsierramusing.blogspot.com/2016/04/the-endangered-sierra-nevada-bighorn.html>**

**I hope each of you has had the opportunity to see and become familiar with these animals that are residents of your county. For me it was a privilege to see and photograph the Sierra Nevada Bighorn Sheep. I cannot attend your meeting but hope that you also will decide to advocate for the endangered bighorn sheep.**

**Respectfully,**

**Dr. Dale Matson**

**9223 N. Ashford Ave.**

**Fresno, CA 93720 (559) 434-9549**

## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Monday, February 13, 2017 7:51 AM  
**To:** Helen Nunn  
**Subject:** FW: Sierra Nevada Bighorn Sheep

-----Original Message-----

From: Roxanne Romo [<mailto:roxanneromo1@gmail.com>]  
Sent: Saturday, February 11, 2017 2:22 PM  
To: Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
Cc: Stacy Corless <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>; Larry Johnston <[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)>; Fred Stump <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>; Bob Gardner <[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)>; John Peters <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>  
Subject: Sierra Nevada Bighorn Sheep

February 11, 2017

Dear Mono County Supervisors,

I urge you to protect the local bighorn sheep populations of the Lundy Canyon area. The county has a responsibility through it's conservation easement to protect wildlife, not domestic sheep. If the domestic sheep pose a threat then they don't belong there plain and simple.

Our public lands and the environment are currently being threatened on so many fronts. Please do your part to preserve our little corner of this planet.

Respectfully,

Roxanne Romo  
Crowley Lake

## Helen Nunn

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**From:** Helen Nunn  
**Sent:** Friday, February 10, 2017 3:50 PM  
**To:** Helen Nunn  
**Subject:** Sierra Nevada Bighorn Sheep

### **Subject: Sierra Nevada Bighorn Sheep**

To: The Mono County Board of Supervisors,

In the interest of protecting the Sierra Nevada Bighorn Sheep, I implore you to please find an alternative to domestic sheep grazing on the Conway/Mattley Ranch near Lee Vining, in close proximity to the Mt. Warren and Mt. Gibbs herd units, close enough to cause them to die of pneumonia. Domestic sheep carry pathogens that kill bighorn, the reason for their rapid demise, and **it is imperative to keep domestic and bighorn sheep apart**. Researchers and volunteers have spent countless hours and effort to keep the Sierra Nevada Bighorn Sheep alive and the herds growing. DO NOT impede this progress. DO NOT allow the animals to suffer because of fiscal concerns.

**Find an alternative to domestic sheep grazing on the Conway/Mattley Ranch, please!**

--

Jeanette Smith  
[jeanette@wildhorsesdesign.biz](mailto:jeanette@wildhorsesdesign.biz)

## Helen Nunn

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**From:** Howard Whitaker <hjameswhitaker@att.net>  
**Sent:** Friday, February 10, 2017 3:09 PM  
**To:** Helen Nunn  
**Subject:** Fwd: Terminate Domestic Sheep Grazing

----- Forwarded Message -----

**Subject:** Terminate Domestic Sheep Grazing  
**Date:** Fri, 10 Feb 2017 14:56:30 -0800  
**From:** Howard Whitaker <hjameswhitaker@att.net>  
**To:** [skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)

Dear Mono County Board of Supervisors,

For decades, I have been a frequent visitor to Mono County and am deeply appreciative of its many attributes.

I have for many years been concerned about the health and survival of the Lundy Canyon herd of bighorn sheep, particularly the devastating effect of pathogens transmitted by the grazing of domestic sheep on the Conway/Mattley Ranch.

With a simple decision by you supervisors to cease the grazing of domestic sheep on the ranch, an enormous threat to the bighorn herd can be eliminated and for the sake of both the bighorn and all of us who value Mono Country, I ask that you please make that decision.

Sincerely,

Howard Whitaker  
2041 Campton Circle  
Gold River, CA 95670-8301



## Helen Nunn

---

**From:** Shannon Kendall  
**Sent:** Monday, February 13, 2017 4:12 PM  
**To:** Helen Nunn  
**Subject:** FW: Conway Ranch and Sierra Nevada bighorn sheep

**From:** David Graber [<mailto:dbear1948@gmail.com>]  
**Sent:** Monday, February 13, 2017 3:54 PM  
**To:** Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>; Stacy Corless <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>; Fred Stump <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>; John Peters <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>; Bob Gardner <[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)>; Larry Johnston <[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)>  
**Subject:** Conway Ranch and Sierra Nevada bighorn sheep

Dear Mono Supervisors:

I am writing to plead that Conway Ranch no longer be available for domestic sheep or goat grazing.

I recently retired as Chief Scientist of the Pacific West Region of the National Park Service. As a young wildlife biologist, I was first assigned to represent NPS on the Sierra bighorn recovery effort back in 1980, and continued in that capacity until 2014. I am a co-author of the Sierra Nevada Bighorn Sheep Recovery Plan published by U.S. Fish and Wildlife Service and California Department of Fish and Wildlife. I continue to serve on the science advisory team to the FWS bighorn recovery effort.

During those more than three decades, our team strived to bring bighorn back from the brink of extinction. There have been many discouraging, if not frightening moments, but as I'm sure you know the bighorn are now doing very well along a substantial stretch of their original range. This is a great success, but also a very precarious one. As wildlife biologists have learned to their great dismay, a robust population of bighorn can collapse over the span of a year or two when exposed to several diseases frequently carried by domestic sheep and goats. This has happened most recently in the Mojave Desert just in the past few years.

At the moment, Conway Ranch represents the greatest threat to Sierra bighorn along their entire extent. I will not belabor the details because I am confident all that information has been made available to you. Please do the right thing.

Sincerely,  
David Graber

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David Graber, Ph.D.  
40854 Oak Ridge Drive  
Three Rivers, CA 93271  
[dbear1948@gmail.com](mailto:dbear1948@gmail.com)



## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Tuesday, February 14, 2017 7:13 AM  
**To:** Helen Nunn  
**Subject:** FW: For 2/21/17 Mono Co. Board of Supervisors meeting; re Sierra Nevada Bighorn Sheep

**From:** Jeff W. [<mailto:jeffwyneken@gmail.com>]  
**Sent:** Tuesday, February 14, 2017 12:54 AM  
**To:** Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Subject:** For 2/21/17 Mono Co. Board of Supervisors meeting; re Sierra Nevada Bighorn Sheep

Dear Ms. Kendall:

I'm writing to recommend the termination of domestic sheep grazing at Conway Ranch due to the proximity of the grazing allotment to the Lundy Canyon bighorn sheep population and the documented danger of lethal viral infection from domestic sheep to wild sheep. Just one encounter between an infected sheep and a bighorn could result in the swift extirpation of the entire bighorn population.

Bighorn sheep have been seen in the vicinity of the grazing area. As the Sierra Bighorn Sheep is endangered, all prudent steps should be taken to protect it from extinction.

Much work has been done to protect and help recover these populations. Let's be proud and conservative of our magnificent Mono legacy and protect these native animals in their last holdouts.

Thank you.

Jeff Wyneken  
PO Box 201  
Lee Vining, CA 93541

## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Tuesday, February 14, 2017 7:13 AM  
**To:** Helen Nunn  
**Subject:** FW: Bighorn sheep

-----Original Message-----

From: Debbie Boucher [<mailto:dboucher2008@gmail.com>]  
Sent: Monday, February 13, 2017 5:18 PM  
To: Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
Subject: Bighorn sheep

Please do everything within your power to ensure the health of this species. If that means restricting sheep from grazing at Conway Ranch, than please do that.

Debbie Boucher, Mammoth Lakes resident

Robert R Tyson  
211 Mesquite Rd  
Bishop CA 93514  
(650) 475-6293

**Sierra Nevada Bighorn Sheep and the Mono County Board of Supervisors -  
Public Meeting for Feb 21 2017**

To the kind attention of the Mono County Board of Supervisors,

Stacy Corless  
Larry Johnston  
Fred Stump  
Bob Gardner  
John Peters

Shannon Kendall, Clerk of the Board

I write to support you in your deliberations to find an equitable and positive solution to damaging interactions between endangered Sierra Nevada bighorn sheep and domestic sheep in Mono County when the Board meets February 21 2017. I cannot attend this meeting, but I very much wish to contribute my thoughts.

As much as I am concerned that ranchers need to continue sheep grazing in areas common to the bighorn, I am at least as concerned and wish to advocate for the welfare of the bighorn which are fatally affected by the pneumonia they acquire by having contact with domestic sheep. The present state of affairs drives a one-way decline for the bighorn.

We should do all we can to conserve and support native animal populations, especially so magnificent a species as the bighorn. An equitable solution *can* be reached that will conserve and preserve both the bighorn and those who depend on domestic sheep. Let me emphasize this. My passionate interest, at the same time involved and passionate *and* detached and scientific, may lie first with the bighorn, but I no less believe in the preservation and conservation of the ways of life and livelihoods long practiced around domestic sheep husbandry.

I have fiscal concerns for the County too. Were I a Mono County taxpayer (I live in Bishop) I would worry about fiscal damage if Mono County does not vigorously act to prevent contact between bighorn and domestic sheep. Consequences I see for Mono County and its tax base include paying for impact research and regulatory review, probably lengthy, and litigation inevitable if the County does not provide for bighorn recovery. I ask, in contrast to maintaining status quo, is not supporting the bighorn a prudent policy and wise use of County monies? Does not keeping things as they are not beg other pragmatic aspects of the high side to conserving both populations such as tourism and the revenue support it provides?

I am presently in Italy, where surprisingly I encounter even at this distance awareness of the bighorn, of its majesty, and of its plight. Italians would say that if the County does not protect such an iconic and beautiful creature it would be considered guilty of *mancanza di soccorso*, failure to care for one in need. This is a criminal offense under Italian law.

I heartily commend you to constructing the solution to preserve these magnificent and needed creatures and also to conserve productive domestic grazing. May both thrive, now and for our future.

Respectfully,



Robert R Tyson

## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Wednesday, February 15, 2017 9:14 AM  
**To:** Helen Nunn  
**Subject:** FW: Bighorn Sheep, Domestic Sheep and Conway/Mattley Ranch

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**From:** diane dickey [didickeybooks@gmail.com]  
**Sent:** Wednesday, February 15, 2017 7:17 AM  
**To:** Shannon Kendall; Stacy Corless; Larry Johnston; Fred Stump; Bob Gardner; John Peters  
**Cc:** [ginniebeth@me.com](mailto:ginniebeth@me.com)  
**Subject:** Bighorn Sheep, Domestic Sheep and Conway/Mattley Ranch

good morning shannon kendall, et al,

im writing to ask mono county board of supervisors to please consider a healthy solution for the use of the conway ranch. the proverbial term, "can't we all get along?" be applied to the issue of our endangered sierra nevada bighorn sheep and domestic sheep grazing - can we find a solution to protect all?

i'm confident in the board, the s.n. bighorn sheep foundation, and citizens of california to allow the recovery of the bighorn sheep to continue & flourish.

i'm asking for a good solution, for the beautiful wildlife in the area to be sustained & valued - good news for nature, good news for human beings.

i'm dedicated to the future of the bighorn sheep, they are a treasure for our wonderful state. i hope you can decide in their favor and help be their good steward, they need your assistance & they need your help.

appreciate your time,  
many thanks  
diane dickey  
supporter of the restoration of the sierra nevada bighorn sheep and  
conserving, protecting, managing, california's wildplaces.

Mono County Board of Supervisors  
P.O. Box 715  
Bridgeport, CA 93517

Hi,

I am writing to ask you to please consider stopping the practice of sheep (or goat) grazing on the Conway Ranch near Lundy Canyon. It can be very dangerous to the resident, endangered big horn sheep in the area due to disease transfer.

There is ample evidence that disease transfer is a real threat and I hope the Fish & Wildlife Services will convince you to stop sheep grazing on the Conway ranch.

Sincerely,

Dennis Switick  
1673 Grant Road  
Mountain View, CA

## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Thursday, February 16, 2017 7:10 AM  
**To:** Helen Nunn  
**Subject:** FW: Conway Ranch/Sheep Grazing

**From:** Lynn Boulton [<mailto:amazinglynn@yahoo.com>]  
**Sent:** Wednesday, February 15, 2017 9:11 PM  
**To:** Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Cc:** Fred Stump <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>; Larry Johnston <[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)>; Stacy Corless <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>; Bob Gardner <[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)>; John Peters <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>  
**Subject:** Conway Ranch/Sheep Grazing

February 15, 2017

Re: Conway/Mattly Ranch – Sheep Grazing

Honorable Mono County Supervisors:

I hope you decide to take domestic sheep grazing off the table at the February 21 board meeting, which will help protect the endangered Sierra Nevada Bighorn Sheep. They are a species unique to the Eastern Sierra and it is a thrill for visitors and locals alike to see them in the wild. I'm glad the CDFW will be presenting the science and explaining the risk that having domestic sheep within 0.5 mile of the bighorns poses to the entire northern unit: the Mt. Gibbs herd, the Yosemite herd, and the Mt. Warren/Lundy herd. The County was listed as a participant in the 2007 SN Bighorn Sheep Recovery Plan. Yet the County has continued sheep grazing on the property contrary to the recommendations in the plan, convinced that domestic sheep could be managed to prevent contact. Now, ten years later, there is much more evidence that nothing short of separation by miles will safeguard the bighorns.

I wish there were mitigations that would allow sheep grazing without putting the bighorns at risk, but there aren't any that I have discovered in my research. Yes, the County could enclose the two properties with double fencing where at least one is a very high fence, but fencing would create new problems for deer, antelope, and sage grouse and all other wildlife. Conway and Mattly ranches are located in a state designated wildlife corridor and essential habitat (see pgs. 75 and 82 of the CEHC Project report). Wildlife needs to be able to freely pass through to/from the Sierras and the Great Basin. It would also be unsightly and mar the viewshed. As a taxpayer I don't want to pay for that solution. I personally would like to see Conway and Mattly Ranches managed for maximum biodiversity and wildlife. This would be much more in line with the terms of the Easement, which was funded by grants that were to offset habitat losses in other parts of the state.

One argument for sheep grazing is to reduce thatch. As it is not really known if or the extent to which thatch truly presents a problem on the property, the Board should consult with experts (e.g. botanical, wildlife, range and ecological restoration specialists) who can make field evaluations and recommendations as to how the property can best be managed for wildlife habitat. Thatch could be burned, mowed, or grazed by other livestock, or adjustments in irrigation could remedy the issue. Sheep grazing is not required to address this question.

From a financial perspective, the County netted \$11-14,000/year on the current lease, which doesn't stimulate the local economy. Compare that to the SNBS recovery project estimated to cost \$22 million over 20 years that all taxpayers finance and which does stimulate the local economy through jobs and tourism. The bighorn sheep are a much better draw to tourists than domestic sheep. For all the talk of preserving the past, the County hasn't invested in preserving the barn, corral, and ranch buildings. They are in disrepair and in need of arrested decay. The ranch buildings clue us in to the ranching past. Without them no one would make that connection. The main draw of the Mono Basin is not the ranches of the Bodie era, but Mono Lake, Yosemite, fishing, fall colors, and the viewshed.

I urge the County to support the Endangered Species Act and to indicate that in Option 3 of Tony Dublino's request to the Board to let the sheep-grazing lease expire due to the risk posed to the SN Bighorn Sheep. The SN Bighorn Sheep recovery has been successful and their numbers have increased over time. The recovery of the entire population, however, will remain precarious as long as the county allows sheep grazing on Conway Ranch. Each species is part of the web of life, the biodiversity of this planet. Each species that becomes extinct creates a hole in that web and a vacuum for other species that consumed it. With each loss, the web of life unravels a little more and a little faster making it harder on the remaining survivors. The Endangered Species Act isn't just saving the listed species; it is saving all of nature.

Regards,  
Lynn Boulton  
Lee Vining



## Helen Nunn

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**From:** Helen Nunn  
**Sent:** Thursday, February 16, 2017 8:40 AM  
**To:** Helen Nunn  
**Subject:** FW: Please protect bighorn sheep

----- Forwarded Message -----

Subject: Please protect bighorn sheep  
Date: Tue, 14 Feb 2017 11:48:04 -0800  
From: Jeff Holmquist <[jholmquist@ucla.edu](mailto:jholmquist@ucla.edu)>  
To: Fred Stump <[stumpsuper@gmail.com](mailto:stumpsuper@gmail.com)>, [scorless@mono.ca.gov](mailto:scorless@mono.ca.gov), [ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov), [bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov), [jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)

Dear Supervisors:

The Sierra Nevada Bighorn Sheep is an icon of our beloved mountains, and I think that you would agree that we should keep this magnificent animal here in our mountains for current and future residents to enjoy. Indeed, I think that your record of environmental stewardship will be a key part of your legacy as County Supervisors.

Our local bighorns have increased in abundance over recent years, but the continued survival of this species is by no means assured. Because of the serious disease risk that domestic sheep pose to bighorns, I urge you to end grazing by domestic sheep at Conway Ranch. This disease risk to mountain bighorns is well-established in the peer-reviewed scientific literature, has been identified as a key area of concern for Sierra Nevada Bighorn Sheep, and has been recognized by courts in other states.

Ending domestic sheep grazing at Conway Ranch makes good fiscal sense. If domestic sheep grazing continues, expensive environmental analyses will be required, and the matter may end up in court, which is good for no one.

Continued sheep grazing at Conway Ranch just doesn't pencil out, given the environmental and fiscal risks. Cattle grazing, though not completely benign from an ecological standpoint, would be far preferable to continued sheep grazing at Conway ranch.

I believe that Mono County should join with our neighbors in Yosemite National Park in doing everything possible to ensure the continued survival of our native bighorn sheep. In case you haven't seen it yet, here is a beautifully-filmed, nine-minute video that explains the uniqueness of our bighorn, outlines the disease threat posed by domestic sheep, and includes a remarkable reintroduction scene.

<https://www.youtube.com/watch?v=qCf47SrgDss>

Yosemite National Park and other federal and state agencies have taken heroic measures to save our bighorns-- shouldn't Mono County do everything that we can do to help out?

During the 1990s, my wife and I were deciding whether or not to relocate to Mono County. While visiting, we were lucky enough to see a herd of bighorn on the slopes of the Wheeler Crest. There was something primordial about that, seeing these animals gliding effortlessly across impossibly steep terrain. The bighorns also awed the First Peoples who lived here-- we know this from their rock carvings. Seeing the bighorns was an important experience for us, and, well,

here we are. We've been fortunate to see them a few times since, both in the Sierra and in the White Mountains. I can't imagine our mountains without them.

Thanks for your attention and for your service as Supervisors.

Sincerely,

Jeff Holmquist

Paradise/Swall Meadows

760-937-6317



**California Program Office**

980 Ninth Street, Suite 1730 | Sacramento, California 95814 | tel 916.313.5800  
[www.defenders.org](http://www.defenders.org)

*VIA U.S. MAIL AND EMAIL*

*February 16, 2017*

Mono County Board of Supervisors  
c/o Shannon Kendall, Clerk of the Board  
P.O. Box 715  
Bridgeport, CA 93517  
[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)

Re: Conway Ranch Grazing Lease Renewal

Dear Supervisors Corless, Johnston, Stump, Gardner and Peters;

We are writing on behalf of Defenders of Wildlife (Defenders) regarding management of activities, and specifically domestic sheep grazing, on the Conway Ranch property in Mono County. Defenders is a non-profit national environmental organization with 1.2 million members and supporters nationally, including 170,000 in California. Defenders is dedicated to protecting all wild animals and plants in their natural communities. To this end, Defenders employ science, public education and participation, media, legislative advocacy, litigation, and proactive on-the-ground solutions to slow accelerating species' extinction rates, halt the associated loss of biological diversity, and minimize wildlife habitat loss.

The Conway Ranch was acquired by Mono County (2000) using State of California and federal grants. This ranch is managed under the terms/conditions of a conservation easement designed to protect various wildlife species and their supporting habitat. Authorized livestock grazing is a discretionary land use allowed per this easement. The current grazing lease for this property authorizes domestic sheep grazing and expires in November, 2017.

Defenders is very concerned over continued domestic sheep grazing on the Conway Ranch property because of its proximity to habitat occupied by the endangered Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*). There is undisputed professional documentation, as well as scientific research, which demonstrates that the bacterium *Mycoplasma ovipneumoniae* is transmitted from infected domestic sheep to bighorn sheep. This transmission occurs through direct contact between the two species, and almost always results in bighorn sheep death as the result of pneumonia.

Once transmitted, *Mycoplasma ovipneumoniae* spreads rapidly within a bighorn sheep population due to their gregarious behavior. This bacterium is known to be persistent for long periods of time, resulting in rapid mortality among bighorn sheep lambs. Over time, this disease-caused mortality results in long-term population decline due to lack of young animal recruitment.

Adult bighorn sheep, although less likely to acquire pneumonia, also acquire the disease from domestic sheep. Adult bighorn sheep, while less likely than lambs to succumb quickly following disease exposure, can also die as a result of subsequent environmental stress (i.e., low food supply and extreme temperatures) because their immune system becomes depressed following disease transmission.

The current Conway Ranch Conservation Management Plan indicates that Mono County personnel will seek the advice and recommendations of bighorn sheep management experts relative to potential disease impacts to Sierra Nevada bighorn sheep posed by domestic sheep grazing. The California Department of Fish and Wildlife (CDFW) and United States Fish and Wildlife Service (USFWS) both have numerous seasoned experts which can provide recommendations relative to domestic sheep grazing within proximity to occupied Sierra Nevada bighorn range. We strongly encourage Mono County to take these recommendations into account as this grazing authorization decision is finalized.

Should Mono County elect to renew the domestic sheep grazing lease for Conway Ranch, it is required to comply with the California Environmental Quality Act (CEQA) and prepare an Environmental Impact Report (EIR) that fully discloses the environmental effects of grazing lease renewal. If any authorized domestic sheep grazing would result in an adverse effect upon Sierra Nevada bighorn sheep or its designated critical habitat, Mono County would need to consult with the CDFW under provisions of the California Endangered Species Act (CESA), as well as the USFWS under provisions of the Endangered Species Act (ESA). The EIR which is prepared must also include measures which could be adopted to mitigate any and all adverse Sierra Nevada bighorn sheep effects to a less-than-significant level.

Given that 1) domestic livestock grazing is a discretionary activity that may be authorized on the Conway Ranch by the Mono County Board of Supervisors; 2) the relatively high cost of preparing a legally defensible EIR if continued domestic sheep grazing is proposed through a lease renewal; and 3) the known risk of disease transmission from domestic sheep to bighorn sheep and the potential resulting mortality of a state/federally listed species, we strongly urge the Mono County Board of Supervisors to allow this grazing lease to terminate. Doing so would contribute to the recovery of this endangered species. If discretionary lease renewal is still considered after the above considerations, recommended bighorn-domestic sheep separation guidelines outlined in the Sierra Nevada Bighorn Sheep Risk Assessment (National Park Service 2011<sup>1</sup>) and other guidance (i.e., Bureau of Land Management 2016<sup>2</sup>; Desert Bighorn Council 1990<sup>3</sup>) should be closely followed.

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<sup>1</sup> National Park Service (NPS). 2011. Sierra Nevada bighorn sheep risk assessment: research and recovery actions. Sequoia and Kings Canyon National Parks.

<sup>2</sup> Bureau of Land Management. 2016. MS 1730 – Management of domestic sheep and goats to sustain wild sheep (public).

<sup>3</sup> Desert Bighorn Council. 1990. Guidelines for the management of domestic sheep in the vicinity of desert bighorn habitat.

We appreciate the opportunity to provide the Mono County Board of Supervisors with this important information regarding the endangered Sierra Nevada bighorn sheep.

Sincerely,



Jeff Aardahl  
California Representative  
Defenders of Wildlife  
980 Ninth Street, Suite 1730  
Sacramento, CA 95814  
[jaardahl@defenders.org](mailto:jaardahl@defenders.org)



Thomas B. Egan  
California Desert Representative  
Defenders of Wildlife  
P.O. Box 388  
Helendale, CA 92342  
[tegan@defenders.org](mailto:tegan@defenders.org)

## References

- Bureau of Land Management (BLM). 2016. MS 1730 – Management of domestic sheep and goats to sustain wild sheep (public). Headquarters. Washington D.C.  
[https://www.blm.gov/style/medialib/blm/wo/Information\\_Resources\\_Management/policy/blm\\_manual.Par.40213.File.dat/MS%201730.pdf](https://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.40213.File.dat/MS%201730.pdf).
- Cahn, M.L., M.M. Conner, O.J. Schmitz, T.R. Stephenson, J.D. Wehausen, and H.E. Johnson. 2011. Disease, Population Viability, and Recovery of Endangered Sierra Nevada Bighorn Sheep. *The Journal of Wildlife Management* 75(8):1753–1766.  
<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=39865&inline=true>.
- Desert Bighorn Council. 1990. Guidelines for the management of domestic sheep in the vicinity of desert bighorn habitat. Desert Bighorn Council Technical Staff. Desert Bighorn Council 1990 Transactions.  
[http://www.desertbighornCouncil.com/app/download/7104371504/Guidelines+for+Management+of+Domestic+Sheep+in+the+Vicinity+of+Desert+Bighorn+Habitat\\_1990+Volume+34.pdf](http://www.desertbighornCouncil.com/app/download/7104371504/Guidelines+for+Management+of+Domestic+Sheep+in+the+Vicinity+of+Desert+Bighorn+Habitat_1990+Volume+34.pdf).
- National Park Service (NPS). 2011. Sierra Nevada bighorn sheep risk assessment: research and recovery actions. Sequoia and Kings Canyon National Parks. Three Rivers, California.  
<https://www.bing.com/search?q=sierra+nevada+bighorn+sheep+risk+assessment%3A+research+and+recovery+actions&form=EDGTCT&q=PF&cvid=2766addb946548e98884bd1e760bd640&pq=sierra+nevada+bighorn+sheep+risk+assessment%3A+research+and+recovery+actions&cc=US&setlang=en-US>.

## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Thursday, February 16, 2017 11:51 AM  
**To:** Helen Nunn  
**Subject:** FW: remove domestic sheep from Conway Ranch

**From:** laurie I [<mailto:lauriel1@earthlink.net>]  
**Sent:** Thursday, February 16, 2017 11:48 AM  
**To:** Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Cc:** Stacy Corless <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>; Larry Johnston <[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)>; Fred Stump <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>; Bob Gardner <[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)>; John Peters <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>  
**Subject:** remove domestic sheep from Conway Ranch

Dear Mono County Board of Supervisors:

I am writing in support of the removal of domestic sheep from Conway Ranch. Grazing domestic sheep in close proximity to a Bighorn Sheep herd poses a substantial risk of disease to the Bighorn population which could reduce or eliminate the wild herd. Establishing and maintaining the herds of Bighorn as they are today involved a significant outlay of money and effort. This would be lost if the herds were lost. It could also result in significant legal costs to Mono County. I would recommend that uses other than domestic sheep grazing on Conway Ranch be considered and implemented.

My personal experiences with Bighorn Sheep in the High Sierra began in about 1984 when I first hiked to what some call Lamb and Ewe Meadow near Lee Vining Peak. The two scientists who were there monitoring the sheep indicated where I could go to see them. It was an amazing introduction to these wonderful animals. In the intervening years I have revisited that area on a couple of occasions. Mostly, though, I am always on the lookout for them from whatever vantage point I may have in the area between Parker Pass and Lundy Canyon. It is a rare, thrilling moment when I am able to discern them in these most wild places. I love too the excited accounts of others who have encountered them in these areas.

These animals have an extremely tough life. What a tragedy it would be to continue to endanger them unnecessarily when our goal should be to ensure their survival in every possible way. Please discontinue the grazing of domestic sheep on Conway Ranch.

Thank you.  
L. Lawrence



Bob Gardner  
Supervisor, District 3  
PO Box 564  
June Lake, CA 93541

February 16, 2017

Dear Bob,

My husband and I are part-time (summer and fall) residents of Mono City. We write to urge you to support any and all protection for our local population of bighorn sheep. Enormous efforts by various agencies, including our great neighbor Yosemite National Park, and many individuals have gone into re-introducing these beautiful wild creatures and helping them thrive. We have spotted them a number of times on our walks up Lundy Canyon, and the thrill never diminishes. My husband prides himself on his pictures of them, beautifully draped over rocks on a sunny afternoon.

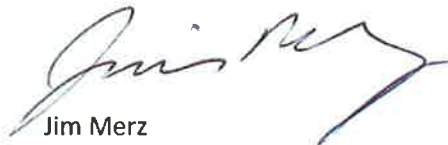
It is heartening to see that a rare species can recover, and yet the bighorn's foothold in our neighborhood is tenuous. As I'm sure you are aware, domestic sheep pose a serious threat to wild bighorn since the former can infect the latter with diseases that decimate the wild animals. We are aware that sheep grazing has a long and cherished history in Mono County. Nonetheless, I think that at this point in Mono County's history it is time to embrace the new – and the wild! The bighorn will thrill the hikers and photographers and others who come to Mono to take in its great beauty. Cattle grazing could replace sheep grazing on Conway Ranch, allowing animal husbandry to continue while protecting the bighorn sheep.

Thank you for all you do for our beautiful section of Mono County. Please add your support to bighorn sheep at the upcoming supervisor meeting when Fish & Wildlife services will make their presentation on the bighorn sheep.

Sincerely,



Heidi Hopkins



Jim Merz

PO Box 409  
Lee Vining 93541

cc: Mono County Board of Supervisors

P.O. Box 128  
Lee Vining, CA 93541

P.O. Box 715  
Bridgeport, CA 93517  
February 16, 2017

Dear Mono County Board of Supervisors,

Last summer as I was walking through high open meadows in Yosemite, I looked up to the crest and saw a Sierra Nevada bighorn sheep silhouetted for a split second against the sky, followed by a second one, before they dropped down the other side, out of sight. I somehow happened to look the moment they were moving up and over.

This serendipitous sighting was a wild moment—an image and experience forever burned in my memory. Having witnessed the initial Yosemite bighorn sheep restoration project in 1986 when 27 animals were relocated to the Yosemite National Park/Inyo National Forest crest-line boundary and having followed the work of partnering agencies and organizations dedicated to protecting and rebuilding the population, I celebrate the return of the bighorn to their native range and the recovery of a species found nowhere else in the world. In celebration, though, I am fully aware their survival remains precarious.

Continued grazing of domestic sheep at Conway Ranch presents a threat to the bighorn. Bighorn rams are known to take off and travel great distances. They have historically been sighted in the Conway Ranch area. Disease transfer from domestic to wild sheep leads to decimation of entire herds. One encounter can undo years of recovery effort. It can undo the very existence of an endangered Sierra Nevada species. Renewing a grazing permit is not worth a loss of this magnitude—a forever loss.

I urge the Mono County Board of Supervisors to terminate domestic sheep grazing at Conway Ranch on behalf of the iconic Sierra Nevada bighorn and in support of the tremendous work of Mono County's neighboring agencies.

Thank you for your consideration.

Sincerely,

Margaret Eissler

David B. Herbst, PhD  
Sierra Nevada Aquatic Research Laboratory, University of California  
1016 Mt Morrison Road, Mammoth Lakes CA 93546  
February 15, 2017

Mono County Board of Supervisors  
P.O. Box 715, Bridgeport, CA 93517  
Sent via email for Board distribution to: [skendall@mono.ca.gov](mailto:skendall@mono.ca.gov), County Clerk

Regarding the risk of domestic sheep grazing at Conway Ranch to Sierra Nevada Bighorn Sheep:

Like any large and seasonally migratory mountain animal, year to year variations in movements often depend on weather, temperature, snow cover, availability of food and cover. While there is some indication from population studies that may show what the herds have done in the past, that does not preclude the chance that future conditions may promote movements that result in contact between domestic sheep and the Endangered Sierra Nevada Bighorn Sheep (SNBS). So what are the odds? How does one go about protecting threatened species or sensitive ecosystems for that matter? Answer - evaluate the risks, minimize or ameliorate those risks, and then, include a margin of safety for what limited evidence and data may not anticipate.

What is known is that if contact occurs, there can be dire consequences for transmission of a disease that threatens a federal listed species that has uncertain prospects for sustaining viable populations. The extremes of climate patterns (drought vs deep snowpack seen in just the last 4-5 years) suggest to me that we have not seen all the possible movement patterns of SNBS in future environments. The marginal value of meadow grazing in the Mono Basin for domestic sheep does not, in my opinion, outweigh the removal of a potential risk to the population of a nearby species (Lundy Canyon and environs) for which great efforts have been invested by Yosemite National Park, the California Department of Fish and Wildlife and others to secure long-term survival.

The County and other groups should support these efforts and abide by the standard of including a margin of safety for protecting species and ecosystems at risk. I include the term ecosystem here because SNBS are representative of Sierra Nevada ecosystems. Whatever actions can be taken to guard the structure and function of mountain ecosystems with a margin of safety for protecting the overarching importance of water resources and forest and meadow integrity, are worthwhile, and will benefit not only SNBS, but other wildlife, habitat values, iconic scenery, and rural recreation economies.

I encourage Mono County and federal/state agencies to act to limit the potential for contact between Bighorn and domestic sheep at Conway Ranch, and reconsider how to manage this land for native wildlife values.

Respectfully,

David Herbst

## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Thursday, February 16, 2017 5:01 PM  
**To:** Helen Nunn  
**Subject:** FW: Sierra Nevada Bighorn Sheep

**From:** john ljung [<mailto:irljung@gmail.com>]  
**Sent:** Thursday, February 16, 2017 5:00 PM  
**To:** Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Cc:** Lisa Cutting <[lisa@monolake.org](mailto:lisa@monolake.org)>; Larry Johnston <[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)>; Fred Stump <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>;  
Bob Gardner <[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)>; John Peters <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>; Stacy Corless <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>  
**Subject:** Sierra Nevada Bighorn Sheep

Greetings,

We are writing to strongly urge you to cancel the lease which allows domestic sheep to graze on Conway Ranch. Domestic sheep pose an undeniable danger to Sierra Nevada bighorn sheep. Yosemite National Park and wildlife agencies have gone to great effort and expense to return bighorn sheep to the Lundy canyon area. These efforts have been successful so far, although the herd is still in danger from forces beyond our control (avalanche, predators, etc). With this in mind we urge you to remove an acknowledged danger which is in your control: the danger posed by nearby domestic sheep.

Conway Ranch, managed by the county, is designated for open space and wildlife. These uses should be paramount. Any other choices, revenue producing or not, should not compromise the health of the Sierra Nevada bighorn sheep herd which occupies county land bordering Conway Ranch and beyond to the other herds. Allowing domestic sheep to graze there would require expensive monitoring and, worse case scenario, compensation for causing the failure of the Lundy Canyon bighorn herd, and paying for reintroduction of healthy animals. What a nightmare! You should not expose the county to the possibility of expensive litigation around this issue. In addition, the annual lease revenue to the county, minus the management fee, is minimal in view of the entire County budget.

We strongly urge you to vote to terminate the grazing lease allowing domestic sheep on Conway Ranch. Thank you for your attention to this issue.

Sincerely,

John and Mary Ljung



February 16, 2017

Mono County Board of Supervisors  
Attn. Stacy Corless, Board Chair  
P.O. Box 715  
Bridgeport, CA 93517

Sent via Email to: Skendall@mono.ca.gov, Board Clerk  
Scorless@mono.ca.gov, Board Chair

RE: Sierra Nevada Bighorn Sheep, Mono County, CA

Honorable Members of the Board,

I am writing on behalf of the National Wildlife Federation to express our interest in matters related to the Sierra Nevada Bighorn Sheep, a federal endangered species, which we understand will be considered by your Board on February 21. While we cannot send a representative to this meeting I wanted to let you know of our organization's keen interest in this issue in the hope we can provide future input and assistance.

The National Wildlife Federation is a national membership organization with more than 4 million members nationwide, and more than 200,000 members in California. Our members care passionately about wildlife including bighorn sheep in the Rocky Mountains, Southwestern Deserts and Sierra Nevada. Through our popular Adopt a Wildlife Acre program, we have helped protect at-risk species including bighorn sheep on more than 1.1 million acres of vital wildlife habitat throughout the U.S.

Please add our organization to your mailing list and inform us of future opportunities to be involved in this important issue.

Sincerely,

Beth Pratt-Bergstrom  
California Director, The National Wildlife Federation  
prattb@nwf.org (209) 620-6271

## Shannon Kendall

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**From:** Kyri Freeman <KFreeman@barstow.edu>  
**Sent:** Thursday, February 16, 2017 3:54 PM  
**To:** Shannon Kendall  
**Subject:** Please consider not renewing the Conway Ranch grazing leases

Please consider not renewing the Conway Ranch grazing leases.

Continued domestic sheep grazing is risky to the Sierra Nevada bighorn sheep, which are endangered, because the bighorns are extremely vulnerable to domestic sheep diseases and could actually be killed off by respiratory infections should contact occur. Since this is an area where the two species could meet, I would rather see the Conway Ranch property managed in a way that does not include domestic sheep. Cattle grazing would be more acceptable, and wildlife management in general should also be considered.

The Sierra Nevada bighorns are a draw for ecotourists, and as their numbers increase, they will be even more so. Knowing how vital ecotourism and outdoors activity are to Mono County, I think the bighorns should be protected and encouraged to flourish. They bring in sustainable dollars, whereas the sheep grazing could result in expensive environmental analysis and even litigation.

Therefore, I would like to see domestic sheep grazing ended on Conway Ranch in favor of sustainability and biodiversity that will last into the future.

Thank you for considering my comments.

Kyri Freeman

Frequent visitor to the Eastern Sierras in general and Lee Vining in particular



Shannon Kendall  
Clerk: Mono County Board of Supervisors  
P.O. Box 715  
Bridgeport, CA 93517

February 16, 2017

RE: Domestic Sheep Grazing at Conway Ranch

On Tuesday February 21, 2017, the Mono County Board of Supervisors will hear a presentation from the CA Department of Fish & Wildlife and US Fish & Wildlife Service on the endangered Sierra Nevada Bighorn Sheep. Please terminate domestic sheep grazing at Conway Ranch in order to prevent the likelihood of a deadly disease being transmitted from domestic sheep to the endangered bighorn. A population of bighorn resides nearby in the Lundy Canyon area. Continued domestic sheep grazing isn't worth the risk to the bighorn and the cost to Mono County.

Please protect the Sierra Nevada Bighorn Sheep (SNBS), they are an endangered species and iconic image of the Sierra Nevada. The SNBS is found nowhere else in the world. The SNBS should be embraced and promoted by Mono County for their tremendous wildlife value. These iconic and remarkable animals are a draw for tourists, hikers and wildlife photographers such as myself. I have seen SNBS near Lundy Canyon, and it is not an experience that I will forget. Yosemite National Park has gone to great effort and expense to restore SNBS in their native range. Mono County should support the efforts of its neighbor agency and work with Yosemite to help recover and protect these magnificent animals.

Continued domestic sheep grazing at Conway Ranch threatens the recovery of this unique species. Saving and restoring the planet's biodiversity is more important than ever. The Sierra bighorn should come first. There is a large body of evidence published in peer-reviewed literature that documents the fatal health risk that domestic sheep (and goats) pose to the SNBS. Wildlife experts will address this issue at the meeting. Domestic sheep grazing was identified as one of the primary issues of concern in the SNBS recovery plan that could adversely affect recovery efforts. Courts in other states have recognized the high risk of disease being transferred from domestic sheep to wild bighorn, and federal agencies have closed allotments to domestic sheep grazing as a result.

There are also fiscal issues to consider: Can the County afford to do the rigorous environmental analysis that will be required if it allows continued domestic sheep grazing? Even if the lessee pays for the analysis is this the best use of County staff and resources? Because of the high risk of disease transfer to bighorn, if the County allows domestic sheep grazing it will likely end up in costly litigation which the County may lose, at added expense to taxpayers. The County should explore options for management of Conway that are fiscally responsible.

Thank you for your time, and please consider other management options for the Conway Ranch besides domestic sheep grazing, including cattle grazing and wildlife management.

Sincerely,

Susan McMahon

## Shannon Kendall

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**From:** eric seubert <sooby497@gmail.com>  
**Sent:** Thursday, February 16, 2017 10:09 PM  
**To:** Shannon Kendall; Stacy Corless; Larry Johnston; Fred Stump; Bob Gardner; John Peters  
**Cc:** virginia chadwick  
**Subject:** Bighorn Sheep

Dear Members of the Mono County Board of Supervisors:

I love the Sierra Nevada Mountains, and all the creatures that live there. I am asking you to please do whatever you can to ensure the survival of the Sierra Nevada Bighorn Sheep, a creature found nowhere else in the world. This creature is an icon for Mono County and the Sierras, and adds tremendous value on so many levels to the lives of the residents and visitors. It would be a shame to jeopardize the decades of expense and effort that have resulted in bringing it back from extinction by exposing it to diseases transmitted by grazing domestic sheep. Surely there is a better use for the Conway Ranch, such as cattle grazing, which won't transmit diseases to the sheep.

When faced with similar situations in other states, the courts and federal agencies have closed domestic sheep grazing, a practice that numerous studies have proven transmits fatal diseases to big horn sheep. If the county presses ahead with domestic sheep grazing, it's likely to end up in costly litigation. The experience of other states indicates that the domestic sheep grazing rights will be curtailed again, but do we really need to go to court and spend thousands of dollars? There are better things to do with that money!

In closing, I would just like to ask you which narrative you'd like to tell your grandchildren and future generations. Do you want to tell them that you allowed the grazing that led to the destruction of the species? Or do you want to say that you banded together with the community and saved the sheep so that Californians can enjoy them forever?

I teach fourth graders, and want each child to have the opportunity to experience the beauty of the Sierras and ALL of its creatures. I would greatly appreciate your help in protecting the Bighorn Sheep.

Sincerely,

Eric Seubert

## Shannon Kendall

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**From:** Westbrook Janet <jwest0554@gmail.com>  
**Sent:** Friday, February 17, 2017 9:14 AM  
**To:** Shannon Kendall  
**Subject:** protect the Big Horn Sheep!

The time has come (or is past time) to phase out sheep grazing in the Eastern Sierra. Domestic sheep carry all kinds of diseases, but particularly respiratory ones. Germs left behind from these diseases can easily infect any wandering Big Horn Sheep from the Sierra. There aren't many of them left, but they should not have to compete with domestic sheep from Bakersfield or elsewhere in the Central Valley. Please stop domestic sheep grazing in Mono County, but especially on the Conway Ranch.

The problem is that over the many years of grazing, the grasses on Conway need "pruning" - what to replace sheep lawn mowers with? Cattle are so destructive to water courses which wander through Conway- they've been removed before because of destruction. There must be some other grazer which could be introduced to the ranch (carefully) which could keep the grasses under control. Tule Elk?? Llamas?

In any case, domestic sheep don't belong anywhere near areas where the rare Sierra Nevada Big Horn Sheep live and roam! Please revoke their grazing permits.

Besides, the market for wool and meat isn't anywhere near what it used to be. The destruction grazing herds of 1000 sheep do is just not worth it. Keep them on fields in the Central Valley.

Janet Westbrook  
[jwest0554@gmail.com](mailto:jwest0554@gmail.com)

## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Friday, February 17, 2017 10:58 AM  
**To:** Leslie Chapman  
**Cc:** Helen Nunn  
**Subject:** FW: Sierra Nevada Bighorn Sheep

**From:** Ricksaezphotography [<mailto:rick@ricksaezphotography.com>]  
**Sent:** Friday, February 17, 2017 10:57 AM  
**To:** Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Cc:** Stacy Corless <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>; Larry Johnston <[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)>; Fred Stump <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>; Bob Gardner <[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)>; John Peters <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>  
**Subject:** Sierra Nevada Bighorn Sheep

I'm writing in support of the following:

- eliminate domestic sheep grazing, this isn't worth the risk to the bighorn and the cost to Mono County.
- I am requesting that the County consider other management options for the Conway Ranch including environmentally appropriate land stewardship and wildlife management.
- I Support protecting the Sierra Nevada Bighorn Sheep, an endangered species and iconic image of the Sierra Nevada. The Sierra Nevada Bighorn Sheep is found nowhere else in the world but right here in our Sierra backyard.
- The Sierra Nevada Bighorn Sheep should be embraced and promoted by Mono County for their tremendous wildlife value. These iconic and remarkable animals are a draw for tourists, hikers and wildlife photographers in other locations.
- Yosemite National Park has gone to great effort and expense to restore Sierra Nevada Bighorn Sheep in their native range. Mono County should support the efforts of its neighbor agency and work with Yosemite to help recover and protect these magnificent animals.
- I have been fortunate to have seen Sierra Nevada Bighorn Sheep, and it is always an amazing experience. I believe it is our civic and patriotic duty to protect these magnificent animals.
- Continued domestic sheep grazing at Conway Ranch threatens the recovery of this unique species. Saving and restoring the planet's biodiversity is more important than ever. Sierra bighorn should come first.
- There is a large body of evidence published in peer-reviewed literature that documents the fatal health risk that domestic sheep (and goats) pose to the SNBS. See <http://bighornhealth.org> for more information.
- Domestic sheep grazing was identified as one of the primary issues of concern in the Sierra Nevada Bighorn Sheep recovery plan that could adversely affect recovery efforts.
- Courts in other states have recognized the high risk of disease being transferred from domestic sheep to wild bighorn, and federal agencies have closed allotments to domestic sheep grazing as a result.
- The County can not afford to do the rigorous environmental analysis that will be required if it allows continued domestic sheep grazing. Even if the lessee pays for the analysis this is not the best use of County staff and resources.

- Due to the high risk of disease transfer to bighorn, the County will likely end up in costly litigation which the County may lose, at added expense to taxpayers if the county allows domestic sheep grazing.
- It is imperative that the County explore options for management of Conway that are fiscally responsible

Thank you,

Rick

**RICK SAEZ**

**PHOTOGRAPHY**

Travel · Landscape · Adventure

1335 Rocking W Drive  
Suite 349  
Bishop, CA 93514  
cell: 760.473.6302  
[rick@ricksaezphotography.com](mailto:rick@ricksaezphotography.com)  
[www.ricksaezphotography.com](http://www.ricksaezphotography.com)  
skype: rick.saez1

## Shannon Kendall

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**From:** susan DesBaillets <susandes@earthlink.net>  
**Sent:** Friday, February 17, 2017 11:20 AM  
**To:** Shannon Kendall  
**Cc:** Stacy Corless; ljohnson@mono.ca.gov; Fred Stump; Bob Gardner; John Peters  
**Subject:** Bighorn Sheep/Conway Rancy Proposal

To: The Honorable Mono County Board of Supervisors

Re: Bighorn Sheep/Conway Ranch Proposal

Please accept my encouragement to vote to terminate domestic sheep grazing on the Conway Ranch property.

The Sierra Nevada Bighorn are a treasured wildlife unique to our region. Living in Mono City, I ski and hike in Lundy Canyon often. On every trip, an eye is kept trained to the upper terrain in hopes of sighting a bighorn. (I've only been lucky enough to have a few sightings, yet it's still a hope to see more!) The thought of exposing this herd to a potentially deadly disease is unthinkable.

Allowing domestic sheep grazing in such close proximity to the Sierra Nevada bighorn presents too great a risk to passing along pneumonia, a disease that had proved to be highly fatal to wild bighorn populations. The efforts to relocate, and to maintain and protect this herd have been great, and it would be a shame to put all that work in jeopardy.

At a time when we struggle to protect wildlife and habitat, the Sierra Nevada Bighorn are a reminder of how restoration of a native animal can be successful. While domestic sheep have a history in Mono County, allowing grazing at Conway Ranch would be a travesty for the potential danger to the bighorn. With this in mind I hope that you will consider voting against allowing grazing at Conway Ranch.

A sincere thank you for taking the time to consider my opinion.

Susan DesBaillets  
350 Peeler Lake Dr.  
Lee Vining, CA 93541  
[susandes@earthlink.net](mailto:susandes@earthlink.net)  
760 914-1833

## Shannon Kendall

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**From:** Margy Verba <margyverba@hotmail.com>  
**Sent:** Friday, February 17, 2017 12:59 PM  
**To:** Shannon Kendall  
**Cc:** Stacy Corless; Larry Johnston; Fred Stump; Bob Gardner; John Peters  
**Subject:** Sierra Nevada Big Horn Sheep at Conway/Mattly Ranch

February 17, 2017

TO: the Honorable Mono County Board of Supervisors

RE: BIG HORN SHEEP at Conway/Mattly Ranch

We are facing what some scientists call an "extinction crisis" losing species at 1,000 to 10,000 times the natural rate of extinction. The Sierra Nevada Bighorn Sheep, found nowhere else in the world, are a success story; through successful management, the species has been rescued from the brink of extinction, and their numbers are slowly increasing. The biggest threat to the species is the well-documented transmission of disease from domestic sheep.

As a resident of Mono City, and frequent hiker in Lundy canyon, I have been blessed with a number of sightings. I have also had a number of backcountry encounters in the Parker Pass area. Each encounter was a gift, and a reminder that we live in an area where we can still see wild animals in the wild. In fact, that is a big part of our tourism draw -- the basis of our local economy.

I understand the value of traditional multi-generational livelihoods such as sheep grazing. However, given the "extinction crisis", the precarious state of our local population, the fact that the Sierra Nevada is their only habitat, and the threat of domestic grazing to that population, in my mind survival of the species outweighs all other considerations.

Added to that concern, is the concern of the expense to Mono County should sheep grazing be allowed on the Conway and Mattly ranches. I serve on the Mono Basin RPAC, and I am all too aware of the financial situation we find ourselves in: simply, Mono County cannot afford to incur any unnecessary expenses. The threat of expensive litigation is real, and must be considered.

Finally, I am a big fan of the Mono County BOS; you make me very proud to be a Mono County resident. I encourage you to make the right decision, and I have faith you will.



Thanks for you consideration of my concerns,

Margaret Verba

P.O. Box 88

Lee Vining, CA 93541

## Shannon Kendall

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**From:** Lisa Belenky <lbelenky@biologicaldiversity.org>  
**Sent:** Friday, February 17, 2017 2:14 PM  
**To:** Shannon Kendall; Stacy Corless; Larry Johnston; Fred Stump; Bob Gardner; John Peters  
**Cc:** tom.stephenson@wildlife.ca.gov; 'Greene, Lacey@Wildlife'; Tony Dublino; carolyn\_swed@fws.gov; shawna\_theisen@fws.gov; 'Nordin, Erin'; 'Justin Augustine'  
**Subject:** Comments for Conway and Mattly Ranch Grazing Issues; Board Feb. 21, 2017 Agenda Items 9 A&B  
**Attachments:** Center 2 17 17 Letter re Conway and Mattly Ranch item 2 21 17 agenda.pdf

To the Supervisors and Clerk of the Mono County Board of Supervisors, Attached please find a letter from the Center for Biological Diversity regarding the Conway Ranch issues on the February 21, 2017 agenda as Items 9 A&B. I hope to be able to attend the meeting, weather permitting. Thank you.

Lisa T. Belenky, *Senior Attorney*  
CENTER for BIOLOGICAL DIVERSITY  
1212 Broadway, Suite 800  
Oakland, CA 94612  
*ofc* (415) 632-5307 *fax* (510) 844-7150  
*cell* (415) 385-5694  
[lbelenky@biologicaldiversity.org](mailto:lbelenky@biologicaldiversity.org)  
<http://www.biologicaldiversity.org>

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**VIA ELECTRONIC MAIL**

February 17, 2017

Mono County Board of Supervisors  
c/o Shannon Kendall, Clerk of the Board  
PO Box 715  
Bridgeport, CA 93517  
[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)

**Re: Conway and Mattly Ranch Grazing Issues; Board Feb. 21, 2017 Agenda  
Items 9 A&B**

Dear Mono County Board of Supervisors,

On behalf of the Center for Biological Diversity (“Center”), I offer the following comments regarding the Conway and Mattly Ranch grazing issues that are scheduled to be discussed at the Board of Supervisors meeting on February 21, 2017. I also plan to attend this meeting, weather permitting, to provide additional input on these important issues that are critical to the long-term survival and recovery of the endangered Sierra Nevada bighorn sheep populations.

The Center is a national, nonprofit organization with offices in Los Angeles and Oakland, California, Arizona, Oregon, Alaska, Washington D.C., and Florida. The Center’s mission is to protect endangered species and wild places through science, policy, education, and environmental law. The Center has over 50,000 members, many of whom reside and/or recreate in Mono County and the Sierra Nevada mountains in California. The Center and its members have worked to ensure the conservation of the Sierra Nevada bighorn, including by seeking protections for this endangered species under federal law. The Center has specifically advocated for steps to reduce the risk of disease transmission from domestic sheep grazing in bighorn habitat for over a decade. The Center’s letter to the Board dated November 22, 2016 regarding risks to the endangered Sierra Nevada bighorn sheep is incorporated herein by reference.

***1. Presentation from Wildlife Agencies***

The Center is encouraged that the Board has scheduled a presentation from the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service for this meeting so that

the most recent scientific information and data is available to the Board on the relevant issues.<sup>1</sup> The Center agrees with the concerns raised by the wildlife agencies in recent letters submitted to the Board<sup>2</sup> regarding the risk to endangered Sierra Nevada bighorn sheep populations from disease transmission due to domestic sheep grazing on both the Mattly and North Conway areas (including Bowl Meadow). Because these activities create unacceptable risks to the bighorn populations, the Center urges the Board to eliminate domestic sheep (and goat) grazing on these lands.

## ***2. Agenda Options for Direction to Staff: Preparation of an RFP for Sheep Grazing Should Be Rejected***

The Options listed in the Agenda for the February 21, 2017 meeting are quite narrow. Looking first only at those options, the Center urges the Board to reject preparation of an RFP for sheep grazing and consider either letting the current grazing lease expire or directing staff to prepare an RFP for proposals for cattle grazing.

Due to the risk of impacts to the endangered Sierra Nevada bighorn populations from disease transmission, the Center urges the County not to seek an RFP for any future domestic sheep grazing on these lands.

Among the narrow alternatives provided, the County should either choose to allow the current grazing lease to lapse or direct staff to issue an RFP for cattle grazing. If either of these are chosen, the Center urges the Board to also clarify that proposals for domestic sheep grazing on these lands will not be considered in the future due to the importance of protecting bighorn sheep.

If the County directs that an RFP is issued for cattle grazing, the County will also need to consider the potentially significant impacts of cattle grazing on bi-state sage grouse populations, wet meadows and water resources.

If no RFP is issued, it would also be prudent for the County to provide additional direction to staff to consider alternative ways to manage these lands to support wildlife habitat, including sage grouse habitat, as anticipated in the Conway Ranch Management Plan.

The Center understands that concerns have been raised with a “no RFP alternative” because there may be a need for ongoing management of the meadows and other areas with sage grouse habitat. If there are areas of the ranches where vegetation thatch may impact habitat quality or require irrigation, additional management measures may be needed. Mowing and other methods have been used in other areas to reduce thatch under a conservation-based

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<sup>1</sup> This accords with the County’s commitment in the Conway Ranch Conservation Management Plan (at 6), which states: “when updating the Sheep Grazing Lease, and when evaluating the condition of the grazing lands during annual monitoring. . . the County will consider concerns and recommendations of state and federal fish and wildlife agencies regarding possible impacts of sheep grazing on Sierra Nevada Bighorn Sheep and sage grouse.”

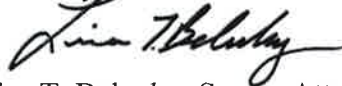
<sup>2</sup> Available in the Board Packet with references.

management strategy, although it would require more active management than the County has implemented in the past.

Finally, the Center again urges the County to take affirmative steps to protect the endangered Sierra Nevada bighorn sheep populations from the threat of disease transmission by not allowing any grazing on Conway and Mattly Ranches in 2017 in light of the scientific information and data available.

The Center looks forward to working with the County on this important issue. Please do not hesitate to contact me if you have any questions regarding the interests of the Center. I look forward attending to the February 21, 2017 Board meeting and the presentation from the wildlife agencies.

Sincerely,



Lisa T. Belenky, Senior Attorney  
Center for Biological Diversity  
1212 Broadway, Suite 800  
Oakland, CA 94612  
(510) 844-7107  
[lbelenky@biologicaldiversity.org](mailto:lbelenky@biologicaldiversity.org)

*cc: (via email)*

Board Members:

Stacy Corless [scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)  
Larry Johnston [ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)  
Fred Stump [fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)  
Bob Gardner [bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)  
John Peters [jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)

Tony Dublino, Environmental Services Manager, Mono County, [tdublino@mono.ca.gov](mailto:tdublino@mono.ca.gov)  
Tom Stephenson, California Department of Fish and Wildlife, [tom.stephenson@wildlife.ca.gov](mailto:tom.stephenson@wildlife.ca.gov)  
Lacey Greene, California Department of Fish and Wildlife, [lacey.greene@wildlife.ca.gov](mailto:lacey.greene@wildlife.ca.gov)  
Carolyn Swed, U.S. Fish and Wildlife Service, Field Supervisor, Reno Fish and Wildlife Office, [carolyn\\_swed@fws.gov](mailto:carolyn_swed@fws.gov)  
Shawna Theisen, U.S. Fish and Wildlife Service, Assistant Field Supervisor, Reno Fish and Wildlife Office, [shawna\\_theisen@fws.gov](mailto:shawna_theisen@fws.gov)

## Shannon Kendall

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**From:** Joy Adams <joyadams104@aol.com>  
**Sent:** Friday, February 17, 2017 2:27 PM  
**To:** Shannon Kendall  
**Subject:** Lundy Canyon

Please, do not renew domestic sheep territory, Lundy Canyon.

Sent from my iPad

## Shannon Kendall

---

**From:** Jef Chadwick <jefmc@me.com>  
**Sent:** Friday, February 17, 2017 3:42 PM  
**To:** Shannon Kendall  
**Cc:** Stacy Corless; Larry Johnston; fstump@mon.ca.gov; bgardner@mon.ca.gov; John Peters  
**Subject:** SNBS

Dear Mono County Board of Supervisors,

Plants and animals live in a dynamic ecosystem. Because weather and other natural conditions force survival behavior such as going dormant or migrating to pass on their genes, we have a complex decision to make about the future of Conway/Mattley Ranch. While the state and federally endangered Sierra Nevada Bighorn Sheep have brought this decision to a head, many other species are involved, such as the Sage Grouse, Pronghorn Antelope and Mule Deer, as well as many plant species.

Consider for a moment you are a young Sierra Nevada ram. You do not get to reproduce, because the older, bigger rams have out competed you for the opportunity to mate. Now the waft of domestic ewes in estrus intrigues you, and you go to Mattley/Conway to investigate. As a matter of courtship, you are nose to nose with a domestic ewe and before you know it pathogens are transferred. Whether or not you had a chance to mate with the domestic sheep, you head back to your bachelor herd. Within a small period of time, you pass the pathogens to other Sierra Nevada rams, and the bigger, stronger rams pass the pathogens to the ewes. Now you are dead and other members of the herd are dying. Animals that do survive, will have fewer and weaker lambs for generations. Another scenario is that wildlife officials would have to kill more of the Sierra Nevada bighorn to prevent the disease pathogens from spreading (epizootic) throughout the Sierra to the herd units between Mt. Warren and the southern Olancho Peak herd.

Allowing grazing of domestic sheep on Conway/Mattley ranch could undo four-plus decades of work to recover the endangered Sierra Nevada bighorn sheep and dishonors the individuals, agencies, volunteers and donors that have worked tirelessly to restore this animal. It also disregards the enormous funding from the governmental agencies, non-profits, and other donors to recover the endangered Sierra Nevada Bighorn. Clearly if the California legislators have continued to fund California Department of Fish and Wildlife as the lead agency in the recovery, the consensus of the people of California is that the Sierra Nevada bighorn should not be put in danger.

It is asked that the Mono County Board of Supervisors permanently discontinue sheep and goat grazing on the Mattley/Conway Ranch and explore future options for management of the parcel within the guidelines of the conservation easement.

Sincerely,  
Jef and Virginia Chadwick  
Constituents of District 3  
Mono County, California



# F. I. M., CORP.

*Farming and Livestock*

25 Saroni Road  
P.O. Box 12  
Smith, Nevada 89430



FRED FULSTONE  
MARIANNE F. LEINASSAR  
KRISTOFOR LEINASSAR  
Phone: 775-465-2381  
Fax: 775-465-1200  
Email: fimcorporation@gmail.com

February 17, 2017

Board of Supervisors  
Mono County  
P. O. Box 715  
Bridgeport, CA 93517

Re: Board of Supervisors Meeting, February 21, 2017, agenda item 9 A & B

Dear Mono County Supervisors:

FIM Corporation would like to request a continuance of the agenda item noted above. We are requesting this continuance for the following reasons:

- To study the approximately 321 pages of corresponding material from the State of California Department of Fish and Wildlife and USFWS found on the Mono County Board of Supervisors website posted February 16, 2017.
- We would like a chance to have a time before the board to present our information in Bridgeport within a month or so.
- FIM has made attempts through phone calls, emails and a visit to the USFWS office to set up a meeting here at the ranch as suggested by Leeann with the USFWS to discuss these issues prior to BOS Meeting but this meeting has not happened to date.
- We will not be able to attend the Mammoth Lakes . Due to a winter storm and we are shearing sheep and Floyd Rathbun our range consultant and Louis Test our attorney cannot attend.

Attached is the following exhibit:

- 1) Letter dated February 17, 2017, from Louis S. Test, Esq., of Hoffman and Test, requesting a continuance to a future Board of Supervisors meeting in order to read emails and documents prior to meeting with the Supervisors.

Thank you in advance for considering our request.

Sincerely,

Marianne F. Leinassar

John W. Hoffman  
Louis S. Test

HOFFMAN & TEST  
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Fax (775) 322-3841

February 17, 2017

Marianne F. Leinassar  
F.I.M. Corp.  
P.O. Box 12  
Smith, NV 89430

**Re: *February 21, 2017 Board of Supervisors Meeting / Conway Ranch***

Dear Marianne:


Due to the short notice, it will be impossible for me to attend the Supervisors meeting on February 21, 2017. I would request that this matter be continued to a future Supervisors meeting. This courtesy was extended to U.S. Fish & Wildlife when they could not attend the last meeting.

Not only has this been short notice for you, but with all the documents that were submitted by U.S. Fish & Wildlife, it would be near to impossible to review all of them thoroughly before February 21, 2017.

FIM has been attempting to set up a meeting with U.S. Fish & Wildlife since last fall. With the emails you forwarded me today, it appears it was U.S. Fish & Wildlife's miscommunication that prevented us from meeting with them as you made numerous attempts to contact them. It does not seem fair that they are now agreeing to meet with us after this issue is presented to the Board of Supervisors. This is another good reason this matter should be continued.

Sincerely,

HOFFMAN & TEST

  
Louis S. Test

LST:ajk

## Shannon Kendall

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**From:** David Allen <dlnallen37@aol.com>  
**Sent:** Friday, February 17, 2017 6:38 PM  
**To:** Shannon Kendall  
**Subject:** Big Horn Sheep

Attn Clerk

Please copy all board members:

Please provide protection to the iconic Big Horn population by excluding nearby domestic sheep-- the risk to an endangered species, and beloved symbol of the wild, is not worth the income value of common domestic sheep.

I am a regular visitor to the eastern Sierra and was once privileged to see a few at a distance-- a treasured memory.

David Allen  
790 Arbol Verde  
Carpinteria, CA

Sent from my iPad

Mono County Board of Supervisors  
P.O. Box 715  
Bridgeport, CA 93517

Emailed to:

Clerk to the Board of Supervisors, Shannon Kendall  
[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)

Larry Johnston  
[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)

Bob Gardner  
[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)

Stacy Corless  
[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)

Fred Stump  
[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)

John Peters  
[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)

February 17, 2017

Re: Endangered Sierra Nevada Bighorn Sheep

Dear Members of the Mono County Board of Supervisors:

I am writing to urge you to terminate domestic sheep grazing at Conway Ranch to protect the health of the Lundy Canyon herd of endangered Sierra Nevada Bighorn Sheep. Anything that Mono County can do to protect and aid in the recovery of this population of Bighorn Sheep should be done.

As I understand it Conway Ranch was procured by Mono County in 2000 and is managed as a conservation easement to protect wildlife and open space. I also understand that other uses of the property such as grazing are allowed but not required on this conservation easement.

Allowing domestic sheep grazing at Conway Ranch could fatally impact the Bighorn Sheep herd. There is a large body of published, peer reviewed scientific evidence indicating that contact between domestic sheep and Sierra Nevada Bighorn Sheep results in disease transmittal between the species and fatal illness in the wild bighorns. Mono County should do all they can to make sure that no domestic sheep grazing occurs near the Sierra Nevada Bighorn Sheep herds. Grazing at Conway Ranch could be shifted to cattle grazing if you think grazing must be permitted on the property, or the land could be managed solely for its wildlife benefit.

The Sierra Nevada Bighorn Sheep is a majestic, iconic species and should be protected so that the endangered species can eventually recover and become a key part of a healthy Sierra Nevada ecosystem. These remarkable bighorn sheep should be promoted by Mono County for their wildlife value since they could provide a strong draw for tourists, hikers, and wildlife photographers.

Please do all you can to help the California Department of Fish & Wildlife and the US Fish & Wildlife Service protect these magnificent animals. Protect them from the grazing of domestic sheep or goats near their habitat, such as Conway Ranch. Thank you for considering my concerns.

Sincerely,



Darla J Heil  
2272 Longview Drive, Bishop, CA 93514  
760-872-3094; [darlaheil@gmail.com](mailto:darlaheil@gmail.com)

## Shannon Kendall

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**From:** Doug Robinson <d Robinson@movingoverstone.com>  
**Sent:** Saturday, February 18, 2017 8:22 AM  
**To:** Shannon Kendall  
**Subject:** no Domestic sheep grazing at Conway Ranch

Please convey to the Board of Supervisors the importance of NOT allowing domestic sheep to graze on the Conway ranch property, as it has the potential to infect the Endangered herd of Sierra Bighorn sheep who live nearby.

I am a lifetime mountain guide who has lived and worked in, and brought economic prosperity to, Mono county for many decades. I and my hundreds of clients are big supporters of the, to date, successful programs to reintroduce the Bighorns, who are now coming back in greater numbers, but are still threatened, especially by diseases that may become transmitted from domestic sheep.

We appreciate the tough job you do to manage the wildness that is a chief draw and economic engine of Mono County.

Thank You!

Doug Robinson  
First President, American Mountain Guides Association.

## Shannon Kendall

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**From:** Rod Goodson <rgoodson@cox.net>  
**Sent:** Saturday, February 18, 2017 5:51 PM  
**To:** Shannon Kendall; Stacy Corless; Larry Johnston; Fred Stump; Bob Gardner; John Peters  
**Subject:** Sierra Nevada Bighorn Sheep

Mono County Board of Supervisors

Please consider the following points when you hear the presentation on February 21 in Mammoth Lakes from the CA Department of Fish & Wildlife and US Fish & Wildlife Service on the endangered Sierra Nevada Bighorn Sheep.

These points are as follows:

### Sierra Nevada Bighorn Sheep (SNBS)

- I have seen these majestic animals and would like you to support protecting the SNBS, an endangered species and iconic image of the Sierra Nevada. The SNBS is found nowhere else in the world but right here in our Sierra backyard.
- The SNBS should be embraced and promoted by Mono County for their tremendous wildlife value. These iconic and remarkable animals are a draw for tourists, hikers and wildlife photographers in other locations.
- Yosemite National Park has gone to great effort and expense to restore SNBS in their native range. Mono County should support the efforts of its neighbor agency and work with Yosemite to help recover and protect these magnificent animals.

### Sheep grazing on Conway Ranch

- Continued domestic sheep grazing at Conway Ranch threatens the recovery of this unique species. Saving and restoring the planet's biodiversity is more important than ever. The Sierra bighorn should come first.
- There is a large body of evidence published in peer-reviewed literature that documents the fatal health risk that domestic sheep (and goats) pose to the SNBS.
- Domestic sheep grazing was identified as one of the primary issues of concern in the SNBS recovery plan that could adversely affect recovery efforts.
- Courts in other states have recognized the high risk of disease being transferred from domestic sheep to wild bighorn, and federal agencies have closed allotments to domestic sheep grazing as a result.

### Fiscal Issues

- Can the County afford to do the rigorous environmental analysis that will be required if it allows continued domestic sheep grazing? Even if the lessee pays for the analysis is this the best use of County staff and resources?
- Because of the high risk of disease transfer to bighorn, if the County allows domestic sheep grazing it will likely end up in costly litigation which the County may lose, at added expense to taxpayers.
- The County should explore options for management of Conway that are fiscally responsible

**Based on these points I would like to ask the County to consider other management options for the Conway Ranch including cattle grazing and wildlife management. Continued domestic sheep grazing isn't worth the risk to the bighorn and the cost to Mono County.**

Best regards,  
Rod Goodson  
Homeowner and hiker in June Lake, CA



This email has been checked for viruses by Avast antivirus software.

[www.avast.com](http://www.avast.com)

## Shannon Kendall

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**From:** Greg Reis <gregorreis@yahoo.com>  
**Sent:** Sunday, February 19, 2017 1:08 AM  
**To:** Shannon Kendall  
**Cc:** Stacy Corless; Larry Johnston; Fred Stump; Bob Gardner; John Peters  
**Subject:** Please protect Sierra Nevada Bighorn Sheep

Dear Mono County Board of Supervisors,

Although I am no longer a Mono County resident, I was for 16 years and I was a homeowner in Lee Vining for 11 years. I still work part-time for the Mono Lake Committee, but this letter is on my own behalf.

I am writing to encourage you to begin enacting protective measures for the Mono Basin bighorn herd by limiting and mitigating the risks of the County's domestic sheep grazing activities. Very soon after the SNBS (Sierra Nevada Bighorn Sheep) were ESA-listed in 2000, LADWP and the USFS closed sheep grazing allotments west of Hwy 395. I have never understood how the county can continue high-risk grazing west of the highway and open itself up to tremendous liability when it receives so little revenue from such activities. A radio-collared SNBS was killed by a car on Hwy 395 a few years ago just north of Conway Ranch, indicating even areas just east of the highway aren't safe for domestic sheep grazing.

Bighorn sheep are migratory and far-ranging. Once I was driving on the highway east of the White Mtns (north of Dyer) and a Desert Bighorn (presumably from the White Mtns) ran across the highway (right in front of a school bus) from west to east, out toward the middle of the valley. The historical museum in Groveland has recent photos of a bighorn sheep (presumably from the Mono Basin herd) somewhere west of Hetch Hetchy. In light of these types of travels, Conway Ranch is a very high risk location for domestic sheep grazing.

I love mountaineering, and I have climbed all the named peaks in the Mono Basin and most of the ones in eastern Yosemite. I love the Sierra Nevada and its plants and wildlife. I have been fortunate enough to see bighorn sheep several times, mostly on or near Mt. Warren. I hope future mountaineers (including my five-year-old son and one-year-old daughter) are also able to come to Mono County to enjoy this special experience.

Please, on Tuesday, protect the public welfare, and make a strong and clear decision to protect the public's wildlife.

Sincerely,  
Greg Reis

Greg Reis San Geronimo, CA 94963 gregorreis.blogspot.com @gregorreis



## Shannon Kendall

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**From:** Dorothy Milliron <loominarie@gmail.com>  
**Sent:** Sunday, February 19, 2017 6:57 AM  
**To:** Shannon Kendall; Stacy Corless; Larry Johnston; Fred Stump; Bob Gardner; John Peters  
**Subject:** Sierra Nevada Bighorn Sheep

Mono County Board of Supervisors,

Please vote to eliminate domestic sheep grazing on the public land at Conway Ranch.

The continuation of welfare ranching promotes biological ill-willed intentions toward Bighorn Sheep restoration and thereby undermines not only its survival in their sole residency, ANYWHERE, but also eliminates the privilege that local residents and visitors have to see these magnificent animals.

It is unconscionable to vote against the restoration of the Sierra Nevada Bighorn Sheep!

Sincerely,

Dorothy P. Milliron  
2311 Brigadoon Avenue  
Bishop, CA 93514

## Shannon Kendall

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**From:** Julia Runcie <juliaruncie@gmail.com>  
**Sent:** Sunday, February 19, 2017 5:19 PM  
**To:** Shannon Kendall; Stacy Corless; Larry Johnston; Fred Stump; Bob Gardner; John Peters  
**Subject:** letter of support for Sierra Nevada bighorn sheep

Julia Runcie  
1852 Saniger Ln  
Bishop, CA 93514  
[juliaruncie@gmail.com](mailto:juliaruncie@gmail.com)

Mono County Board of Supervisors  
P.O. Box 715  
Bridgeport, CA 93517

Dear Mono County Board of Supervisors,

For four years, I had the privilege of working as a field technician for the California Department of Fish and Wildlife's Sierra Nevada Bighorn Sheep Recovery Program. I was lucky enough to observe these iconic animals regularly as they scrambled in the cliffs above Lundy Lake and traversed the windy summit of Excelsior Mountain. As an ecologist, mountaineer, and passionate resident of the Eastern Sierra, I feel strongly that the Sierra bighorn's worth as a component of our mountain ecosystem is beyond measure. The threat posed by continued domestic sheep grazing in close proximity to wild sheep herds is unacceptable, and I urge you to prohibit grazing of domestic sheep on Conway Ranch immediately.

Domestic sheep grazing at Conway Ranch provides negligible financial benefits to Mono County, and the County should pursue other management options for this property. Abundant evidence demonstrates that the respiratory pathogens carried by domestic sheep are fatal to wild sheep and can be quickly and devastatingly transmitted throughout wide-ranging herds. The Sierra bighorn population is still small and vulnerable enough that a disease epidemic has the potential to eradicate this species from the Range of Light forever. We can't take that risk.

It is the duty of the Board of Supervisors to prioritize the conservation of the priceless biodiversity in Mono County's backyard. Sierra Nevada bighorn sheep exist only in our small corner of the world – let's work together to keep them there.

Thank you for taking my concerns seriously.

Sincerely,

Julia Runcie

## Shannon Kendall

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**From:** Martha Henning <mhenning@pcc.edu>  
**Sent:** Sunday, February 19, 2017 6:49 PM  
**To:** Shannon Kendall; Stacy Corless  
**Cc:** Larry Johnston; Fred Stump; Bob Gardner; John Peters  
**Subject:** Concerns regarding domestic sheep grazing at Conway Ranch

Mono County Board of Supervisors  
Attn. Chairwoman Stacy Corless  
P.O. Box 715  
Bridgeport, CA 93517

Dear Honorable Supervisors,

Please accept my support for recovering the endangered Sierra Nevada bighorn sheep by removing domestic sheep from Conway Ranch. Yosemite and the Mono Basin are critical to our national environment, and I visit every year from my home state in Washington. Researching the history of the bighorn sheep, I have gained enormous respect for the monumental efforts among state and federal agencies, non-profits, academic institutions, and private citizens like myself to return the bighorn to its native range. I have also learned about the recent reintroduction of bighorn sheep to Yosemite's Cathedral Range, and how this herd's remoteness provides a buffer from contact with domestic sheep. This separation from domestic sheep is important because disease from domestic sheep still poses the single largest threat to the persistence and survival of Sierra Nevada bighorn sheep.

The Mt. Warren and Mt. Gibbs herds also use habitat within Yosemite National Park. Unfortunately, these herds are not as isolated from domestic sheep grazing. I am concerned about domestic sheep grazing at Conway Ranch and its proximity, less than one mile, from areas often used by the Mt. Warren herd. Continued domestic sheep grazing isn't worth the risk to the bighorn and the cost to Mono County. I respectfully request that Mono County discontinue domestic sheep grazing at Conway Ranch and consider other management options, including cattle grazing and wildlife management.

I hope Sierra Nevada bighorn sheep will continue to call Yosemite and Mono County home and I encourage Mono County to join in the considerable efforts to recover this unique native animal. Thank you for your efforts in protecting the Sierra Nevada bighorn sheep from their greatest threat.

In appreciation for your work and wisdom, sincerely,

Dr. Martha L. Henning

cc:

Stacy Corless, Board Member, Mono County Board of Supervisors  
Larry Johnston, Board Member, Mono County Board of Supervisors  
Fred Stump, Board Member, Mono County Board of Supervisors  
Bob Gardner, Board Member, Mono County Board of Supervisors  
John Peters, Board Member, Mono County Board of Supervisors

Martha L. Henning, Ph.D.  
Division of English and World Languages  
Portland Community College  
PO Box 19000  
Portland, OR 97280-0990

[mhenning@pcc.edu](mailto:mhenning@pcc.edu)

## Shannon Kendall

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**From:** kcnjhnsn@gmail.com on behalf of Kate McShane Urban  
<k.mcshane.urban@gmail.com>  
**Sent:** Sunday, February 19, 2017 9:03 PM  
**To:** Shannon Kendall; Stacy Corless; Fred Stump; Bob Gardner; John Peters; Larry Johnston  
**Cc:** Virginia Chadwick  
**Subject:** bighorn sheep recovery efforts - thank you, and a request

Dear Mono County Board of Supervisors,

I'm writing to thank you for your work in the past few years on behalf of the Sierra Nevada Bighorn Sheep recovery effort. As a frequent visitor to the Sierra Nevada, I deeply appreciate the opportunity to share the natural beauty of Mono County with these unique and spectacular creatures. Last winter, I had the joyful experience of bringing my one year-old niece to the Eastern Sierra to see places like Mammoth for the first time - I hope she'll once day have the chance to see a bighorn, too!

I'm also writing to ask you to continue to protect bighorn sheep by limiting domestic sheep grazing at Conway Ranch. As you know, the Sierra Nevada bighorn is currently at high risk of extinction - it's also an important part of the complex Sierra Nevada ecosystem, and a huge draw for tourists and wildlife lovers who help to support local business and the local economy. Domestic sheep can transfer deadly diseases to bighorns in the area, and are therefore a huge threat to their survival. Courts in other states have already acknowledged this threat as an unacceptable risk, and federal agencies have closed certain areas to domestic sheep grazing as a result.

I hope you'll consider other, lower-impact options for the management of Conway Ranch, such as cattle grazing or wildlife management - these uses would allow the just-established bighorn herds in the area to continue to thrive, and give the species the best chance of achieving long-term stability.

Thank you so much for your time, and for all you're doing to keep Mono County wild and wonderful!

Best,

Kate Urban  
Palo Alto, CA

## Shannon Kendall

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**From:** Jora Fogg <jora@friendsoftheinyo.org>  
**Sent:** Monday, February 20, 2017 10:19 AM  
**To:** Shannon Kendall  
**Cc:** Stacy Corless; Larry Johnston; Fred Stump; Bob Gardner; John Peters; sam@friendsoftheinyo.org  
**Subject:** Friends of the Inyo comments on SN Bighorn and Conway Ranch  
**Attachments:** SNBS\_MonoCounty\_Feb21.pdf

Dear Members of the Board,

Please accept the attached letter on behalf of Friends of the Inyo regarding the Conway Ranch RFP. Regrettably, I will be out of town March 7th but someone from Friends of the Inyo will be at the meeting to give public comment.

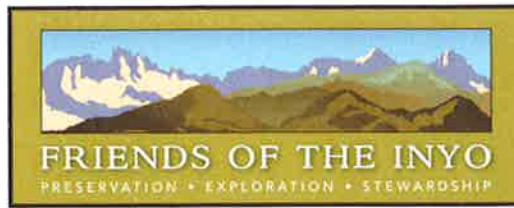
Thanks for your continued work on this important issue,

Jora

--

Jora Fogg | Preservation Manager  
Friends of the Inyo  
819 N Barlow Lane, Bishop, CA 93514  
760-873-6500 | [friendsoftheinyo.org](http://friendsoftheinyo.org)

-Caring for the Eastern Sierra's Public Lands-



February 17, 2017

Mono County Board of Supervisors  
PO Box 715  
Bridgeport, California 93517

RE: Conway Grazing RFP

Dear Honorable Members of the Mono County Board:

Friends of the Inyo is pleased to have the opportunity to comment on the Sierra Nevada Bighorn Sheep (SNBS). Our mission is to ensure the public lands of the Eastern Sierra exist in an intact, healthy natural state for present and future generations of people and wildlife. We represent over 700 members from across the Eastern Sierra, the state and beyond. We have been involved in issues facing SNBS since the early days of the recovery effort and recently worked on providing comments to the Inyo National Forest on SNBS as part of the May 2016 Draft Revised Land Management Plan.

We are pleased to see the Board will hear a presentation from CDFW on the science and status of SNBS. The decision following that presentation is whether or not to continue domestic sheep grazing at Conway Ranch. Friends of the Inyo believes domestic grazing of sheep threatens the recovery of the SNBS, a unique and endangered species. Saving and restoring the planet's biodiversity is crucial given all of the emerging threats to our wildlife, such as climate change. There is more intrinsic value to the SNBS than grazing domestic sheep. According to the California Department of Fish and Wildlife website:

*The Sierra Nevada Bighorn Sheep was listed as an endangered species on January 3, 2000, following emergency listing on April 20, 1999, under the federal Endangered Species Act (ESA). In 1999, they also were moved from threatened to endangered status under the California Endangered Species Act (CESA).*

*Under the Endangered Species Act (ESA), management of Sierra Nevada Bighorn Sheep is guided by the [Sierra Nevada Bighorn Sheep Recovery Plan \(PDF\)](#). California Department of Fish and Wildlife is the lead agency jointly with U. S. Fish & Wildlife Service, in collaboration with National Park Service, BLM, U. S. Forest Service, and USDA Wildlife Services. The recovery actions being implemented by the agencies include (1) Management of disease risk from domestic sheep, (2) translocations (augmentations and reintroductions) to increase bighorn numbers and their geographic distribution, (3) predator management to limit predation on bighorn sheep, and (4) monitoring and management of genetic SNBHS variation.*

*Major threats to the SNBHS are [Disease from domestic sheep and goats](#), habitat changes resulting from vegetation succession, predation, inbreeding depression (low genetic diversity), and small population size (causing increased effects from weather, climate, avalanches and other unpredictable natural events) threaten the recovery of Sierra Nevada Bighorn Sheep. The potential for these factors to*



*interact and reduce demographic rates (survival and reproduction) is termed an extinction vortex. The concern is that a Sierra Nevada bighorn sheep population with insufficient survival and reproduction will decline in numbers and go extinct if the factors causing the decline are not reversed.*

As stated, the Sierra Nevada bighorn is an endangered species and iconic animal of the Eastern Sierra. The SNBS should be embraced and promoted by Mono County for their incomparable wildlife value as part of the County's "Wild By Nature" motto. These majestic and remarkable animals are a draw for tourists, hikers and wildlife photographers. Observing them in the wild is an unforgettable experience. CDFW, Yosemite National Park and other agencies and partners have gone to great effort and expense to restore SNBS in their native range. We request Mono County support the efforts of its cooperating agencies and help facilitate the recovery of these magnificent animals.

There is a large body of evidence published in peer-reviewed literature that documents the fatal health risk that domestic sheep (and goats) pose to the SNBS. Refer to the Bighorn Sheep Disease Research Consortium at <http://bighornhealth.org> where it states:

*Pneumonia is one of the biggest hurdles limiting the comeback of bighorn sheep in western North America. People have known about the disease since the 1990's, but progress in identifying the causative agent has been slow. Domestic sheep and goats brought in to graze in bighorn sheep habitat introduce pneumonia to wild sheep. Attempts to manage the disease in bighorn sheep are costly and frustrating and have met with limited success.*

Therefore, domestic sheep grazing was identified as one of the primary issues of concern in the SNBS Recovery Plan that could adversely affect recovery efforts. Courts in other states have recognized the high risk of disease being transferred from domestic sheep to wild bighorn, and federal agencies have closed allotments to domestic sheep grazing as a result. We are concerned that if the County reauthorizes sheep grazing there could likely be costly litigation; taxpayer dollars that are better spent managing the property for the values outlined in the conservation easement.

Friends of the Inyo believes one of Conway Ranch's greatest assets is its visual characteristic as a classic eastside meadow important to locals and visitors as part of Mono County's heritage and supports vital wildlife habitat in the Mono Basin. We would like to see the County explore best practices for management of the Conway meadow that are fiscally and *ecologically* responsible. This may include cattle grazing under diligent management but other management tools may be effective as well.

In conclusion, Friends of the Inyo respectfully asks that you do not approve domestic sheep grazing at Conway Ranch. Despite the low probability of contact, exposing the endangered Sierra Nevada Bighorn to the slightest possibility of disease is not acceptable. We hope that you will explore alternative management practices, however if you do support an RFP for cattle grazing consider it carefully and confer with specialists as to best management practices for this meadow ecosystem which supports other important species such as Sage Grouse and Mule Deer.

Friends of the Inyo is honored to participate in these important conversations and to preserve our public lands and its wildlife for current and future generations. Thank you for considering our comments.

Respectfully,

Jora Fogg, Preservation Manager  
Sam Roberts, President

20 February 2017

**Re: Sierra Nevada Bighorn Sheep and Domestic  
Livestock Grazing at Conway/Mattly Ranches**

Mono County Board of Supervisors  
P.O. Box 715  
Bridgeport, CA 93517

Dear Supervisors,

I am writing to provide input to the forthcoming meeting (originally February 21, postponed to March 7) of the Mono County Board of Supervisors where domestic livestock grazing at Conway Ranch and risk to Sierra Nevada Bighorn Sheep (SNBHS) will be deliberated. My comments address two issues: 1) disease transmission from domestic to wild sheep, and 2) vegetation diversity at Conway Ranch and effects of domestic livestock grazing.

I am a research climate ecologist specializing in mountain ecosystems of the Great Basin with particular focus on eastern Sierra Nevada and Mono Basin landscapes, where I have worked for more than 30 years. In the recent 12 years this has included efforts committed to science and management underlying recovery of Sierra Nevada bighorn sheep. I have owned a house in Mono City for 25 years, and spend June through October each year in residence when I conduct field research. Periodically through the rest of the year my family and I are also in residence. My comments derive both from my experience as a regional scientist and as a Mono Country homeowner.

Disease Transmission Risk: Recovery of SNBHS since the early days of endangerment has been highly uneven. Successes made through re-introductions often were followed by drastic declines, with a low census of 50 sheep in 1995 (Stephenson et al. 2012). In the last decade, successes have out-numbered population declines, and the number of herds and overall sheep count has trended upwards, although gains remain uneven across the range (Runcie et al. 2015). Contributing to the challenge for SNBHS recovery is the natural behavior of these sheep to live in small herds, where stochastic events can drastically reduce numbers.

Disease transmission from domestic livestock (sheep, goats) to native SNBHS remains one of the greatest threat for recovery and long-term maintenance of the populations (Cahn et al. 2009; Wehausen et al. 2011). Respiratory pneumonia transmitted by bacteria (*Pasteurella* sp.) is highly lethal to SNBHS and carried by domestic animals. Pneumonia transmitted from domestic sheep is hypothesized to have been the driving factor for original collapse of SNBHS in the late 19<sup>th</sup> century (Wehausen et al. 2011). SNBHS have been disease-free through the recent recovery decades, but a single instance of transmission could decimate the herds, as has happened in desert bighorn sheep in recent years. Transmission between animals occurs via nose to nose contact or through contact with air-distributed droplets that contain the bacteria. Studies indicate that direct contact of animals may not be necessary for transmission, as bacteria can remain

viable for up to 18 m distant from live animals, and bacteria have been isolated from grass in a field grazed by domestic sheep, as well as in water (Clifford et al. 2009 and references therein).

Respiratory pneumonia can be transmitted by a single SNBHS coming in contact with live bacteria. Once introduced to the native sheep population, disease spreads rapidly. Ironically, the successes gained by improving SNBHS herd distribution over the range puts the entire group at high risk due to greater connectivity of herds (Stephenson et al. 2012). Pneumonia is highly fatal to SNBHS, and there is no feasible method either to cure animals in the wild or halt the spread of the disease. Efforts to quantify the risk associated with grazing domestic sheep adjacent to the SNBHS recovery areas predict that outbreaks would be disastrous to the population and to efforts to reach recovery goals (Clifford et al. 2009, Cahn et al. 2011). A recommendation following extensive analysis, experimentation, and risk modeling is: "To eliminate all risk of contact and potential disease transmission, domestic sheep cannot be grazed on allotments that overlap with areas utilized by Sierra Nevada bighorn sheep" (Clifford et al. 2009, pg. 2559).

The SNBHS herd in upper Lundy Canyon (Warren herd) is the northernmost extent of the native sheep at present. This is a small herd unit, at high risk of contact with domestic sheep at Conway or Mattly Ranch. Rams can travel far from the herd (> 53 km, Stephenson et al. 2012), and have been reported to cross US 395 near Conway Ranch. The only protection without risk to the native SNBHS is to remove domestic sheep from their vicinity. I strongly urge domestic sheep and goat grazing to be excluded from Conway and Mattly Ranches.

*Cahn, M.L., Connor, M.M., Schmitz, O.J., Stephenson, T.R., Wehausen, J.D., and Johnson, H.E. 2011. Disease, population viability, and recovery of endangered Sierra Nevada Bighorn Sheep. Journal of Wildlife Management 75:1753-1766.*

*Clifford, D.L., Schumaker, B.A., Stephenson, T.R., Bleich, V.C., Cahn, M.L., Gonzales, B.J., Boyce, W.M. and Mazet, J.A.K. 2009. Assessing disease risk at the wildlife-livestock interface. A study of Sierra Nevada bighorn sheep. Biological Conservation 142:2559-2568.*

*Runcie, J.M., Few, A.P., German, D.W., Wehausen, J.D., and Stephenson, T.R. 2015. 2014-2015 Annual Report of the Sierra Nevada Bighorn Sheep Recovery Program. California Department of Fish and Wildlife. 21 pages.*

*Stephenson, T.R., et al. 2012. 2010-2011 Annual Report of the Sierra Nevada Bighorn Sheep Recovery Program: A Decade in Review. California Department of Fish and Game.*

*Wehausen, J.D., Kelley, S.T., and Ramey, R.R. 2011. Domestic sheep, bighorn sheep, and respiratory disease: a review of the experimental evidence. California Fish and Game 97:7-24.*

Meadow Diversity and Domestic Sheep Grazing. A suggestion has been forwarded that meadow plant diversity at Conway and Mattly Ranches is 1) unique for the Mono Basin and 2) that domestic sheep grazing serves to promote that diversity. I am unaware of evidence to support these two statements.

In general, mountain meadows are widely known to support high plant species diversity in the Great Basin, primarily through provision of high water tables and high soil moisture. To the

extent that Conway and Mattly Ranch meadows are wet is mostly an artifact of human activities, through historic water diversions that persist in keeping some meadow areas wet while they would naturally be drier. Sheep grazing, in general, is widely known to counter health of native plant diversity and functioning, especially in wet meadows, through intensive and selective grazing, transmission of alien, invasive species, and by soil trampling and compaction that tends to decrease permeability of water and hasten run-off, lowering soil moisture (Stillwater Sciences 2012).

I have only been able to find information about plant species diversity at Conway and Mattly Ranches from the Eastern Sierra Land Trust (ESLT) Baseline Report (ESLT 2014) and the Conway Ranch Annual Report and Operations Plan (CROP 2016). In the former, Table III-14 lists “dominant plants found or presumed to be present on the Conway Ranch project site.” Despite the recent date of the overall report, this list must be very old, in that long dismissed taxonomic names are used. For instance, “Gramineae” is used rather than the current “Poaceae” for the grass family. A rule was adopted by the international botanical committee in the early 1970s to change this name, and this has been widely adopted both in scientific and management communities ever since. Thus, this undated plant list appears to be decades old, is likely long out of date, and in need of replacement from new surveys.

To the extent this list does represent current plant diversity, I have asked for input from several botanist and vegetation-ecology colleagues whose knowledge of meadow diversity and impacts of grazing in the Mono Basin area is greater than mine. They provided brief review of Table III-14 given its age, and focused on the more recent “Summary Table Report” in ESLT 2014 (note, however, that this table indicates at the bottom: “Information Expires 3/2/2015”). I excerpt pertinent comments here:

“In regard to Table III-14 list of plants ‘found or presumed to be present,’ I see no rare plants at all. There are a few weeds (dandelion, cheat grass, mullein).”

“As for the highlighted rare plants from the California Natural Diversity Database query for the Lundy quadrangle, based on habitat, elevation and records, the only ones that might be found on the Conway Ranch are *Allium atrorubens* (2B.3), *Ranunculus hydrocharoides* (2B.1), *Streptanthus oliganthus* (1B.2), and the *Viola purpurea* ssp. *aurea* (2B.2). All but the *Streptanthus* (which is the least likely to be found) are list 2 plants, meaning they are common across the border in Nevada. And, of these, only the *Ranunculus* is a meadow species.”

“The records in that area for *Boechea tularensis* (1B.3) are considered spurious by Jepson” [that is, the Jepson Manual of California Flora, the currently accepted botanical reference].

“*Lupinus duranii* is a plant of the big sandy flats, and I doubt that Conway Ranch has any.”

“The *Mimulus glabratus* is no longer a valid taxon, and was lumped into the common *Mimulus guttatus*.”

To sheep grazing: “In general, sheep, like goats, are not ideal for conservation grazing. Unlike cattle, which primarily eat grass and don't eat large amounts of native forbs (low % of their intake), sheep do eat them (but they don't forage on the perennial shrubs like goats). Also

different from cattle, sheep bite deeper, and often remove crowns and rhizomes. They don't spread out like cattle, so the effects are highly concentrated. So, unless the sheep are being put in an area dominated by non-natives, they will impact the native flora. You can see this in Dexter Canyon, which is quickly becoming a Blue Flag Iris monoculture (sheep don't eat the iris)."

"*Allium* and *Lupinus* might increase in abundance as a consequence of sheep grazing, if they occurred on the Ranch properties. Geophytes are active in early spring when many wet meadow species are in full flush, and are often overlooked by sheep. Sheep hooves may redistribute bulbs at a time of year when the plants are dormant. By contrast, sheep avoid eating lupines as they are toxic. If lupines were in the Ranch, they might be spread by sheep grazing. Neither *Allium* nor the more likely lupine species to occur at the Ranch (i.e., not *L. duranii*), however, are rare to the area."

"The *Mimulus* and *Ranunculus* are obliged to be near running water, and thus would not respond well to grazing."

"The Masonic Mountain jewelflower is likely preferred by sheep; nothing about its reproduction and establishment would be served by sheep activity."

"If the *Viola* is present (unlikely, as it prefers forest floor conditions), it might be ignored by sheep. If growing in the vicinity of sheep grazing, however, it is likely to be damaged by hooves and trampling."

A final note from the CROP report (pg 6, 2016) documents spread of alien species in the Ranch, which is likely favored by sheep grazing impacting native species:

"The 2014 removal of the liners from the raceways has caused an infestation of Russian Thistle and Woolly Mullein along the raceway edges, as formerly lined and dry raceway berms were now thoroughly saturated."

In sum, to my knowledge there is little evidence for unique native plant diversity at Conway or Mattly Ranches, what uncommon species are there are likely supported by artificially high water tables in the wet meadows, sheep grazing is likely to have a cumulative negative effect on native plant diversity, and sheep grazing is likely to promote spread of alien invasive species. Current plant inventories at these ranches are needed to update the species lists and to monitor impacts of domestic livestock grazing. I find no justification for maintaining sheep on these ranches from the standpoint of native plant diversity.

In addition to impact on native plant diversity, as a lagomorph (rabbit) specialist, pygmy rabbits (*Brachylagus idahoensis*, a species of concern) occur in the Mono Basin. I have not surveyed for them in the Conway or Mattly Ranch areas, but it is not unlikely they would be present in the drier, sage shrubland areas given the soil and shrub types, despite that they do not occur in the list of Exhibit F (ESLT 2014). Livestock grazing is considered to negatively impact pygmy rabbits through trampling of burrows (pygmy rabbits are the only native burrowing rabbits in our region), soil compaction, and reduction of grasses and forbs, which is an important part of

pygmy rabbits' summer diet, although this has been studied primarily for effects of cattle (Lyman 2004; Siegel-Thines et al. 2004).

*CROP. 2016. Conway Ranch 2015 Annual Report and 2016 Operations Plan. Prepared by Mono County Department of Public Works, Bridgeport, CA May 2016.*

*Eastern Sierra Land Trust. 2014. Conway and Mattly Ranches Conservation Easement. Baseline documentation report. Exhibits.*

*Lyman, R.L. 2004. Biogeographic and conservation implications of Late Quaternary pygmy rabbits (Brachylagus idahoensis) in eastern Washington. Western North American Naturalist 64:1-6.*

*Siegel-Thines, N.J., Shipley, L.A., Saylor, R.D. 2004. Effects of cattle grazing on ecology and habitat of Columbia Basin pygmy rabbits (Brachylagus idahoensis). Biological Conservation 119:525-534.*

*Stillwater Sciences. 2012. A guide for restoring functionality to mountain meadows of the Sierra Nevada. Prepared by Stillwater Sciences, Berkeley, California for American Rivers, Nevada City, California. 74 pages.*

Overall. In your deliberations, I urge you to withdraw domestic sheep grazing at Conway and Mattly Ranches for protection of SNBHS, an action that should not negatively impact meadow diversity at these locations, and, to the contrary, is likely to improve opportunities for native plant functioning as well as protect potential pygmy rabbit habitat.

Sincerely,

*/s/ Connie Millar*

CONSTANCE I. MILLAR  
942 Kains Ave., Albany, CA 94706  
P.O. Box 201, Lee Vining, CA 93541  
millarconnie@gmail.com





## MONO LAKE COMMITTEE

P.O. Box 29  
Hwy 395 at Third Street  
Lee Vining, CA 93541

Phone (760) 647-6595  
Fax (760) 647-6377

### Board of Directors

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Sally Gaines

Martha Davis  
David Kanner  
Richard Lehman  
Gina Radieve  
Vireo Schiller  
Tom Soto  
Sherryl Taylor  
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Kristine Zeigler

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Helen Green  
Ed Grosswiler  
Genny Smith

### Executive Director

Geoffrey McQuilkin

### Southern California Office

1718 Wellesley Avenue  
Los Angeles, CA 90025

### On the Internet

[www.monolake.org](http://www.monolake.org)  
[www.monobasinresearch.org](http://www.monobasinresearch.org)

February 20, 2017

Mono County Board of Supervisors  
Shannon Kendall, Clerk  
P.O. Box 715  
Bridgeport, CA 93517

Subject: Conway Ranch Grazing Lease

Dear Supervisors Corless, Johnston, Stump, Gardner, and Peters:

The Mono Lake Committee (MLC) is writing to provide comments on your February 21, 2017 meeting agenda items 9a. Presentation on Sierra Nevada Bighorn Sheep and 9b. Direction to Staff regarding Conway Ranch Request for Grazing Proposal.

The Mono Lake Committee urges Mono County to protect endangered Sierra Nevada bighorn sheep by affirming that the risk of disease transmission from domestic sheep to bighorn sheep is too high and therefore take action to not renew expiring domestic sheep grazing leases on Conway and Mattly ranches.

MLC is a non-profit citizens' group dedicated to protecting and restoring the Mono Basin ecosystem, educating the public about Mono Lake and the impacts on the environment of excessive water use, and promoting cooperative solutions that protect Mono Lake and meet real water needs without transferring environmental problems to other areas. Supported by 16,000 members, MLC has been active in the Mono Basin since 1978.

The current domestic sheep grazing lease that expires in November 2017 provides Mono County with an opportunity to comply with wildlife agency recommendations regarding protection of Sierra Nevada bighorn sheep. As the Board can see from the submissions of the wildlife agencies, the only way to protect bighorn sheep from the pneumonia carried and transmitted by domestic sheep is by creating large, physical buffers through geographic separation. The current grazing leases on Conway and Mattly ranches do not provide this buffer and therefore the bighorn sheep are at risk. The solution is simple: To eliminate the risk, the County must not renew the grazing lease.

The gamble that Mono County would be taking by continuing domestic sheep grazing is not only a risk to the Lundy Canyon herd but also adjacent herds in Yosemite National Park and nearby Mt. Gibbs and Alger Lakes. And in fact, the

entire population could be at risk if the disease was transmitted from herd to herd. The Yosemite herd in particular has received much attention and funding recently in an effort to increase recovery efforts. The wildlife agencies tasked with protecting endangered bighorn have long been concerned about the disease risk and have been urging the County to eliminate domestic sheep grazing on its property.

When Mono County purchased Conway Ranch in 2000, the original grants required that the property be maintained as wildlife habitat, deer migratory corridors, and open space protection. Other uses were allowed by the grants as long as they didn't conflict with these primary goals. When a conservation easement was established on the property in 2014, the original goals were written into that easement and are the guiding management direction today. Removing the leases is in line with both the easement requirements and also the original grant requirements.

MLC believes the County should approach this management question from the perspective of what is best for the land and all wildlife, including not only endangered bighorn sheep but also the Bi-State population of Greater Sage Grouse.

Thank you for the opportunity to comment on this important issue. Please contact me at (760) 647-6595 or [lisa@monolake.org](mailto:lisa@monolake.org) if you have any questions or would like to discuss further.

Sincerely,

A handwritten signature in cursive script, appearing to read "Lisa A. Cutting".

Lisa Cutting  
Eastern Sierra Policy Director

P.O. Box 802  
Menlo Park  
CA 94026

February 20, 2017

Mono County Board of Supervisors  
c/o Shannon Kendall, Clerk  
P.O. Box 715  
Bridgeport, CA 93517

Dear Mono County Board of Supervisors,

I urge you to terminate sheep grazing at Conway Ranch in order to protect bighorn sheep.

Please consider other options for this ranch, including cattle grazing and/or wildlife management. This is not only the right thing to do for the native flora and fauna of the Sierra Nevada, but is also the fiscally responsible thing to do.

I visit Mono County a couple of times annually, and have been fortunate enough to see bighorn sheep on a Mono Lake Committee weekend seminar. And, of course, I scan for them as I hike and explore the canyons and ridges of the eastern Sierra, especially Lundy Canyon which is my favorite place to camp. While I understand that sheep and cattle have economic benefits for the residents of Mono County, I would be grateful if domestic grazing could be so arranged that wildlife such as the bighorn sheep can coexist. The danger of disease transmission from domestic to wild sheep is high.

In the decades that I have been visiting the East Side to hike, birdwatch, climb, it's been heartening to learn of the increased study of and protections for bighorn sheep. Yosemite has gone to much effort and expense to restore bighorn sheep. As their neighbor, please support and extend their efforts with your own.

I look forward to visiting Mono County for a few decades yet, and to knowing that I may have a chance to glimpse these remarkable animals. And, if I never see one, just knowing that they are there, contributing to a healthy ecosystem in the Sierra Nevada, will be its own reward.

Thank you.

Sincerely,

Chris MacIntosh

cmaci@sbcglobal.net

## Shannon Kendall

---

**From:** dsjibesson@gmail.com  
**Sent:** Monday, February 20, 2017 8:21 PM  
**To:** Shannon Kendall  
**Cc:** Stacy Corless; Larry Johnston; Fred Stump; Bob Gardner; John Peters  
**Subject:** Big Horn Sheep

We are writing to express our interest in the Big Horn Sheep and the domestic sheep grazing allotment on Conway Ranch. We have been vacationing for the past 30+ years along the 395 corridor, as a family with our sons who are now adults. Our sons talk of going to Bridgeport with their friends. Our family has always explored within the public lands seeking solitude and beauty. We search for at least one new adventure every trip. We have yet to see Big Horn Sheep and continue to gaze with our naked eye or binoculars, high up onto the ridges. We consider the native Big Horn Sheep a valuable asset, one we hope our grandchildren can view, enjoy and learn from their tenuous life. Domestic grazing by livestock presents a threat to the population of Big Horn Sheep and a threat to their existence. We encourage you to consider removal of livestock and development of a long term plan, identifying Big Horn Sheep as the management priority.

Denis and Sherrie Besson

Sent from my iPad

Tuesday, February 21, 2017

Shannon Kendall, Clerk  
Mono County Board of Supervisors  
PO Box 715  
Bridgeport, CA 93517

**Conway Ranch conservation easement - domestic sheep & goat grazing**

Dear Shannon Kendall,

I understand that on March 7, 2017 the Board is discussing whether or not to permit domestic sheep grazing on the Conway Ranch conservation easement. This really concerns me because I have been spending 4-6 weeks per year, for the past 15 years, staying at June Lake (The Haven) and enjoying the whole area from Lee Vining to Mammoth. One of the key activities I enjoy when staying in Mono County is climbing & hiking in order to see & photograph Sierra Nevada Bighorns. I look for them in the Mt. Gibbs area of Yosemite near Tioga Pass, as well as the herd in Lundy Canyon near the Conway Ranch property. See the attached photo I took awhile ago on Mt. Gibbs!

OK, the evidence I've seen tells me that it is seriously problematic for wild Sierra Nevada Bighorns to have any contact/proximity with domestic sheep & goats due to a disease carried by the domestic animals which affects Bighorns, killing them with a very high mortality rate. These are very rare critters who need all our attention to keep them going—I strongly urge the Board to consider not allowing domestic sheep/goat grazing on the Conway Ranch property in order to protect these amazing Californians.

I'm sending a copy of this to each member of the Board—I apologize if this is inconvenient for you, but I really care about our Bighorns and want to be sure that all the decision-makers are aware of my thoughts on this issue. Please let me know if you have any questions, or want to discuss this further.

My appreciation,

Bob Finch  
248B Esperanza St.  
Tiburon, CA 94920  
(415) 937-5286





Rosanne Higley  
 424 Mountain View Dr  
 Swall Meadows, CA 93514-7161



USA FOREVER

RECEIVED

FEB 21 2017

Mono County Board of Supervisors  
 OFFICE OF THE CLERK  
 P.O. Box 715  
 Bridgeport, CA 93517

Please take seriously the upcoming presentation by the CA Dept of Fish & Wildlife concerning the removal of domestic sheep from the Conway Ranch conservation easement. Continuing recovery of the Sierra Nevada Bighorn depends on protection from diseases carried by the domestic sheep AND represents historic wildlife. Consider other options such as cattle grazing or management for other wildlife species. Sierra Nevada Bighorn represent an important link to our Native American heritage and are a species of interest to area visitors. Thank you. Rosanne Higley



## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Wednesday, February 22, 2017 12:53 PM  
**To:** Stacy Corless  
**Cc:** Leslie Chapman; Helen Nunn  
**Subject:** FW: Sheep grazing on Conway Ranch and protecting the Sierra Nevada Bighorn Sheep

**From:** Lily Pastel [<mailto:lilypastel17@yahoo.com>]  
**Sent:** Wednesday, February 22, 2017 12:35 PM  
**To:** Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>; Larry Johnston <[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)>; Fred Stump <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>; John Peters <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>; Bob Gardner <[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)>  
**Subject:** Sheep grazing on Conway Ranch and protecting the Sierra Nevada Bighorn Sheep

Dear Mono County Supervisors,

I am writing to convey my support of ending domestic sheep grazing on Conway Ranch in an effort to support the recovery of the Sierra Nevada Bighorn Sheep(SNBS).

The SNBS is a native and endangered species that is found nowhere else in the world - continued grazing of domestic sheep on the Conway Ranch property threatens their survival and recovery through disease transmission.

The economic viability of grazing sheep on Conway Ranch is already in question, and the necessary monitoring to ensure protection of the SNBS is not an appropriate use of Mono County's resources. Wildlife management and monitoring should be the responsibility of Fish and Wildlife, and the land should be transferred to their management. If it makes economic sense, and the county would like to continue grazing the land - it should avoid domestic sheep and goat grazing and instead graze cattle.

Allowing the continued grazing of domestic sheep on the Conway Ranch property undermines the incredible work that Yosemite National Park has undertaken to restore the SNBS to its historic range. The county should show support for this work, and our unique native species, by not renewing the grazing agreement. The SNBS have great intrinsic value, but are also of an economic benefit to Mono County, where they attract a wide range of visitors who come to see the iconic sierra species - it would be tragic to see this California megafauna to go the way of the Grizzly.

Thank you for your time,  
Lily Pastel

PO Box 392  
Lee Vining, CA 93541  
805-458-1244

February 22, 2017

Mono County Board of Supervisors  
C/O Clerk of Supervisors  
PO BOX 715  
Bridgeport, CA 93517

Dear John Peters, Bob Gardner, Stacy Corless, Fred Stump, and Larry Johnston,

My name is Gabrielle Renteria and I live in June Lake, California. I am writing to ask you to vote NO on domestic sheep grazing on Conway Ranch. The Sierra Nevada Bighorn Sheep is an endangered species and there is scientific research showing the effect domestic sheep grazing can have on the Sierra Nevada Bighorn. Just one domestic sheep can transmit diseases that can wipe out entire herds of Bighorn. We should be making decisions and changes to help protect these wonderful animals, not allowing practices that can wipe out the entire population.

Please don't get me wrong. I am not against all grazing on Conway, I understand that grazing is a historic land use in Mono County and the Eastern Sierra. I would love to see the property used to graze horses or cattle. However, given what is at stake I do not think we can take the risk that domestic sheep present. I believe that because of the high risk of disease transmission, if Mono County decides to allow sheep grazing on Conway it will likely end up in costly litigation.

I hope that you will vote to protect this beautiful species. If we don't stand up for them, who will?

Sincerely,

Gabrielle Renteria

189 Hillside Drive  
PO BOX 633  
June Lake, CA 93529

renteria.gm@gmail.com  
909-373-5097

February 22, 2017

Mono County Board of Supervisors

P.O. Box 715

Bridgeport, CA 93517

Dear Board of Supervisors,

Thank you for the opportunity to comment on the management of the endangered Sierra Nevada Bighorn Sheep. In a time when wild spaces are shrinking rapidly, I find that protecting the species that inhabit them becomes more urgent. There are millions of domestic sheep on the planet and their wild counterparts are dwindling.

Please act to protect these rare and majestic animals from disease. It just isn't worth the risk to allow domestic sheep to graze on the Conway Ranch property. Please find another management option for Conway Ranch that won't further endanger the Bighorn Sheep.

Thank you so much for your hard work and dedication to making Mono County a better place and protecting what little pristine land and animals there are left in this county,

Best,

Nora Livingston

P.O. Box 371

Lee Vining, CA

93541

## Helen Nunn

---

**From:** Shannon Kendall  
**Sent:** Thursday, February 23, 2017 12:20 PM  
**To:** Leslie Chapman; Helen Nunn  
**Subject:** Fwd: sheep on Conway Ranch

Begin forwarded message:

**From:** Peter Boffey <[peterboffey1@gmail.com](mailto:peterboffey1@gmail.com)>  
**Date:** February 23, 2017 at 9:17:53 AM PST  
**To:** <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>, <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>, <[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)>, <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>, <[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)>, <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>  
**Subject:** sheep on Conway Ranch

To The County Board Members:

I can't pretend to be a local and will identify myself as an S.F. Bay Area outdoor enthusiast who visits Mono County two or three times per year. The Sierra Nevada Bighorn Sheep are part of the Eastern Sierra that draws me back, time and again.

When you meet on Tuesday March 7, 2017, please consider terminating the practice of domestic sheep grazing at Conway Ranch in order to prevent the likelihood of deadly disease being transmitted from domestic sheep to the endangered bighorn. Such a decision would seem to fulfill the county's management mandate for Conway Ranch as a conservation easement to protect wildlife and open space.

Since other uses are allowed, please consider other management options for the Conway Ranch, including cattle grazing and wildlife management. Continued domestic sheep grazing isn't worth the risk to the bighorn and the cost to Mono County.

Respectfully,

Peter Boffey

Walnut Creek CA 94597

## Helen Nunn

---

**From:** Shannon Kendall  
**Sent:** Thursday, February 23, 2017 12:21 PM  
**To:** Leslie Chapman; Helen Nunn  
**Subject:** Fwd: Conway Ranch grazing

Begin forwarded message:

**From:** Daniel Dawson <[danielrdawson@gmail.com](mailto:danielrdawson@gmail.com)>  
**Date:** February 23, 2017 at 9:44:42 AM PST  
**To:** <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>, <[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)>, <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>, <[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)>, <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>  
**Cc:** <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Subject:** Conway Ranch grazing

Mono County Board of Supervisors:

At least 4 of you know me and know that I am no longer a resident of Mono County so I am not speaking to you as a constituent, but rather as an informed and concerned citizen and longtime supporter of Bighorn sheep conservation.

As you consider the question of terminating domestic sheep grazing on Conway Ranch I urge you to consider the economic impacts if you consider no others. Domestic sheep grazing does almost nothing for Mono County. The sheep owners typically are from the Central Valley. The enterprise creates almost no local jobs. Bighorn sheep, on the other hand, are a part of the tourism allure of Mono County. Remember the phrase "the wild side of of CA"? That is why people come. I took an informal, completely unscientific poll, of about a dozen people here in Ashland, Oregon. All had visited the eastern Sierra. All raved about it. All of them said they would come again if they could. All of them said, if they thought there was a chance of glimpsing a Bighorn sheep, it would strongly influence them to come again soon.

The recovery of the Sierra Nevada Bighorn is one of the greatest wildlife conservation stories of modern times. It has been a cooperative effort amongst hundreds of people. Infection from contact with domestic sheep has been demonstrated as one of the leading causes of death in Bighorn. It is incumbent on Mono County to do your (small) part in this recovery. Please get rid of the domestic sheep on Conway Ranch.

Best regards from a strong supporter of Mono County.

Dan

*Dan Dawson*  
[danielrdawson@gmail.com](mailto:danielrdawson@gmail.com)

## Helen Nunn

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**From:** Helen Nunn  
**Sent:** Thursday, February 23, 2017 1:18 PM  
**To:** Helen Nunn  
**Subject:** FW: Sierra Nevada Bighorn Sheep

**From:** "Carter, Sue" <[scarter@portervilleschools.org](mailto:scarter@portervilleschools.org)>  
**Date:** February 23, 2017 at 12:56:11 PM PST  
**To:** <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Subject:** **Sierra Nevada Bighorn Sheep**

February 23, 2017

Susan Carter

16427 Palomino Drive

Springville, CA 93265

[carter251@aol.com](mailto:carter251@aol.com) or [scarter@portervilleschools.org](mailto:scarter@portervilleschools.org)

Mono County Board of Supervisors

P.O. Box 715

Bridgeport, CA 93517

Dear Board of Supervisors:

As a species found only in the Sierra Nevada, our very own Sierra Nevada Bighorn Sheep (SNBS) deserve to be protected and preserved. I urge you to stop domestic sheep grazing at the Conway Ranch to prevent potential diseases from being transmitted from those domestic sheep to the SNBS. Your action in halting this domesticated sheep grazing would be in line with other grazing allotments closed by federal agencies, and would prevent the costly litigation that is likely to follow if said grazing is allowed to continue.

The wild and native SNBS are of inestimable value as a keystone species, let alone a considerable draw to tourists and others who come to the area to see the SNBS and in the process support the local economy.

I have felt honored to have witnessed the SNBS clambering around a hillside by Parker Pass in Yosemite, and again while hiking up Lundy Canyon. These sightings have enriched my life, and have encouraged others to spend time on the east side of the Sierra, in the hopes of seeing these animals.

I respectfully urge you to close the grazing allotment on Conway Ranch. This will help insure that I, and future generations, are able to experience the diversity of wildlife in the Sierra Nevada.

Sincerely,

Susan Carter

559.361.9615



## Helen Nunn

---

**From:** Helen Nunn  
**Sent:** Friday, February 24, 2017 7:58 AM  
**To:** Helen Nunn  
**Subject:** FW: Sheep grazing on Conway Ranch

**From:** <[riffly@aol.com](mailto:riffly@aol.com)>  
**Date:** February 24, 2017 at 9:47:07 AM CST  
**To:** <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Cc:** <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>, <[ljohnson@mono.ca.gov](mailto:ljohnson@mono.ca.gov)>, <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>, <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>  
**Subject:** Sheep grazing on Conway Ranch

Having grown up vacationing and working some at Virginia Lakes every summer (a place my family has been coming to since the early 1930's when Walt Foster made a resort there) I feel obligated to advocate for this part of Mono County. My younger days saw me hiking all over the peaks and back range up there. My heritage as an outdoorsman and naturalist gave me a keen eye to the creatures that lived to the west of the Mono Basin. Up beyond the timber line, my brother and I always saw what we thought were Deer droppings and paid interest to them since we were hunters. It took me 30 years of hiking and a solo climb to Excelsior Peak one fall to run across some Big Horn Sheep. Mentioning this to Del Hubbs the Range Manager for the Inyo Forest at the time, it was a bit of an enlightenment if not an embarrassment for I had never suspected that there were some Big Horn Sheep roaming the mountains of my youthful wanders. I wish my running across these Big Horn was an intention instead of an accident. I majored in Biology in college and should have suspected those droppings were more than from deer but indeed a manifestation of something else; an icon lives in the Sierra Nevada and White Mountains and familiar mountains are all a part of that.

I cringe now at the sight of domestic sheep out in Eastern California meadows. Being involved with fishery issues up along the east side I know full well the agony of the realization that grazing especially from sheep that has impacted the Sierra Nevada so much. Along with this there is the established culture and heritage of ranching from a century and a half of doing so. While somewhat fitting to the scene of local life and economy there is a nasty underside to it all.....land maggots. I love Mono County and the people who make a living here but none the less some just don't get the perspective of how distinctive and special it is. Conway Ranch sets so close to the high mountains and timber line with its population of Big Horn to the north side of Tioga Pass. It is one place where sheep grazing has no longer any propriety. It must stop despite the heritage of it there. We know better.

The risk of this continued sheep grazing on the Conway Plain is just not worth it to either the Big Horn or Mono County for that matter. The risk of a law suit for not considering all the peer reviewed science stating the risk to Big Horn from domestic sheep has led other states and counties away from continued grazing on public land adjacent to Big Horn ranges. There are options here and I would think that you supervisors would see that changing to them would be a better move. Even cattle grazing would better than sheep and could fill the short fall here if there is even be one to be imagined. I hope that maybe a fish hatchery will work for Conway Ranch's management in some way in the future as well; but there are a lot of hopes for this

land I guess. Please there is no good reason to continue Sheep Grazing on Conway Ranch. Again we know better.

Lew Riffle 650 Via Hierba Santa Barbara, Ca 93110

February 16, 2017

Shannon Kendall, Clerk  
Mono County Board of Supervisors  
PO Box 715  
Bridgeport, CA 93517

Dear Ms. Kendall

I am a resident of Chalfant Valley writing to oppose domestic sheep grazing at Conway Ranch. It has been widely established that such activities were a major factor in decimating the Sierra Nevada bighorn sheep (SNBS) populations of the high country. How is it possible that after decades of work and millions of dollars spent to restore populations of this magnificent creature, we are willing to risk it all for such a negligible benefit to the county?

Any revenues the county collects from grazing permits pale compared with the money generated by the tourist trade. How many people come to Mono County in hopes of seeing domestic sheep? How much will the county have to pay when lawsuits are brought against it for recklessly endangering this protected species?

I strongly urge the county to protect this unique asset by ceasing domestic sheep grazing activities in this area, and to instead focus on uses that pose no threat to SNBS.

Thank you

Harold McDonald  
PO Box 165  
Bishop, CA 93515

## Helen Nunn

---

**From:** Shannon Kendall  
**Sent:** Saturday, February 25, 2017 6:11 PM  
**To:** Leslie Chapman; Helen Nunn  
**Subject:** Fwd: Sierra Nevada Bighorn Sheep

Begin forwarded message:

**From:** Bruce A Muirhead <[bamu@comcast.net](mailto:bamu@comcast.net)>  
**Date:** February 25, 2017 at 7:12:20 PM CST  
**To:** <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Cc:** <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>, <[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)>, <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>, <[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)>, <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>  
**Subject:** Sierra Nevada Bighorn Sheep

Mono County Board of Supervisors

P.O. Box 715

Bridgeport, CA 93517

Dear Board of Supervisors:

Please help protect and preserve our Sierra Nevada Bighorn Sheep!

As you know they are susceptible to potential diseases being transmitted from domestic sheep grazing on Conway Ranch.

Halting this domesticated sheep grazing would be in line with other grazing allotments closed by federal agencies, and would prevent the costly litigation that is likely to follow if such grazing is allowed to continue.

Our Bighorn are a keystone species, and deserve to be treated like one. People come from all over to see them, which helps support the local communities.

I have hiked the Eastern Sierra, and visited the White Mountains. Knowing and feeling the presence of the Bighorn, even without seeing one, was

always a bit magical!

I ask you as good stewards to please make a statement for our Bighorn, and close the grazing allotment on Conway Ranch.

Thank you in advance for your consideration.

*Bruce Muirhead* 😊😊

*388 Borica Dr.*

*Danville, CA 94526*

Mono County Board of Supervisors  
P.O. Box 715  
Bridgeport, CA 93517

Dear Mono County Board of Supervisors:

I'm writing this letter to urge your support of the protection of the Sierra Nevada Bighorn Sheep, an endangered species and iconic image of the Sierra Nevada.

I had the chance to go on several "sheep counts" in Lundy Canyon to count how many female sheep had offspring two years ago. The day included hiking straight up talus fields with spotting scopes and telemetry gear on the opposite side of the canyon from the sheep to get the best view of the herd in order to determine the sex and age of the new sheep. Hiking in the same rugged terrain that these animals glide over effortlessly gives one a perspective of how remarkable they really are, and how well-suited they are to this place. Every time I hike any of the canyons in this area, I keep an eye out for this often-illusory species, hoping to catch a glimpse. They are truly a jewel of the Eastern Sierra, and so worthy of being protected.

Continued domestic sheep grazing isn't worth the risk to the bighorn and the cost to Mono County. Please consider other management options for the Conway Ranch including cattle grazing and wildlife management. Continued domestic sheep grazing at Conway Ranch threatens the recovery of this unique species. Saving and restoring the planet's biodiversity is more important than ever - and the Sierra bighorn should come first. Domestic sheep grazing was identified as one of the primary issues of concern in the SNBS recovery plan that could adversely affect recovery efforts. Courts in other states have recognized the high risk of disease being transferred from domestic sheep to wild bighorn, and federal agencies have closed allotments to domestic sheep grazing as a result.

Please vote in line with the science – please vote to save and protect the Sierra Nevada Bighorn Sheep, a species that can be found nowhere else in the world but right here in our backyard, a species that should be embraced and promoted for their tremendous wildlife value.

Sincerely,

Jessica Horn  
Eastern Sierra Resident  
PO Box 196  
Lee Vining, CA 93541  
760-648-3118



2/27/17

Mono County Board of Supervisors,  
P.O. Box 715,  
Bridgeport,  
CA 93517

Subject; Management of Conway and Mattly Ranches for Grazing

Honorable Mono County Board of Supervisors:

Thank you for the opportunity to be able to participate in the discussion on grazing issues in the Mono Basin area. I am a long time Mono County resident and local business owner. I have also been involved in the Sierra Nevada bighorn sheep issues for many years and value the presence of these magnificent animals in the mountains in my life and in the lives of the visitors that we bring to Mono County to experience the mountains.

You will have heard input from scientists that there is no doubt that domestic sheep have the ability to transmit respiratory disease to wild sheep populations. Such disease transmission has occurred in Northern California and has resulted in complete extirpation of wild bighorn populations in some areas.

Domestic sheep have been sighted on the Dana Plateau amid prime bighorn habitat. This is despite fencing and monitoring by their shepherds. While sheep are permitted to graze on the Conway and Mattly Ranch areas this has a very high probability of occurring again. Having grown up on sheep stations in New Zealand I know that you cannot underestimate the ability of sheep to find their way to greener pastures no matter the fencing.

Mono County is promoting its self as "Wild by Nature", not "Domestic by Humans". California Fish and Wildlife, US Fish and Wildlife Service and Yosemite National Park have spent large amounts of money, considerable effort and time to ensure the long-term survival of the bighorn in Mono County.

Does this Board want to take the personal responsibility for putting the local bighorn population at risk of extirpation for the sake of a few dollars of income?

In fact, how much money does the County gain from the allocation of grazing permits in this area? All-in-all, administering the gazing would seem to be a major headache and expense that the County could do without. Who would be responsible for attempting to securely fence the perimeter of the ranches? Not the leasees I assume.

There is probably more money to be made by promoting the wildlife value of the bighorn to photographers and visitors than from grazing and far fewer problems.

I urge the County to discontinue domestic sheep grazing in these areas and to look for other options with the properties.

Respectfully yours

Robert SP Parker



## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Tuesday, February 28, 2017 12:59 PM  
**To:** Bob Gardner; John Peters; Larry Johnston; Fred Stump  
**Cc:** Leslie Chapman; Helen Nunn  
**Subject:** FW: Domestic sheep grazing/Conway Bighorn habitat

-----Original Message-----

From: Michael Graber [<mailto:michael@graberproductions.com>]  
Sent: Tuesday, February 28, 2017 12:16 PM  
To: Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
Cc: Stacy Corless <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>  
Subject: Domestic sheep grazing/Conway Bighorn habitat

Dear Mono County Board of Supervisors,

Although I am sympathetic to the sheep rancher who currently holds the grazing lease in the Conway Summit area, I am also deeply troubled by the evidence that native Bighorn Sheep potentially could contract fatal respiratory diseases from feeding in the same grazing zones. It is my opinion therefore, Mono County should vote to revoke the grazing permit and remove domestic sheep from this area.

Perhaps to mitigate the financial impact to the rancher, other suitable terrain could be identified as a substitute. I would also suggest that various non-profit organizations would be willing to financially participate in obtaining suitable grazing land that would not negatively impact the survival of native, large mammal populations such as the Sierra Bighorn Sheep.

Respectfully submitted,

Michael Graber  
123 Desiderata Lane  
Bishop, CA 93514  
714-743-0071

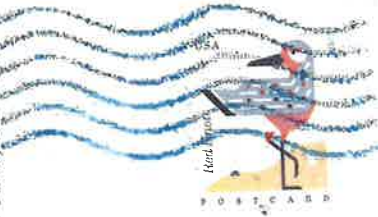


I urge you to terminate  
domestic sheep grazing  
at Conway Ranch in order  
to help the recovery program  
for Sierra Nevada Bighorn  
Sheep. The risk of disease  
transfer from domestic  
sheep to SNBS is too  
great. SNBS are found  
nowhere else. Please

support efforts to terminate  
by finding other uses for  
Conway Ranch.

Ellen Smith

Ms. Ellen Smith  
1469 Dana Ave  
Palo Alto, CA 94301



Mono County Board  
of Supervisors  
P.O. Box 715  
Bridgeport CA  
93517

2-23-17

To: Mono Co. Board of Supervisors  
From: Martha Breed Re: March 7 meeting

Martha Breed  
1285 Clover Ln  
Walnut Creek, CA 94595

Subject: PROTECT the Sierra BIGHORN Sheep  
Best practice is to remove domestic sheep  
from grazing Conway Ranch to prevent  
the fatal health risk that domestic  
sheep pose to the wild Sierra Bighorn  
sheep. Increased separation is the  
simplest method of doing so.

Thanks, Martha Breed



Martha Breed  
1285 Clover Ln  
Walnut Creek, CA 94595

OAKLAND CA 946

RECEIVED

24 FEB 2017 PM 6 L



Mono County Board of  
Supervisors  
PO Box 715  
Bridgeport CA 93517

071515



## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Saturday, February 25, 2017 3:02 PM  
**To:** Leslie Chapman; Helen Nunn  
**Subject:** Fwd: Please vote "NO" on the grazing (and "YES" to support bighorn sheep)

Begin forwarded message:

**From:** Ellen King <[ellen@monolake.org](mailto:ellen@monolake.org)>  
**Date:** February 25, 2017 at 4:05:33 PM CST  
**To:** "[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)" <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Cc:** "[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)" <[scorless@mono.ca.gov](mailto:scorless@mono.ca.gov)>, "[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)" <[ljohnston@mono.ca.gov](mailto:ljohnston@mono.ca.gov)>, "[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)" <[fstump@mono.ca.gov](mailto:fstump@mono.ca.gov)>, "[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)" <[bgardner@mono.ca.gov](mailto:bgardner@mono.ca.gov)>, "[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)" <[jpeters@mono.ca.gov](mailto:jpeters@mono.ca.gov)>  
**Subject:** Please vote "NO" on the grazing (and "YES" to support bighorn sheep)

Dear Mono County Supervisors,

I'm urging you to vote "NO" on the issue of re-issuing grazing permits for sheep on the Conway/Mattly ranch parcels. Sheep grazing on these parcels is not of great economic value to Mono County, and there is clear evidence that a disease that is not fatal to domestic sheep can, when they come into close contact with bighorn sheep, infect and potentially kill an entire herd of bighorn. The proximity of the Conway/Mattly parcels to known bighorn ranges makes such contact very likely. The county's motto is "Wild by Nature". You have the opportunity make that motto come alive by protecting to protect an animal that is iconic to the idea of "wild". I urge you to do the right thing and vote to protect the bighorn sheep.

Thank you,  
Ellen King

**Ellen King, Membership Coordinator**  
**Mono Lake Committee**  
(760) 647-6595 | (760) 647-6386 x123  
Hwy 395 at Third Street, P.O. Box 29, Lee Vining, CA 93541  
[www.monolake.org](http://www.monolake.org) | [www.monobasinresearch.org](http://www.monobasinresearch.org)

*Saving Mono Lake for future generations through  
protection, restoration, education, and science.  
Long Live Mono Lake!*

February 21, 2017

Shannon Kendall, Clerk  
Mono County Board of Supervisors  
P.O. Box 715  
Bridgeport, Ca 93517

Re: The endangered Sierra Nevada Bighorn Sheep  
and Conway Ranch sheep grazing

To Shannon Kendall,

Please terminate sheep grazing at Conway Ranch to prevent the deadly disease from being transmitted from sheep to the endangered bighorn of Lundy Canyon.

Federal agencies have closed allotments to sheep grazing to protect the bighorn.

Mankind has driven the SNBS to higher elevations with less habitat to sustain them. They need access to lower elevation habitats for food.

Thank you for making the best decision for our county, and the SNBS, an essential part of the eastern sierra natural history and biodiversity.

Thank you,  
Jane Kenyon  
P.O. Box 814  
Mammoth Lakes, Ca 93546  
760-934-0372



February 20,  
2017

Dear Mono County Board  
of Supervisors,

Several years ago John and I found ourselves sitting atop Mt. Lewis in the Ansel Adams Wilderness, during several days of peak bagging. How long we'd been roosting in the spot there, atop the peak, I don't recall, but as John was training his camera for a 360° panoramic shot, he suddenly, hoarsely, whispered, "Whoa!" Below us, to the west, perhaps 200-300 yards, blending in so perfectly with the Sierran batholith, we espied close to a dozen - well, maybe more like seven or eight (we were so excited) Sierra Nevada Bighorn Sheep. And who knew how long they had been standing in their broad-sided stance, fixated upon us? →



That one moment of eye-to-eye (from a distance, true) embodies my heartfelt passion and heartfelt love affair with the Sierra Nevada, going on sixty years now for me. It's icons - such as the Bighorn Sheep, pull me back year after year. We forthwith sent a photo of <sup>the</sup> Big Sheep sighting to Jan Wehansen, with whom we've traversed - during weekend jaunts - neighboring canyons and peaks - lead of the Sierra Nevada Bighorn Sheep organization out of Bishop. He substantiated our sighting with its head identification and history.

Beautiful sightings such as these must receive protection. I understand the Board may consider whether to terminate domestic sheep grazing at Conway Ranch in order to prevent deadly diseases being passed on to the endangered Bighorn. Continued domestic sheep grazing isn't worth the risk to the Bighorn, and the cost to Mono County. Please consider other management options for Conway Ranch.

One of the primary concerns in the Bighorn Sheep recovery plan is the issue of domestic sheep grazing. Continued grazing could adversely affect recovery plans. Other states' courts have recognized the issue, and federal agencies have closed allotments to domestic sheep grazing as a result.

And the monoculture concerns? ... → Can Mono County



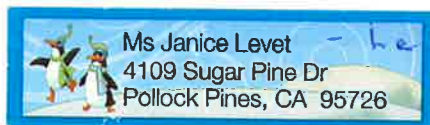
afford the environmental analysis required if sheep grazing continues? Due to the high risk of disease transfer to Bighorn Sheep, if the County allows domestic grazing it will likely end up in costly litigation which the County may lose, at added expense to the taxpayers. "

Saving and restoring our Earth's biodiversity is more important NOW than ever. The Sierra Bighorn should come first.

Now is the time for us all to ACT!

Sincerely,

Jan LePouvoir



March 1, 2017

Mono County Board of Supervisors  
PO Box 715  
Bridgeport, California 93517

RE: Conway Grazing RFP

Honorable Mono County Supervisors:

Thank you for the opportunity to comment on the issue of sheep grazing at Conway Ranch. We are also looking forward to the presentation by the Department of Fish and Wildlife.

The Sierra Nevada Bighorn is renowned as the classic wild species of the Eastern Sierra. They are sought by photographers and are a life- list animal for many. Seeing a herd of this wildest of the wild animals is an indescribable thrill. I feel very fortunate to have had the experience of seeing two bucks lock horns on a giant boulder just above me and my partner. The next day we saw a small group of ewes and lambs in a meadow. These images are indelible and cherished memories.

We all know that the Sierra Nevada Bighorn Sheep (SNBHS) was listed as an endangered species on January 3, 2000. Within 5 years it could be down listed to *threatened* status. According to information in your packet, this will not occur until the risk of contact between wild bighorn and domestic sheep is eliminated. There is a myth that domestic sheep and bighorn must have nose to nose contact to spread pneumonia, the fatal disease that can wipe out an entire herd. However, it has been documented that pneumonia can be transmitted to bighorn from domestic sheep in a pen 30 feet away.

The Lundy herd has been observed within a mile of Conway Meadow and a ram was killed by a car near Conway Summit. There seems to be no viable mitigation to keep the Lundy group from contact with domestic sheep in Conway Meadow. Fencing would not suffice as it inhibits the movement of other wildlife and bighorn could conceivably scale many fences or have contact through a fence. Alternating seasons isn't a recommended solution as there are too many variables including climate change and a species that can wander up to 30 miles.

There have been millions of dollars spent by agencies and foundations to bring this iconic animal back from the brink of extinction. It is our responsibility to ensure that the Sierra Nevada Bighorn flourish and continue into the next century for future generations to enjoy. One SNBHS has more intrinsic value than a whole herd of domestic sheep. Today, the Mono County Board of Supervisors has a choice and I hope it is to discontinue the grazing of domestic of domestic sheep in Conway Meadow.

Keep Mono County Wild.

Respectfully,

Sydney Quinn and Dennis Schumacher, MD  
POB 340, Big Pine, California, 93513

**Helen Nunn**

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**From:** Shannon Kendall  
**Sent:** Thursday, March 02, 2017 8:26 AM  
**To:** Bob Gardner; Fred Stump; John Peters; Larry Johnston; Stacy Corless  
**Cc:** Leslie Chapman; Helen Nunn  
**Subject:** FW: OPPOSE DOMESTIC SHEEP ON CONWAY RANCH!

See below.

-----Original Message-----

**From:** Terry and Vern [<mailto:tmcvern@sti.net>]  
**Sent:** Thursday, March 02, 2017 8:24 AM  
**To:** Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Subject:** OPPOSE DOMESTIC SHEEP ON CONWAY RANCH!

What, precisely, is it that you want to tell your grand children?

You have the chance to see a magnificent creature thriving in its natural habitat.

(((((((((((((((((((((((((((((((( OR ))))))))))))))))))))))))))))))))

Here's a mutton sandwich. Put on this itchy wool hat.

OPPOSE DOMESTIC SHEEP ON CONWAY RANCH!

Vern Gersh  
LEE VINING

## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Thursday, March 02, 2017 8:47 AM  
**To:** Bob Gardner; Fred Stump; John Peters; Larry Johnston; Stacy Corless  
**Cc:** Leslie Chapman; Helen Nunn  
**Subject:** FW: Conway Ranch oppose the domestic sheep because this can't be undone

**From:** Vern Gersh [<mailto:tmcvern698@gmail.com>]  
**Sent:** Thursday, March 02, 2017 8:43 AM  
**To:** Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Subject:** Conway Ranch oppose the domestic sheep because this can't be undone

In the future there may be some way to protect the wild sheep from the threat domestic sheep pose as a disease vector. A drug or vaccine may yet provide hope to these wild creatures.

But if you don't oppose this, the death of these magnificent animals CAN NEVER BE UNDONE. Your vote will be remembered.

Terry McLaughlin

Robert R Tyson  
211 Mesquite Rd  
Bishop CA 93514  
(650) 475-6293

**Sierra Nevada Bighorn Sheep and the Mono County Board of Supervisors -  
Public Meeting for Feb 21 2017**

To the kind attention of the Mono County Board of Supervisors,

Stacy Corless  
Larry Johnston  
Fred Stump  
Bob Gardner  
John Peters

Shannon Kendall, Clerk of the Board

I write to support you in your deliberations to find an equitable and positive solution to damaging interactions between endangered Sierra Nevada bighorn sheep and domestic sheep in Mono County when the Board meets February 21 2017. I cannot attend this meeting, but I very much wish to contribute my thoughts.

As much as I am concerned that ranchers need to continue sheep grazing in areas common to the bighorn, I am at least as concerned and wish to advocate for the welfare of the bighorn which are fatally affected by the pneumonia they acquire by having contact with domestic sheep. The present state of affairs drives a one-way decline for the bighorn.

We should do all we can to conserve and support native animal populations, especially so magnificent a species as the bighorn. An equitable solution *can* be reached that will conserve and preserve both the bighorn and those who depend on domestic sheep. Let me emphasize this. My passionate interest, at the same time involved and passionate *and* detached and scientific, may lie first with the bighorn, but I no less believe in the preservation and conservation of the ways of life and livelihoods long practiced around domestic sheep husbandry.

I have fiscal concerns for the County too. Were I a Mono County taxpayer (I live in Bishop) I would worry about fiscal damage if Mono County does not vigorously act to prevent contact between bighorn and domestic sheep. Consequences I see for Mono County and its tax base include paying for impact research and regulatory review, probably lengthy, and litigation inevitable if the County does not provide for bighorn recovery. I ask, in contrast to maintaining status quo, is not supporting the bighorn a prudent policy and wise use of County monies? Does not keeping things as they are not beg other pragmatic aspects of the high side to conserving both populations such as tourism and the revenue support it provides?

I am presently in Italy, where surprisingly I encounter even at this distance awareness of the bighorn, of its majesty, and of its plight. Italians would say that if the County does not protect such an iconic and beautiful creature it would be considered guilty of *mananza di soccorso*, failure to care for one in need. This is a criminal offense under Italian law.

I heartily commend you to constructing the solution to preserve these magnificent and needed creatures and also to conserve productive domestic grazing. May both thrive, now and for our future.

Respectfully,



Robert R Tyson

## Helen Nunn

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**From:** Shannon Kendall  
**Sent:** Thursday, March 02, 2017 1:07 PM  
**To:** Bob Gardner; Fred Stump; John Peters; Larry Johnston; Stacy Corless  
**Cc:** Leslie Chapman; Helen Nunn  
**Subject:** FW: Conway Ranch

**From:** Liliane Gersh [<mailto:lilianeviolet@gmail.com>]  
**Sent:** Thursday, March 02, 2017 11:27 AM  
**To:** Shannon Kendall <[skendall@mono.ca.gov](mailto:skendall@mono.ca.gov)>  
**Subject:** Conway Ranch

Greetings!

I am very concerned about the future of the native Sierra sheep. I truly hope that this is not one of the occasions when the next generation looks back and says, "If only.... If only the sheep had been not been allowed to graze on the Conway Ranch, native Sierra sheep would not be extinct. It's more than a shame. Perhaps more research could have stopped the disease, but now it's too late."

Please do not allow the sheep to graze on the Conway Ranch. I understand the economics involved, but looking into the future, I would hate to see yet another species disappear. You have a chance to do something about it.

Yours,  
Liliane Gersh

Mono County Board of Supervisors  
P.O. Box 715  
Bridgeport, CA 93517

Dear Board of Supervisors:

Please help protect and preserve our Sierra Nevada Bighorn Sheep!

As you know they are susceptible to potential diseases being transmitted from domestic sheep grazing on Conway Ranch.

Halting this domesticated sheep grazing would be in line with other grazing allotments closed by federal agencies, and would prevent the costly litigation that is likely to follow if such grazing is allowed to continue.

Our Bighorn are a keystone species, and deserve to be treated like one. People come from all over to see them, which helps support the local communities.

I have hiked the Eastern Sierra, and visited the White Mountains. Knowing and feeling the presence of the Bighorn, even without seeing one, was always a bit magical!

I ask you as good stewards to please make a statement for our Bighorn, and close the grazing allotment on Conway Ranch.

Thank you in advance for your consideration.

Sincerely,

*Bruce Mitchell*  
388 Borica Dr.  
Danville, CA 94526





OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Public Works - Roads**

**TIME REQUIRED** 30 minutes (10 minute presentation;  
20 minute discussion) **PERSONS APPEARING** Garrett Higerd

**SUBJECT** State Transportation Funding  
Legislation Update **BEFORE THE BOARD**

### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Two competing bills have been introduced in the California state legislature to address the transportation funding crisis that has been worsening over recent years. Draft letters have been prepared in support of both bills and attached for consideration.

### RECOMMENDED ACTION:

Receive update on SB 1 (Beall) & AB 1 (Frazier) the "Transportation Funding and Reform Act" and AB 496 (Fong) the "Traffic Relief and Road Improvement Act". Consider approval of a letter of support for one of the proposed bills – potentially with recommended amendments. Provide direction to staff.

### FISCAL IMPACT:

None at this time. However, if signed into law, both proposals would significantly increase funding to maintain and improve local streets and roads and state highways. SB 1 (Beall) & AB 1 (Frazier) would be primarily funded by increases to state gas tax, vehicle registration fees, and diesel taxes and a partial restoration of weight fee diversions and partial loan repayments. AB 496 (Fong) would primarily be funded by weight fee diversions, loan repayments, vehicle sales and use taxes, and vehicle insurance taxes that are currently diverted to the state General Fund to pay for services like public health and human services.

**CONTACT NAME:** Helen Nunn

**PHONE/EMAIL:** x5534 / hnunn@mono.ca.gov

SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

**SEND COPIES TO:**

### MINUTE ORDER REQUESTED:

YES  NO

### ATTACHMENTS:

Click to download
<a href="#">Staff Report</a>
<a href="#">Attachment A AB1</a>
<a href="#">Attachment B AB496</a>
<a href="#">Mono LTC Letter of Support - Berryhill</a>
<a href="#">Mono LTC Letter of Support - Bigelow</a>
<a href="#">Draft Letter of Support SBI - AB1</a>
<a href="#">Draft Letter of Support AB496</a>

### History

Time	Who	Approval
3/2/2017 3:25 PM	County Administrative Office	Yes
3/2/2017 12:42 PM	County Counsel	Yes
3/2/2017 12:04 PM	Finance	Yes



# MONO COUNTY DEPARTMENT OF PUBLIC WORKS

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POST OFFICE BOX 457 • 74 NORTH SCHOOL STREET • BRIDGEPORT, CALIFORNIA 93517  
760.932.5440 • Fax 760.932.5441 • [monopw@mono.ca.gov](mailto:monopw@mono.ca.gov) • [www.monocounty.ca.gov](http://www.monocounty.ca.gov)

Date: March 7, 2017  
To: Honorable Chair and Members of the Board of Supervisors  
From: Garrett Higerd, County Engineer  
Re: State Transportation Funding Legislation Update

## **Recommended Action**

Receive update on SB 1 (Beall) & AB 1 (Frazier) the "Transportation Funding and Reform Act" and AB 496 (Fong) the "Traffic Relief and Road Improvement Act". Consider approval of a letter of support for one of the proposed bills – potentially with recommended amendments. Provide direction to staff.

## **Fiscal Impact:**

None at this time. However, if signed into law, both proposals would significantly increase funding to maintain and improve local streets and roads and state highways. SB 1 (Beall) & AB 1 (Frazier) would be primarily funded by increases to state gas tax, vehicle registration fees, and diesel taxes and a partial restoration of weight fee diversions and partial loan repayments. AB 496 (Fong) would primarily be funded by weight fee diversions, loan repayments, vehicle sales and use taxes, and vehicle insurance taxes that are currently diverted to the state General Fund to pay for services like public health and human services.

**Strategic Plan Alignment:**        *Infrastructure*

## **Background:**

Two competing bills have been introduced in the California state legislature to address the transportation funding crisis that has been worsening over recent years. CSAC has prepared a revenue and expenditure analysis of SB 1 (Beall) & AB 1 (Frazier) the "Transportation Funding and Reform Act." Please see it attached as Attachment A. Very recently, AB 496 (Fong) the "Traffic Relief and Road Improvement Act" was introduced. Please see the package of information from the Assembly Republican Caucus attached as Attachment B.

One significant difference between the two legislative proposals is that SB 1 & AB 1 raises revenues partially through new taxes and AB 496 redirects existing revenues without imposing new taxes. CSAC has not had the time to prepare a complete legislative analysis comparing AB 496 (Fong) to (Beall/Frazier). However, Chris Lee, CSAC Legislative Analyst, prepared the following response regarding the merits of AB 496 (Fong):

"CSAC supports some of the reform measures, but we cannot support a \$4.875 billion per year diversion from the state General Fund. Counties rely on these revenue streams for public health, human services and public safety programs. Moreover, these funds would be subject to annual budget fights in the legislature and likely not

stable enough to effectively plan expenditures. We'd also be very concerned with potential cuts during the next inevitable budget deficit given the volatility of California's General Fund revenue sources.

CSAC policy supports funding transportation through user fees (i.e. gas tax, reg fees, other fees/taxes EXCEPT VMT) and we've had several Board of Directors votes in recent years to affirm that position.

CSAC is supporting AB 1 and SB 1 which would both phase-in a shift of weight fees from transportation bond debt service to current transportation projects—at a cost of approximately \$500 million/year to the General Fund. Recall that the price-based excise tax, which is what is really paying bond debt service since it backfills weight fees, is actually a long-standing general fund diversion. Taxes didn't go up on consumers under Prop 42 sales tax, transportation simply took sales tax (i.e. general fund revenues) and allocated them to transportation. The price-based excise tax replaced the state sales tax on gasoline under the swap—so no net change for consumers. Rather, the general fund simply took back some of the revenues that had previously been diverted by 42.

We understand if Mono County feels that it needs to support the proposal, but we're encouraging counties to support AB 1 and SB 1, which would provide constitutionally-protected, dedicated revenues for local streets and roads."

The Mono LTC approved letters of support for Beall/Frazier On February 24, 2017. Please see those letters attached. There was no discussion of AB 496 (Fong) at that meeting because no information was available at that time.

Staff believes that the transportation funding crisis should be addressed and both of these proposals would provide enough funding to make significant improvements to local streets and roads and state highways. Draft letters have been prepared in support of both bills and attached for your consideration.

If the Board wishes to write a letter in support of AB 496 (Fong) we recommend that the letter include a request that the following items be addressed with amendments:

- Add annual inflation adjustment to gas and diesel taxes. Without an inflation adjustment, the purchasing power of Counties will be constantly eroded over time and eventually will not keep up. This is one of the foundational problems with the existing system.
- Eliminate the annual Board of Equalization adjustment of the price-based excise tax to reduce unnecessary volatility in Highway User Tax Account (HUTA) revenue.
- Create a Zero Emission Vehicle Tax with an annual inflation factor. Zero emission vehicles have all of the same impacts on the road system as a traditional compact car and should pay a use fee.
- Include a plan to reliably fund the mandated services that Counties currently provide with General Fund revenue streams, especially public health and human services.

Please contact me at 924-1802 if you have any questions regarding this item.

Respectfully submitted,



Garrett Higerd

County Engineer

Attachments: Attachment A – AB 496 (Fong)  
Attachment B – SB 1 (Beall) & AB 1 (Frazier)  
Mono LTC Support Letters for SB 1 (Beall) & AB 1 (Frazier)  
Draft Letter of Support for Beall/Frazier  
Draft Letter of Support for Fong



**AB 1 (Frazier)/SB 1 (Beall): Transportation Funding/Reform  
CSAC Revenue and Expenditure Analysis**

---

1100 K Street  
Suite 101  
Sacramento  
California  
95814

Telephone  
916.327.7500  
Facsimile  
916.441.5507

*All revenue and expenditure estimates are based of full implementation of these funding/reform packages which occurs in year five. If adopted in 2017, full implementation would occur in FY 2021-22.*

**REVENUES**

New Revenues

Maintenance & Rehabilitation Investments - \$3.12 billion annually

- Gas tax increase of 12-cents, which generates \$1.8 billion annually
  - AB 1 levies the entire increase in year one
  - SB 1 levies the increase in increments over three years (6-cents in year one, 9-cents in year two, and 12-cents in year three)
  - Gas tax revenues deposited into the Road Maintenance and Rehabilitation Account (RMRA)
    - SB 1 would capture off-highway vehicle (OHV) increment from new gas tax for RMRA, whereas AB 1 maintains current practice of sending OHV related share to OHV accounts
  - Indexed for inflation every three years
- Vehicle registration fee (VRF) of \$38, which generates \$1.3 billion annually
  - Deposited into the RMRA
  - Indexed for inflation every three years
- Zero emission vehicle registration fee (ZVRF) of \$100 (SB 1) or \$165 (AB 1), which would generate approximately \$20 million annually
  - Deposited into the RMRA
  - Indexed for inflation every three years

Freight Investments - \$600 million annually

- 20-cent diesel excise tax, which generates \$600 million annually
  - Deposited into the Trade Corridors Improvement Fund (TCIF)
  - Indexed for inflation every three years

Transit Investments - \$563 million annually

- Up to a 4% increase in the sales tax on diesel, which generates approximately \$263 million annually
  - Deposited into the State Transit Assistance Account (STA)
  - Allocated via the Public Transportation Account (PTA) formula
  - AB 1 increases the rate by 3.5% all for the STA/PTA allocation
  - SB 1 increases the rate by 4%, 3.5% which benefits the STA/PTA formula and 0.5% benefits the Transit and Intercity Rail Corridor Program (TIRCP)
- Increase existing cap and trade expenditures, which generates approximately \$300 million annually
  - From 10% to 20% of total cap and trade auction proceeds for the TIRCP
  - From 5% to 10% of total cap and trade auction proceeds for the Low Carbon Transit Operations Program (LCTOP)

**TOTAL NEW REVENUE GENERATED FOR ALL INVESTMENT CATEGORIES:**

**\$4.28 BILLION**

# ATTACHMENT A

## Restored/Returned Revenues

Maintenance & Rehabilitation Investments - \$1.81 billion annually

- \$500 million in truck weight fees
  - Directed to the Highway User Tax Account (HUTA)
  - Allocated via the 44 STIP/44 LSR/12 SHOPP split
  - AB 1 would phase in a specific dollar amount to be returned to transportation projects whereas SB 1 would phase in a certain percentage of weight fee revenue. AB 1 would cap the weight fee transfer to the General Fund to \$500 million in FY 2021-22 and SB 1 would cap the transfer to 50% of total weight fee revenue collected in FY 2021-22. Depending on how much weight fee revenue is collected in any given year one approach could return more back to transportation projects than another but it's difficult to predict.
- Eliminate the annual BOE adjustment of the price-based excise tax, reset the rate to 17.3-cents, which would generate \$1.125 billion over FY 2016-17 anticipated revenues
  - Directed to the HUTA
  - Allocated via the 44/44/12 split
- Return \$125 million in price-based revenues related to the sale of fuel for non-highway purposes (Off-Highway Vehicles)
  - Directed to the HUTA
  - Allocated via the 44/44/12 split
- Return \$60 million in miscellaneous transportation revenues
  - Directed to the RMRA
  - Allocated via the 50 state/50 local split after off-the top set-aside

**TOTAL RESTORED/RETURNED REVENUE GENERATED FOR ALL INVESTMENT CATEGORIES: \$1.81 BILLION**

## One-Time Revenues

Maintenance & Rehabilitation Investments

- \$703 million in transportation loans
  - Split 50/50 between the state/locals

**TOTAL ONE-TIME REVENUES GENERATED FOR ALL INVESTMENT CATEGORIES: \$703 MILLION**

**TOTAL NEW REVENUE GENERATED FOR ALL INVESTMENT CATEGORIES: \$4.28 BILLION**

**TOTAL RESTORED/RETURNED REVENUE GENERATED FOR ALL INVESTMENT CATEGORIES: \$1.81 BILLION**

---

**GRAND TOTAL ON-GOING REVENUE FOR ALL INVESTMENT CATEGORIES: \$6.09 BILLION**



# ATTACHMENT A

## EXPENDITURES BY ACCOUNT FOR ROAD PURPOSES

### Road Maintenance and Rehabilitation Account (RMRA)

- Receives \$3.18 billion from new and returned/restored revenue annually:
  - \$3.12 billion from new revenues (gas tax, VRF, ZVRF)
  - \$60 million from returned revenues (miscellaneous revenues)
- Take-downs before formula allocation:
  - \$200 million annually for the State Local Partnership Program (SLPP)
  - \$80 million annually for the Active Transportation Program (ATP)
  - \$30 million annually for 4-years to establish the Advanced Mitigation Program (not reflected in calculations throughout analysis as this take-down will cease in year five/full implementation)
  - \$2-5 million annually for the CSU/UC transportation centers (SB 1 would allocated \$2 million for the UC system only whereas AB 1 would allocated \$2 million for the UC system and \$3 million for the CSU system)
- Remainder for formula allocation:
  - \$2.9 billion
  - Remainder split 50 state/50 local
    - \$1.45 for the SHOPP
    - \$1.45 billion for LSR

**TOTAL GENERATED FOR RMRA:**

**\$3.18 BILLION**

### Highway User Tax Account (HUTA)

- Receives \$1.75 billion from returned/restores revenues annually:
  - \$1.125 billion from resetting the price-based excise tax rate
  - \$500 million in truck weight fees
  - \$125 million from OHV related price-based excise tax revenue
- Formula allocations:
  - 44% STIP/44% LSR/12% SHOPP
    - \$770 million for the STIP
    - \$770 million for LSR
    - \$21 million for the SHOPP

**TOTAL GENERATED FOR HUTA:**

**\$1.75 BILLION**

**TOTAL GENERATED FOR RMRA:**

**\$3.18 BILLION**

**TOTAL GENERATED FOR HUTA:**

**\$1.75 BILLION**

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**GRAND TOTAL ON-GOING REVENUE FOR ROAD PURPOSES CATEGORIES:**

**\$4.93 BILLION**

# ATTACHMENT A

## EXPENDITURES BY SYSTEM FOR ROAD PURPOSES

### Local Streets and Roads

- \$2.22 billion annually
  - \$1.45 billion annually from new/returned revenue from the RMRA
  - \$770 million annually from restores/returned revenue from the HUTA
- Potential LSR benefits from \$200 million SLPP and \$80 million ATP
- One time revenue of \$352 million from transportation loan repayment

### State Highways Operations and Protection Program

- \$1.47 billion annually
  - \$1.45 billion annually from new/returned revenue from the RMRA
  - \$21 million annually from restores/returned revenue from the HUTA
- Potential State Highways benefits from \$200 million SLPP and \$80 million ATP
- One time revenue of \$352 million from transportation loan repayment

### State Transportation Improvement Program

- \$770 million annually
- Potential State Highways benefits from \$200 million SLPP and \$80 million ATP

# ATTACHMENT B

## AB 496 (Fong)

### Assembly Republican Transportation Funding Plan

The Traffic Relief and Road Improvement Act provides **\$7.8 billion (\$5.6 billion multi-year/\$2.2 billion one-time revenues)** for transportation **without raising taxes**. AB 496 includes reforms to make transportation spending more accountable and efficient, and eliminates regulatory barriers that prevent traffic relief. It provides \$2.2 billion in one-time revenues from repayment of transportation loans.

#### Reforms

- Repeals the “road diet,” which blocks projects that reduce traffic congestion
- Creates a CEQA exemption for road repair projects
- Creates a Transportation Inspector General
- Requires audits for major transportation projects \*
- Increases Caltrans contracting, and extends the sunset for public-private partnerships
- Achieves savings from Caltrans efficiencies
- Provides new oversight for Caltrans spending
- Restores independence for the California Transportation Commission
- Facilitates federal funding for the Trade Corridors Improvement Fund (TCIF) program

#### Annual Revenues

**\$5.6 billion** in multi-year additional transportation funding

- \$3 billion from sales and use taxes collected from sale of new and used vehicles
- \$1.1 billion from return of truck weight fees for transportation
- \$550 million from vehicle insurance taxes
- \$270 million in new funding from cap-and-trade for transit [equivalent to amount that would be generated by the 3.5% diesel sales tax increase in AB 1 (Frazier)]
- \$160 million from AB 118 vehicle registration fees (backfilled by cap-and-trade)
- \$140 million from return of miscellaneous transportation revenues \*
- \$135 million from diesel sales tax (backfilled by cap-and-trade)
- \$125 million from return of taxes from sale of fuel for non-highway purposes
- \$100 million from Caltrans efficiencies
- \$10 million from return of diverted funds to the Off-Highway Vehicle Trust Fund

#### Total Funding Distribution (one-time revenues/multi-year revenues)

- **\$2.8 billion** (\$700 million/\$2.1 billion) for **local streets and roads**
- **\$2.4 billion** (\$1.03 billion/\$1.32 billion) for **new capacity/traffic relief**
- **\$1.9 billion** (\$190 million/\$1.7 billion) for **highway maintenance and rehabilitation**
- **\$520 million** (\$250 million/\$270 million) for **transit**
- **\$100 million** (all ongoing) for **active transportation**
- **\$80 million** (all ongoing) for **DMV modernization and CHP funding** \*
- **\$10 million** (all ongoing) for **Off-Highway Vehicle Trust Fund**

\* Amendments pending

# AB 496 (Fong) ATTACHMENT B

## Frequently Asked Questions

1. Does this plan include tax increases?

*No. The Traffic Relief and Road Improvement Act generates \$7.8 billion in new transportation funding (\$5.6 billion annual/\$2.2 billion one-time revenues) by ensuring that existing fees and taxes paid by transportation system users are dedicated for transportation.*

2. Does this plan divert funding currently dedicated to other programs?

*The Traffic Relief and Road Improvement Act does not reduce revenues committed to any specific state or local program. The bill dedicates revenues from transportation taxes, which inappropriately support the state General Fund rather than transportation projects.*

3. Will this bill require General Fund cuts?

*The Legislature has increased General Fund spending by more than \$36 billion over the past six years. None of this new spending supports roads. The General Fund impact of this plan is a small fraction of recent growth. The Governor and Legislative Democrats propose tax increases that place the transportation funding burden disproportionately on low-income and middle class families. Assembly Republicans welcome the opportunity to discuss General Fund spending priorities, but we will not support efforts by Democrats to fund transportation on the backs of the poor.*

4. Why shouldn't transportation users pay higher taxes to fund roads?

*Californians pay the second highest gas prices and the highest gas taxes (including cap-and-trade) in the nation. The average Californian pays more than \$200 every year to register a vehicle. Next to housing, families pay more for transportation than any other household expenditure (including food and healthcare). Gas taxes are regressive because lower income Californians drive less fuel efficient vehicles, and commute longer distances due to the state's lack of affordable housing (According to the LAO, commute times increase 4.5 percent for every 10 percent increase in rent). At the same time, the Legislature is diverting transportation taxes for non-transportation purposes. California motorists already face some of the poorest roads and worst congestion in the nation. The Legislature should ensure that existing transportation tax revenues fund transportation before imposing regressive tax increases on hard-working families.*

5. What does this bill do to reduce traffic congestion?

*According to PPIC, nearly 60 percent of Californians view traffic congestion as a "big problem." According to The Road Information Program (TRIP), a national transportation research group, congestion-related delays cost California motorists \$28 billion every year. In Los Angeles and the Bay Area, TRIP determined that the average motorist loses 80 hours due to congestion each year, costing \$1,700 in lost time and wasted fuel. Traffic congestion ranks as the top concern for Los Angeles County residents—surpassing physical safety, making ends meet, and housing affordability. The Traffic Relief and Road Improvement Act provides nearly \$2.5 billion to increase system capacity and reduce congestion. The bill ensures that last year's decision to slash \$750 million from capacity projects can be immediately restored.*

6. What is the "road diet," and why should it be repealed?

*In 2013, the Legislature required that all new development must reduce automobile travel. This change to CEQA rewards projects that increase traffic, and blocks projects that reduce traffic. Stakeholders estimate this will "add approximately \$1 billion in costs for each additional lane mile in California." The Administration describes this policy objective as a "road diet." Assembly*

# ATTACHMENT B

*Republicans believe transportation funding should be used to reduce traffic, not create it. Policies designed to create gridlock should be repealed.*

7. Does this bill restore funds diverted from transportation?

*Yes. This bill eliminates the diversion of \$1 billion annually from gas tax revenues to the General Fund (i.e. the “weight fee swap”). This diversion steals more than \$400 million annually from local streets and roads. The bill also requires repayment of all outstanding transportation loans. It also ensures that revenues from the “hidden gas tax” (i.e. 11 cent gas price increase due to cap-and-trade) are appropriately funding transportation.*

8. Does this plan provide stable and sustainable transportation funding?

*Yes. Existing transportation funding is tied to the gas tax. The Governor has issued an Executive Order requiring a 50% reduction in petroleum consumption by 2030. The Air Resources Board proposes to place 4.2 million zero-emission vehicles on the road by 2030. Owners of zero-emission vehicles are predominantly wealthy, and pay no gas tax (According to an October 2015 University of California, Berkeley, study, the wealthiest 20 percent of households capture 90 percent of federal tax credits for electric vehicle purchases). If petroleum consumption declines, so will road funding. Gas tax increases will increasingly shift the funding burden to low-income motorists. The Traffic Relief and Road Improvement Act diversifies the transportation funding portfolio to provide stable and sustainable revenue. This bill creates the first new dedicated sources of transportation funding in 17 years.*

9. Does this plan address all of the state’s transportation needs?

*Yes. The Traffic Relief and Road Improvement Act includes new funding for deferred maintenance, highway improvement, local streets and roads, transit, active transportation, DMV modernization and CHP. It also facilitates federal funding for trade corridor improvements.*

10. Does this plan include reforms to improve efficiency and accountability for transportation spending?

*Yes. California has the 4<sup>th</sup> highest overhead costs in the nation for transportation projects. In May 2014, the Legislative Analyst released a review of staff support costs at Caltrans. The report determined that Caltrans is overstaffed by 3,500 full-time employees, at a cost of more than \$500 million per year. The Traffic Relief and Road Improvement Act achieves savings from Caltrans efficiencies, increases oversight over Caltrans spending, and creates a new Transportation Inspector General to audit projects and improve performance. All major transportation projects will be regularly audited. The plan increases flexibility for Caltrans to contract out, and restores a program allowing public-private partnerships.*

## AB 496 (Fong) Transportation Plan Comparison

	AB X (Fong)	Governor's Plan	AB 1 (Frazier)	SB 1 (Beall)
<b>Preliminary Revenue Estimate</b>	<b>\$7.8 billion</b> (\$5.6 billion annual/\$2.2 billion one-time revenues)	<b>\$4.3 billion</b> (\$4.2 billion annual/\$0.7 billion one-time revenues)	<b>\$6.8 billion</b> (\$6.1 billion annual/\$0.7 billion one-time revenues)	<b>\$6.8 billion</b> (\$6.1 billion annual/\$0.7 billion one-time revenues)
<b>Gas Tax Increase<sup>1</sup></b>	No Increase	11.7 cents/gallon + annual inflation adjustment	19.5 cents/gallon + annual inflation adjustment	19.5 cents/gallon over 3 years (Y1: 13.5 cents; Y2: 3 cents; Y3: 3 cents) + annual inflation adjustment
<b>Vehicle Registration Tax</b>	None	\$65/year	\$38/year + annual inflation adjustment	\$38/year + annual inflation adjustment
<b>Diesel Excise Tax Increase<sup>2</sup></b>	No Increase	11 cents/gallon + annual inflation adjustment	17 cents/gallon + annual inflation adjustment	17 cents/gallon + annual inflation adjustment
<b>Diesel Sales Tax Increase</b>	No Increase	No Increase	3.5% + annual inflation adjustment	4% + annual inflation adjustment
<b>Zero Emission Vehicle Tax</b>	None	None	\$165/year + annual inflation adjustment	\$100/year + annual inflation adjustment
<b>Weight Fee Diversion (~\$1 billion/year)</b>	100% restored Takes effect immediately	No Restoration	Partial Restoration (10% per year over 5 years)	Partial Restoration (10% per year over 5 years)
<b>Loan Repayment</b>	100% repayment in year 1 (\$2.2 billion)	Partial Repayment (32% over 3 years)	Partial Repayment (16% in year 1; 16% in year 2)	Partial Repayment (16% in year 1; 16% in year 2)
<b>Vehicle Sales and Use Taxes</b>	Dedicated to transportation	Diverted to General Fund	Diverted to General Fund	Diverted to General Fund
<b>Vehicle Insurance Taxes</b>	Dedicated to transportation	Diverted to General Fund	Diverted to General Fund	Diverted to General Fund

<sup>1</sup>Increase over 2016-17 rate of 27.8 cents/gallon

<sup>2</sup>Increase over 2016-17 rate of 16 cents/gallon

# Mono County Local Transportation Commission

PO Box 347  
Mammoth Lakes, CA 93546  
760.924.1800 phone, 924.1801 fax  
commdev@mono.ca.gov

PO Box 8  
Bridgeport, CA 93517  
760.932.5420 phone, 932.5431 fax  
www.monocounty.ca.gov

February 24, 2017

The Honorable Tom Berryhill  
6215 N. Fresno Street, Suite 104,  
Fresno, CA 93710

Re: SB 1 & AB 1 (Beall/Frazier) Transportation Funding and Reform – Support

Dear Senator Berryhill:

Rural counties such as Mono rely on the partnership with the State of California to provide a vital transportation system that serves local communities, the state, and the county. The gas tax is the single largest funding source for cities and counties, yet this revenue has declined statewide and nationally due to inflation and a backlog of fix-it-first infrastructure needs. Additionally, the recent reduction of the price-based excise tax on gasoline will further delay maintenance and add cost to projects, as it is exponentially more expensive to maintain or rebuild failed pavements than it is to maintain those in good condition.

Rural counties have small populations and thus very little ability to generate local transportation funding. Mono County has a population of 13,756 with a small sales-tax base, and a high number of lane miles per person to maintain.

One example of the ongoing transportation funding fiasco/impact/crisis to Mono County: In 1999, Mono County LTC, Inyo County LTC, Kern Council of Governments, and the State entered into a Memorandum of Understanding (MOU) to improve the SR 14 and US 395 corridor in our region. The Olancha/Cartago four-lane project was one of the identified projects for joint funding. Mono County LTC had programmed the funds for construction in order to complete this project after 20 years in 2018-19 fiscal year as part of the 2016 State Transportation Improvement Program (STIP). But as you are aware, the California Transportation Commission had to trim approximately \$754 million of funding from the 2016 STIP. The Olancha/Cartago project was one of the many projects statewide that were halted due to unreliable transportation funding.

Senate/Assembly Bill 1, as estimated by California State Association of Counties (CSAC), would provide much-needed new statewide investment to maintain and improve local streets and roads and state highways, ensure existing revenues meant for transportation projects are redirected to transportation, and implement a number of reforms to improve project delivery while still protecting the environment.

The Mono County LTC is asking for your support in moving this bill forward for California. If there is anything you need from the Mono County LTC, please contact Gerry Le Francois, Principal Planner, at [gfrancois@mono.ca.gov](mailto:gfrancois@mono.ca.gov) or 760.924.1810. We look forward to finding a transportation funding solution with you.

Sincerely,



John Peters  
Chair, Mono County Local Transportation Commission

cc: The Honorable Frank Bigelow, California State Assembly  
The Honorable Jim Frazier, California State Assembly  
The Honorable Jim Beall, California State Senate



# Mono County Local Transportation Commission

PO Box 347  
Mammoth Lakes, CA 93546  
760.924.1800 phone, 924.1801 fax  
commdev@mono.ca.gov

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Bridgeport, CA 93517  
760.932.5420 phone, 932.5431 fax  
www.monocounty.ca.gov

February 24, 2017

The Honorable Frank Bigelow  
P.O. Box 942849,  
Sacramento, CA 94249-0005

Re: SB 1 & AB 1 (Beall/Frazier) Transportation Funding and Reform – Support

Dear Assemblyman Bigelow:

Rural counties such as Mono rely on the partnership with the State of California to provide a vital transportation system that serves local communities, the state, and the county. The gas tax is the single largest funding source for cities and counties, yet this revenue has declined statewide and nationally due to inflation and a backlog of fix-it-first infrastructure needs. Additionally, the recent reduction of the price-based excise tax on gasoline will further delay maintenance and add cost to projects, as it is exponentially more expensive to maintain or rebuild failed pavements than it is to maintain those in good condition.

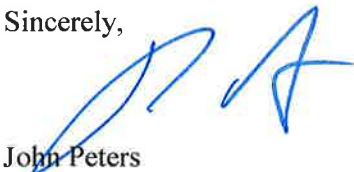
Rural counties have small populations and thus very little ability to generate local transportation funding. Mono County has a population of 13,756 with a small sales-tax base, and a high number of lane miles per person to maintain.

One example of the ongoing transportation funding fiasco/impact/crisis to Mono County: In 1999, Mono County LTC, Inyo County LTC, Kern Council of Governments, and the State entered into a Memorandum of Understanding (MOU) to improve the SR 14 and US 395 corridor in our region. The Olancho/Cartago four-lane project was one of the identified projects for joint funding. Mono County LTC had programmed the funds for construction in order to complete this project after 20 years in 2018-19 fiscal year as part of the 2016 State Transportation Improvement Program (STIP). But as you are aware, the California Transportation Commission had to trim approximately \$754 million of funding from the 2016 STIP. The Olancho/Cartago project was one of the many projects statewide that were halted due to unreliable transportation funding.

Senate/Assembly Bill 1, as estimated by California State Association of Counties (CSAC), would provide much-needed new statewide investment to maintain and improve local streets and roads and state highways, ensure existing revenues meant for transportation projects are redirected to transportation, and implement a number of reforms to improve project delivery while still protecting the environment.

The Mono County LTC is asking for your support in moving this bill forward for California. If there is anything you need from the Mono County LTC, please contact Gerry Le Francois, Principal Planner, at [glefrancois@mono.ca.gov](mailto:glefrancois@mono.ca.gov) or 760.924.1810. We look forward to finding a transportation funding solution with you.

Sincerely,



John Peters  
Chair, Mono County Local Transportation Commission

cc: The Honorable Tom Berryhill, California State Senate  
The Honorable Jim Frazier, California State Assembly  
The Honorable Jim Beall, California State Senate



Larry Johnston~District One    Fred Stump~ District Two    Bob Gardner ~ District Three  
John Peters ~ District Four    Stacy Corless ~ District Five

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## BOARD OF SUPERVISORS COUNTY OF MONO

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P.O. BOX 715, BRIDGEPORT, CALIFORNIA 93517  
(760) 932-5538 • FAX (760) 932-5531  
*Shannon Kendall, Clerk of the Board*

March 7, 2017

The Honorable Tom Berryhill  
California State Senate  
State Capitol, Room 3076  
Sacramento, CA 95814

Re: SB 1 & AB 1 (Beall/Frazier) Transportation Funding and Reform – Support

Dear Senator Berryhill:

Rural counties such as Mono rely on the partnership with the State of California to provide a vital transportation system that serves local communities, the state, and the county. The gas tax is the single largest funding source for cities and counties, yet this revenue has declined statewide and nationally due to inflation and a backlog of fix-it-first infrastructure needs. Additionally, the recent reduction of the price-based excise tax on gasoline will further delay maintenance and add cost to projects, as it is exponentially more expensive to maintain or rebuild failed pavements than it is to maintain those in good condition.

Rural counties have small populations and thus very little ability to generate local transportation funding. Mono County has a population of 14,074 with a small sales-tax base, and a high number of lane miles per person to maintain.

One example of the impact of the ongoing transportation funding fiasco/crisis to Mono County: In 1999, Mono County LTC, Inyo County LTC, Kern Council of Governments, and the State entered into a Memorandum of Understanding (MOU) to improve the SR 14 and US 395 corridor in our region. The Olancho/Cartago four-lane project was one of the identified projects for joint funding. Mono County LTC had programmed the funds for construction in order to complete this project after 20 years in 2018-19 fiscal year as part of the 2016 State Transportation Improvement Program (STIP). But as you are aware, the California Transportation Commission had to trim approximately \$754 million of funding from the 2016 STIP. The Olancho/Cartago project was one of the many projects statewide that were halted due to unreliable transportation funding.

Senate/Assembly Bill 1, as estimated by California State Association of Counties (CSAC), would provide much-needed new statewide investment to maintain and improve local streets and roads and state highways, ensure existing revenues meant for transportation projects are redirected to transportation, and implement a number of reforms to improve project delivery while still protecting the environment.

The Mono County Board of Supervisors is asking for your support in moving this bill forward for California. If there is anything you need from Mono County, please contact Garrett Higerd, County Engineer, at [ghigerd@mono.ca.gov](mailto:ghigerd@mono.ca.gov) or 760.924.1802. We look forward to finding a transportation funding solution with you.

Sincerely,

Stacey Coreless  
Chair, Mono County Board of Supervisors

cc: The Honorable Frank Bigelow, California State Assembly  
The Honorable Jim Frazier, California State Assembly  
The Honorable Jim Beall, California State Senate

DRAFT



Larry Johnston ~ District One   Fred Stump ~ District Two   Bob Gardner ~ District Three  
John Peters ~ District Four   Stacy Corless ~ District Five

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## BOARD OF SUPERVISORS COUNTY OF MONO

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P.O. BOX 715, BRIDGEPORT, CALIFORNIA 93517  
(760) 932-5538 • FAX (760) 932-5531  
*Shannon Kendall, Clerk of the Board*

March 7, 2017

The Honorable Vince Fong  
California State Assembly  
State Capitol, Room 4144  
Sacramento, CA 95814

Re: AB 496 (Fong) Traffic Relief and Road Improvement Act – Support

Dear Assemblyman Fong:

On behalf of Mono County, we would like to express our support for AB 496.

However, we request that it be amended to address the following:

- Add annual inflation adjustment to gas and diesel taxes. Without an inflation adjustment, the purchasing power of Counties will be constantly eroded over time and eventually will not keep up. This is one of the foundational problems with the existing system.
- Eliminate the annual Board of Equalization adjustment of the price-based excise tax to reduce unnecessary volatility in Highway User Tax Account (HUTA) revenue.
- Create a Zero Emission Vehicle Tax with an annual inflation factor. Zero emission vehicles have all of the same impacts on the road system as a traditional compact car and should pay a use fee.
- Include a plan to reliably fund the mandated services that Counties currently provide with General Fund revenue streams, especially public health and human services.

Rural counties such as Mono rely on the partnership with the State of California to provide a vital transportation system that serves local communities, the state, and the county. Transportation funding has declined statewide and nationally due to inflation and a backlog of fix-it-first infrastructure needs which significantly adds cost to projects, as it is exponentially more expensive to maintain or rebuild failed pavements than it is to maintain those in good condition.

Rural counties have small populations and thus very little ability to generate local transportation funding. Mono County has a population of 14,074 with a small sales-tax base, and a high number of lane miles per person to maintain.

Our current funding system is broken and not serving its intended purpose. Despite California drivers paying the nation's highest gas tax and second highest gas prices overall, roads and highways remain poor and traffic congestion continues to worsen. The state budget has grown significantly over the last decade, but funding for transportation has remained stagnant. The consequence of the status quo is higher costs for motorists to operate their vehicles and too much time spent idle in traffic, which costs our economy billions and disproportionately hurts low-income families.

One example of the impact of the ongoing transportation funding fiasco/crisis to Mono County: In 1999, Mono County LTC, Inyo County LTC, Kern Council of Governments, and the State entered into a

Memorandum of Understanding (MOU) to improve the SR 14 and US 395 corridor in our region. The Olancha/Cartago four-lane project was one of the identified projects for joint funding. Mono County LTC had programmed the funds for construction in order to complete this project after 20 years in 2018-19 fiscal year as part of the 2016 State Transportation Improvement Program (STIP). But as you are aware, the California Transportation Commission had to trim approximately \$754 million of funding from the 2016 STIP. The Olancha/Cartago project was one of the many projects statewide that were halted due to unreliable transportation funding.

AB 496 is a comprehensive funding plan that improves our infrastructure and builds new capacity on highways using existing revenues and without raising taxes or fees. This measure includes reforms to make transportation spending more accountable and efficient, and eliminates regulatory barriers that prevent traffic relief.

With AB 496, the legislature has an opportunity to restore the promise to California taxpayers that all the tax dollars they provide for using our transportation system goes towards improving our roads. This is the only responsible proposal that properly invests in our roads without increasing taxes and fees, and we therefore strongly support this measure.

The Mono County Board of Supervisors is asking for your support in moving this bill forward for California. If there is anything you need from Mono County, please contact Garrett Higerd, County Engineer, at [ghigerd@mono.ca.gov](mailto:ghigerd@mono.ca.gov) or 760.924.1802. We look forward to finding a transportation funding solution with you.

Sincerely,

Stacey Coreless  
Chair, Mono County Board of Supervisors

cc: The Honorable Frank Bigelow, California State Assembly  
The Honorable Tom Berryhill, California State Senate



OFFICE OF THE CLERK  
OF THE BOARD OF SUPERVISORS

## REGULAR AGENDA REQUEST

Print

**MEETING DATE** March 7, 2017

**Departments: Public Works - Roads**

**TIME REQUIRED** 5 minutes

**PERSONS  
APPEARING  
BEFORE THE  
BOARD** Garrett Higerd

**SUBJECT** Request for Letter of Support for  
AB174

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### AGENDA DESCRIPTION:

(A brief general description of what the Board will hear, discuss, consider, or act upon)

Assemblyman Bigelow, along with a bipartisan coalition, introduced AB 174, which requires one voting member of the California Transportation Commission to reside in a county with a population of less than 100,000. Currently, the California Transportation Commission consists of 11 voting members. There are no requirements to fill these positions. This bill will ensure the voices of small, rural California counties are heard and will give our communities a needed seat at the table. This item is sponsored by Supervisor Johnston.

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### RECOMMENDED ACTION:

Approve proposed letter of support for AB174 and authorize Chair to sign on behalf of the County. Provide any desired direction to staff.

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### FISCAL IMPACT:

None.

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**CONTACT NAME:** Helen Nunn

**PHONE/EMAIL:** x5534 / hnunn@mono.ca.gov

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SUBMIT THE ORIGINAL DOCUMENT WITH  
ATTACHMENTS TO THE OFFICE OF  
THE COUNTY ADMINISTRATOR  
**PRIOR TO 5:00 P.M. ON THE FRIDAY**  
**32 DAYS PRECEDING THE BOARD MEETING**

### SEND COPIES TO:

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### MINUTE ORDER REQUESTED:

YES  NO

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### ATTACHMENTS:

Click to download

[Proposed Letter of Support](#)

[Fact sheet](#)

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**History**

<b>Time</b>	<b>Who</b>	<b>Approval</b>
3/2/2017 6:44 AM	County Administrative Office	Yes
3/2/2017 12:43 PM	County Counsel	Yes
3/2/2017 8:22 AM	Finance	Yes





Larry Johnston ~ District One   Fred Stump ~ District Two   Bob Gardner ~ District Three  
John Peters ~ District Four   Stacy Corless ~ District Five

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**BOARD OF SUPERVISORS  
COUNTY OF MONO**

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P.O. BOX 715, BRIDGEPORT, CALIFORNIA 93517  
(760) 932-5533 • FAX (760) 932-5531  
*Shannon Kendall, Clerk of the Board*

March 7, 2017

Assemblyman Frank Bigelow  
P.O. Box 942849  
Sacramento, CA 94249-0005  
Re: Support for AB 174

RE: SUPPORT FOR AB 174 (BIGELOW)

Dear Assemblyman Bigelow:

We write to support AB 174, which would require one voting member of the California Transportation Commission to reside in a county with a population of less than 100,000. The California Transportation Commission's mission is to be a unified voice for transportation issues in California; however, all eleven members of the California Transportation Commission currently reside in a county with a population over a million. It is impossible for the Commission to meet their mission as a unified voice for transportation issues in California with this formation.

Mono County is a large county that spans 3,132 square miles with a population of just over 14,000 residents and 685 miles of maintained County roads. Like other small counties, our road and transit needs are very different from the metropolitan and urban areas that currently have representation on the California Transportation Commission.

AB 174 will ensure the voices of small, rural California counties are heard on transportation issues. Without rural representation on the Commission, it is impossible for the Commission to meet their mission as a unified voice for transportation issues in California. Our rural roads are crumbling and polka dotted with pot holes. Shovel-ready projects to update our infrastructure keep receiving the red line. The time has come to ensure our issues have a voice and a vote. It is for the reasons stated above that we enthusiastically support AB 174.

Sincerely,

Stacy Corless, Chairwoman  
County of Mono Board of Supervisors

**CAPITOL OFFICE**  
Room 4158  
Sacramento, CA 95814  
(916) 319-2005  
FAX (916) 319-2105

Assembly California Legislature

**FRANK BIGELOW**  
ASSEMBLYMEMBER, 5<sup>TH</sup> DISTRICT

**COMMITTEES**  
Vice Chair, Appropriations  
Vice Chair, Governmental  
Organization  
Banking and Finance  
Insurance  
Water, Parks & Wildlife

**DISTRICT OFFICE**  
33 C Broadway  
Jackson, CA 95642  
(209) 223-0505  
FAX (209) 762-8262



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## **AB 174: CALIFORNIA TRANSPORTATION COMMISSION RURAL REPRESENTATION ACT**

COAUTHORS: AGUIAR-CURRY, CABALLERO, DAHLE, GALLAGHER, MATHIS, WOOD

### **IN BRIEF:**

AB 174 would require one voting member of the California Transportation Commission to reside in a county with a population of less than 100,000.

### **EXISTING LAW:**

Currently, the California Transportation Commission consists of 11 voting members, and 2 Members of the Legislature who are appointed as non-voting ex-officio members. Of the 11 voting members, 9 are appointed by the Governor, one is appointed by the Senate Committee on Rules, and one is appointed by the Speaker of the Assembly.

### **THE ISSUE & AUTHOR'S STATEMENT:**

The California Transportation Commission's mission is to be a unified voice for transportation issues in California; however every current member of the California Transportation Commission resides in a county with a population over one million people. It is impossible for the Commission to meet their mission as a unified voice for transportation issues in California without a representative from a small rural county of under 100,000 people.

### **THE SOLUTION:**

AB 174 will ensure the voices of small, rural California counties are heard on the Commission. Our rural roads are crumbling and polka dotted with pot holes. Shovel-ready projects to update our infrastructure keep receiving the red line. The time has come to ensure our issues have a voice and a vote.

### **SUPPORT:**

**PENDING**

### **CONTACT:**

**Katie Masingale, Office of Assemblyman Bigelow  
(916) 319-2005 or [Katie.Masingale@asm.ca.gov](mailto:Katie.Masingale@asm.ca.gov)**