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EDMUND G. BROWN JR., Governor
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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[1]. 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[2]. 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[3].

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[4]. 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[5–7] and case studies[8–10] 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[7]. 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[7]. There is definitive evidence, however, that the bacteria *Mannheimia haemolytica*, often associated with pneumonia in bighorn sheep[11], has been transferred from domestic sheep to bighorn sheep[6,12]. This was done by genetically tagging bacteria in domestic sheep and then locating those tagged bacteria in bighorn sheep during comingling experiments[6]. In addition, disease pathogens (including *Mycoplasma ovipneumoniae*) have been transmitted between animals in separate pens spaced 25-39 feet apart[13].

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[8,10]. 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[9]. 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[14]. 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[14]. 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[15].

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*[10], the Western Association of Fish and Wildlife Agencies' *Recommendations for domestic sheep and goat management in wild sheep habitat*[16], and The Wildlife Society and American Association of Wildlife Veterinarians Joint Issue Statement, *Domestic sheep and goats disease transmission risk to wild sheep*[17]. 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"[18]. In addition, the Bureau of Land Management (BLM) has guidelines[19] and both the BLM and the US Forest Service[20] have issued decisions directed at effectively separating domestic and bighorn sheep.

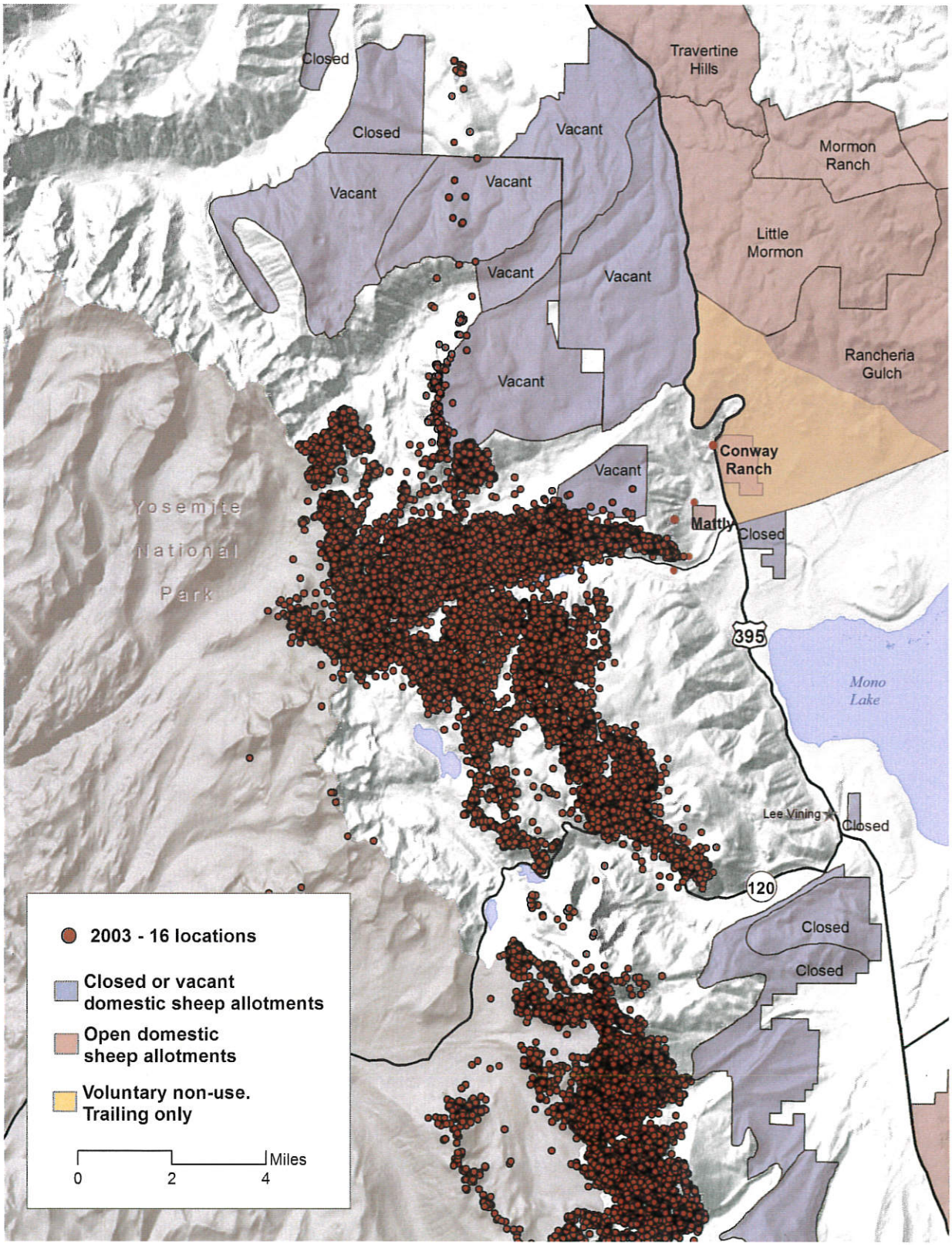
Conway Ranch threatens Mt. Warren Herd

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.[21,22] 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.[21,22] 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.[23]


Closed
Closed
Vacant
Vacant
Vacant
Vacant
Vacant
Vacant
Travertine Hills
Mormon Ranch
Little Mormon
Rancheria Gulch
Conway Ranch
Vacant
Matlly
Closed
Yosemite National Park
395
Mono Lake
Lee Vining
Closed
120
Closed
Closed
2003 - 16 locations
Closed or vacant domestic sheep allotments
Open domestic sheep allotments
Voluntary non-use. Trailing only
Miles
0
2
4

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[24]. 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.[22]

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[13]. Viable pneumonia bacteria has persisted after traveling airborne more than 60 feet[25]. 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.

Sincerely,

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Program Leader for Sierra Nevada Bighorn Sheep Recovery

cc: Alisa Ellsworth, CDFW Environmental Scientist
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