

October 21, 2014

Regular Meeting

Public Comment

Ron Cohen, CHP

Commander Re:

Truck Restriction

Process for future

TRUCK RESTRICTION PROCESS

The following suggested procedures are in accordance with CVC Sections 21101, 35701, 35702 and their related sections.

1. **Local Agency Prepares a Draft Truck Restriction Ordinance or Resolution.** The local agency prepares a draft ordinance or resolution of the proposed truck restriction and informs the appropriate Caltrans District Truck Coordinator. The ordinance or resolution must cite the CVC Section providing the justification for the truck restriction. Caltrans districts should notify the Headquarters Office of Truck Services (see Caltrans Contacts at end of these guidelines) in writing as soon as possible after learning of a truck restriction proposal. Districts should request and forward copies of local agencies' draft ordinances or resolutions to Headquarters Office of Truck Services, Legal and Environmental Programs for review.
2. **Local Agency Prepares Initial Study.** The initial study provides the information necessary to justify the proposed restriction, and may also indicate if the proposed restriction is subject to California Environmental Quality Act (CEQA) review. The initial study allows the preliminary submittal of information by Caltrans, local agencies, and California Highway Patrol staff, as well as initial comments from the trucking industry, affected industries, and citizen groups. It should include the proposed restriction type, location, existing conditions, alternatives, maintenance and safety considerations on the alternative route(s), any initial public comment, and conditions that may involve further CEQA compliance.
3. **Local Agency Provides Public Review and Comment Period.** During the public review period, the local agency gives public notice of the proposed truck restriction, and public hearings can be advertised and held. All documentation acquired to date regarding the proposed truck restriction should be available for public review prior to the public hearing.
4. **Local Agency Receives Comments and Prepares Final Truck Restriction Report.** The local agency considers all comments received. If the local agency still wants to proceed with the proposed restriction, a final truck restriction report is prepared and forwarded to the Caltrans district office. This final report includes any comment revisions, and the draft restriction ordinance or resolution. The Caltrans District Director forwards the report with the District's recommendations to the Caltrans Traffic Operations Division Chief at Headquarters. (See the checklist for the contents of the truck restriction report, following these guidelines.)
5. **Caltrans Traffic Operations Submits Recommendation to the Director's Office.** The Traffic Operations, Office of Truck Services, in cooperation with Caltrans Headquarters Environmental and Legal Divisions, prepares a recommendation regarding the truck restriction and submits it to the Caltrans Director's Office.
6. **Caltrans Director Issues Written Approval.** If approved, the Caltrans Director issues a written approval of the draft ordinance or resolution for the truck restriction.
7. **Local Agency Passes Final Truck Restriction Ordinance or Resolution.**
8. **Local Agency Erects Restriction Signs, and Restriction is Enforced.**

Ron Cohen / CHP
Public Comment

October 21, 2014

Regular Meeting

Correspondence

FIM Response to

Letter sent to Mr.

Tony Dublino by

Calif. Dept. of Fish &

Wildlife

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F.I.M., CORP.
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October 20, 2014

EMAIL TO: Mono County Board of Supervisors

re: Conway and Mattly Ranches: F.I.M. Corp Response to letter sent to Mr. Tony Dublino by Tom Stephenson, California Dept of Fish and Wildlife

Dear Sirs:

October 14, 2014 CDFW biologist Tom Stephenson sent to Mr. Tony Dublino a letter opposing sheep grazing and making other proposals concerning the pending Conservation Easement on the Conway and Mattly Ranches. Mr. Stephenson opposes sheep grazing based on his eagerness to claim that domestic sheep cause disease in bighorn sheep. That letter is a topic on the Board of Supervisors' meeting October 21, 2014.

Please remind Mr. Stephenson that Mono County has an established policy concerning Sierra Nevada Bighorn Sheep as specified in Resolution No. R07-81 "A Resolution of the Mono County Board of Supervisors Regarding the Proposed Designation of Critical Habitat for the Sierra Nevada Bighorn Sheep by the U.S. Fish and Wildlife Service", and the Board will consider Mr. Stephenson's comments is so far as they are consistent with existing County policy. (See Attachment No. 1.)

Sierra Nevada Bighorn Sheep were transplanted into Lee Vining Canyon in 1986. F.I.M. Corporation sheep have grazed in close proximity to the SNBS since the 1986 release of the bighorns. The agency Biologists have been predicting that their SNBS would "catch" disease from our sheep, so they have watched the SNBS carefully for symptoms and tested them for pathogens. In these 28 years California Fish and Game (now California Dept. of Fish and Wildlife) has not documented any transfer of disease.

Please remember that there has been sheep grazing on Conway and Mattly Ranches since 1940, both before and after the bighorn sheep were transplanted to Mono County. Throughout the most recent 13 years we at F.I.M. Corporation have grazed within the Conway and Mattly Ranches as well as federal grazing areas to the west and no "disease transmission" has occurred.

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The accusation of what the biologists call disease transmission is just supposition and false statements by people who claim to be scientists. Reputable Veterinarians who are also Epidemiologists have consistently stated that there is no record of the disease transmission in natural habitats. Mr. Stephenson claims that disease transmission is inevitable but the direct experience with bighorn sheep in Mono County indicates that there is no basis for Stephenson's fears.

Please consider the following comments by F.I.M. Corporation to Mr. Stephenson's letter and include our conclusions with any response by Mono County to CDFW:

CDFW first paragraph ends with a statement that "It is the goal and responsibility of CDFW to protect and maintain viable populations of fish and wildlife resources throughout the State."

CDFW has clearly failed to meet their goal of viable Sierra Nevada Bighorn Sheep in any location north of Mammoth Lakes. The reasons are well documented in that the area lacks dependable winter range so the animals are killed by severe winter weather and those not killed by the cold are killed by predators especially Mountain Lions. There is no record of domestic sheep causing disease in the bighorns but there are plenty of examples of bighorn sheep becoming weak due to the stress of being captured and transplanted by biologist and their weakened immune systems result in the bighorns dying from stress induced pneumonia brought on by pathogens already present in the respiratory systems of the bighorn sheep. No transfer of pathogens is necessary since the bighorns are already infected.

The presence of pathogens is well documented by CDFW Veterinarian Ben Gonzales and further discussed in Attachment 2 by Dr. Don Knowles and Dr. Anette Rink; in Attachment 3 by Dr. Glen Weiser, in Attachment 4 by the United States Animal Health Association report on wildlife and livestock disease interactions dated October 2007; and in Attachment 5, CAST Report: Pasteurellosis Transmission Risks between Domestic and Wild Sheep, August 2008. Each of these papers essentially state there is no proof of disease transmission from domestic sheep to bighorn sheep in natural habitats. Mr. Stephenson been provided with this information and chooses to ignore it in favor of boldly stating that domestic sheep pathogens always cause disease in bighorn sheep in paragraph 3.

First sentence third paragraph: Mr. Stephenson states that: "Contact between bighorn and domestic sheep typically causes fatal pneumonia in bighorn that can persist in populations for decades and cause large-scale population declines." He says this in spite of one of his cited experts, Dr. Bill Foreyt, having stated during a bighorn sheep symposium in Boise that he now defines "contact" between domestic sheep and bighorn sheep that is necessary for disease transmission as requiring at least "60 days in an enclosure". Further Dr. Foreyt stated "I don't know what happens under field conditions". Each of Stephenson's

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statements are dramatic and intended to worry or scare the people who hear them but each of them are also false and no longer accepted by experts.

Mr. Stephenson even states that sheep grazing in Conway and Mattly Ranches are the highest risk of disease transmission to SNBS throughout the range of the species and the presence of domestic sheep will prevent him and his partners in the US Fish and Wildlife Service from delisting the SNBS under the Endangered Species Act. First the highest recorded risk of pneumonia in bighorn sheep has occurred as a result of the stress of biologists capturing and transplanting the animals. Biologists activities not only transplant bighorns but failure of adequate Veterinary supervision means that along with the transplanted animals all the disease pathogens and parasites are transplanted too. Careless transplanting protocols are dangerous and deadly to bighorns but there still is no proof of bighorn sheep die-offs being a result of contact with domestic sheep.

Delisting the bighorn sheep by the USFWS is promised when the numbers rise to a specified levels not when all the domestic sheep are sold by their owners. To date the SNBS in Mono County has failed to increase in accordance with normally expected biological increase. Most large mammal populations increase at a rate of about 20% per year. Based on an increase of 20% per year since 1986, the SNBS population in Lee Vining and Lundy Canyon areas should be over 2,000 bighorn sheep. As it is there are fewer bighorns alive in Mono County than the numbers that have been transplanted and released into the County. The CDFG and USFWS recovery plan and the CDFW management have failed.

The proposals for transplanting Sierra Nevada Bighorn Sheep into Mono County include a statement to the effect that if the animals fail to reproduce and thrive in Mono County the survivors will be captured and placed in suitable locations with dependable year round habitats. CDFW failure to produce a healthy population of bighorn sheep should mean it is time to rescue the surviving SNBS and move them to a safe location outside of Mono County.

Page 2 second paragraph describes two or possibly four bighorn rams that Mr. Stephenson believes were in the area near the Mattly Ranch. This is in direct contradiction with the testimony of Mr. Philip Partridge. Mr. Partridge was responsible for observing and recording the locations of SNBS during airplane overflights that included areas near both Lee Vining and Bridgeport. Mr. Partridge has provided an affidavit (Attachment 6) to the effect that from 2001 to 2007 he did not observe or locate a single SNBS in the Bodie Hills and Dog Creek areas.

Page 3, second paragraph, refers to grants received by the County to purchase the Conway and Mattly ranches. Please remind Mr. Stephenson that the purchase of these properties was primarily sought in order to prevent further real estate development of the area. In other words the purchase of the development rights was more important than the purchase of the land itself. With the retirement of development rights the remaining uses of the land and water rights

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will be restricted to agriculture, recreation, and possibly aquaculture as spelled out in the restrictive covenants accepted at the time of purchase. The National Fish and Wildlife Foundation and the California State Parks should both be satisfied with this result.

Please see the F.I.M. Corporation comments concerning the proposed Conservation Easement for additional discussion of future management of the Conway Ranch and Mattly Ranch.

Thank you for your attention:

BY EMAIL:

/s/ Fred Fulstone

Fred Fulstone
F.I.M. Corporation
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/s/Marianne F. Leinassar

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RESOLUTION NO. R07 - 81

A RESOLUTION OF THE MONO COUNTY
BOARD OF SUPERVISORS REGARDING THE PROPOSED DESIGNATION OF
CRITICAL HABITAT FOR THE SIERRA NEVADA BIGHORN SHEEP BY THE
U.S. FISH AND WILDLIFE SERVICE

WHEREAS, The Board of Supervisors supports the need to protect the Bighorn Sheep in the Eastern Sierra, and it believes that this need must be balanced with the needs of the people, and

WHEREAS, Tourism and agriculture are the two leading economic engines in Mono County and provide millions of dollars annually to our County's economy, and

WHEREAS, Recreational usage of public lands in Mono County, which comprise over ninety-five percent (95%) of the County's land base, includes back-country skiing, snowmobiling, hiking, and off-road vehicle travel, and

WHEREAS, The U.S. Assistant Secretary for Fish and Wildlife and Parks in correspondence to the Director of the U.S. Fish and Wildlife Service, dated April 28, 2004, stated, " 'critical habitat' is a legal and administrative exercise that adds very little additional conservation benefit to a listed species", and

WHEREAS, The U.S. Assistant Secretary for Fish and Wildlife and Parks in the aforementioned correspondence goes on to state, "critical habitat designations must not be based on speculation or determinations that lack supporting data. Working with landowners, local governments, states and tribes on a voluntary partnership basis often provides benefits superior to the designation of critical habitat", and

WHEREAS, The Mono County Board of Supervisors heard testimony on September 4, 2007, from the California Department of Fish and Game regarding possible disease transmission from domestic sheep to bighorn sheep, which was contradicted by testimony from experts in the fields of veterinary medicine and range management, and

WHEREAS, Livestock grazing is the primary component of our agricultural economy in Mono County and provides critical health and stability of rangeland, fuels reduction, the addition of nutrients to the soil and the increase in certain crop production, such as alfalfa, and

1 **WHEREAS**, According to the Mono County Annual Crop Report, the economic
2 value of the lamb harvest in Mono County has averaged over a million dollars annually
3 over the last five years, and

4 **WHEREAS**, The Quarterly Report of the Sierra Nevada Bighorn Sheep Recovery
5 Program (April - June, 2007) states that only thirty-two (32) Sierra Nevada bighorn
6 sheep are present in the Mount Gibbs and Mount Warren Herd Units combined, and

7 **WHEREAS**, Less than one percent (1%) of the proposed critical habitat overlaps
8 with land that is currently designated as federal grazing allotments in Mono County.

9 **WHEREAS**, There are unresolved issues regarding the scientific name of the
10 Bighorn sheep found in the Eastern Sierras from Mammoth Lakes to the Bridgeport
11 area, and

12 **WHEREAS**, These conflicting issues include scientific disagreements concerning
13 the genetic makeup of various bighorn herds in the Eastern Sierras, and the best
14 available scientific data has only recently become available,

15 **NOW, THEREFORE, BE IT RESOLVED** by the Mono County Board of
16 Supervisors as follows:

17 **SECTION ONE:** That any change in taxonomy of bighorn sheep in Mono
18 County must be based on a proper scientific approach, which cannot be accomplished
19 through this current Federal Register regulatory process.

20 **SECTION TWO:** That all areas of the proposed designation of critical habitat for
21 the Sierra Nevada bighorn sheep in Mono County which overlap with federal grazing
22 allotment lands be removed from such designation.

23 **SECTION THREE:** That no restriction to public access or recreation be
24 imposed on any of the lands in Mono County proposed for critical habitat
25 for the Sierra Nevada bighorn sheep.

26 **PASSED AND ADOPTED** this 20th day of November, 2007, by the following
27 vote:

28 **AYES** : Bauer, Farnetti, Hazard, Hunt, Reid
29 **NOES** : None.
30 **ABSTAIN** : None.
31 **ABSENT** : None.

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ATTEST:

Lynnda Roberts

Lynnda Roberts
Clerk of the Board

Duane "HAP" Hazard

DUANE "HAP" HAZARD, Chair
Board of Supervisors

APPROVED AS TO FORM:

Marshall Redolph

COUNTY COUNSEL by *Lynnda Roberts*

Outline of Concerns relating to the perception of disease transmission issues at the Livestock/Wildlife interface in the Western United States
By Don Knowles, DVM, PhD and Anette Rink DVM, PhD.

Abstract:

The following document is a synopsis of opinions and data derived from the current literature addressing the risk domestic sheep represent concerning pneumonia of big horn sheep. The summary below acknowledges that domestic sheep have been shown, in some situations, including experimental mixing to share certain pathogens. What is not known is the true risk domestic sheep present to big horn sheep or the contributions of a multitude of other risk factors such as carrier big horns, other wildlife, other domestic animals and big horn sheep genetics, especially immunogenetics.

Introduction:

The issue is not whether the current literature provides data pointing to domestic sheep as one potential risk factor to big horn sheep under experimental conditions; the issue is that of the actual risk which domestic sheep present to big horn sheep under natural-range conditions. As is summarized below, *Pasteurella* spp. require physical contact for efficient transmission and the threshold (infectious dose and other factors) for transmission of *Pasteurella* under natural conditions of range are not known. Furthermore the risk of disease transmission from other animals such as wild cervids, bison, cattle, and other wildlife to big horn sheep health is present but not yet defined. Also, the contributions of big horn genetics in terms of their susceptibility to disease and or carrier status of pathogens are also not known. The current outcome of enforcing buffers between domestic and wild sheep populations is based on limited surveillance of a multitude of potential risk factors with the focus and current recommendations intended to minimize an unknown degree of risk presented by domestic sheep to bighorn sheep. These recommendations have not taken into account well-established knowledge concerning the need for extreme close contact between an infected and naïve animal for effective transmission of *Pasteurella* spp. under natural range conditions. Neither do they take into account the numerous management techniques which are applied by range sheep operations to prevent contact between domestic sheep and wildlife.

Historically there are numerous examples where conclusions, based on limited data and personal bias, have been drawn concerning causal infectious disease relationships. Decisions were made and press releases issued which had significant economic and/or emotional impact only to find years later that the information used to make these decisions was incomplete and the conclusions reached did not hold up to the test of time and research. Examples include:

- the conclusion that scrapie was the cause of BSE;
- canine distemper virus was the cause of multiple sclerosis;

- domestic sheep were the source of scabies (mites) in big horn die-offs, and
- adenovirus was the primary cause of deaths in Arabian foals.

All attempts to reproduce BSE in cattle with scrapie from domestic sheep have failed; canine distemper virus and the measles virus of humans are closely related and able to induce cross reactive antibodies (which led to the initial conclusion and confusion), however careful molecular studies have shown the presence of measles virus components in patients with multiple sclerosis, but components of canine distemper virus have not been found; attempts to transmit scabies (*Psoroptes* spp.) mites among different species have failed to show domestic sheep were the source for big horn sheep, and the true underlying cause of the susceptibility of Arabian foals to adenovirus was shown to be a genetic deficiency in immune response. Analysis of each of these examples show historical economic and/or emotional loss and pain which could have been avoided by careful examination of the basic principles of causation in infectious diseases and transmission.

The literature (some peer reviewed and some not) regarding management concerns of big horn sheep populations in the Western United States is voluminous. There are many opinions as to the cause(s) of the inability of big horn sheep to thrive in some locations. Whether a group or individual believes that domestic sheep are part of the decline experienced by some big horn sheep populations or not, a survey of the literature allows one to find a statement or statements in support of their bias. There is general agreement as summarized by the Desert Bighorn Council that the difficulties big horn sheep apparently face in enhancing their populations fall into the following areas. (1) Comparatively lower tolerance to poor range conditions; (2) Interspecific competition (competition between two or more species for limited resources); (3) Excessive hunting; (4) loss of habitat, and (5) enhanced susceptibility to diseases, especially pneumonia, relative to domestic sheep and to other wildlife species in the Bovidae family.

There is no disagreement that infectious causes of pneumonia, in particular bacteria such as *Pasteurella haemolytica* (recently renamed to *Mannheimia haemolytica*) and other bacteria such as *Pasteurella multocida* and *Pasteurella trehalosi* are isolated from diseased big horn sheep. Recent discussions call into question the frequency or epidemiological importance of *Mannheimia haemolytica*. Often left out of the discussions is that these bacteria don't form spores and are extremely labile (easily broken down or rendered non-infectious) in the environment and therefore require close contact both in terms of distance and time for transmission. In fact in Foreyt, et. al. the authors state "*Pasteurella haemolytica* is a relatively labile bacterium and generally requires direct physical contact between animals for transmission".

- ❖ While it is known that this bacterium and some related strains can be isolated from domestic sheep, the role of the domestic sheep, if any, under natural range conditions in the transmission of these bacteria to big horn sheep is not known. The importance of this point can not be over emphasized. Important to this point as quoted in references by Martin and Ward "Evaluation of samples from Idaho and Alaska bighorn sheep has conclusively demonstrated that free roaming

bighorn sheep which have not had contact with domestic sheep are not free of *P. Haemolytica*". To date only one report has been published which found that BHS and domestic sheep shared the same *Pasteurella* isolates (Ward et al., 1997), all animals sampled in this study were healthy. In the Hell's Canyon BHS disease outbreak in 1995-6 a domestic goat was initially implicated because she shared a *Pasteurella* isolate with several BHS. This die-off involved BHS herds in 3 states and a variety of different *Pasteurella* were subsequently isolated, none corresponding to the very localized, goat associated *Pasteurella* strain. Not one single report from any disease investigation has established a direct link to domestic sheep as the origin of the pathogen, be that viral, bacterial or parasitic.

- ❖ Secondly, and of equal importance the possibility of other animal sources, including big horn sheep, of these bacteria or other infectious diseases for transmission to big horn sheep under natural range conditions is also not known. Research published by D. K. Onderka and colleagues in 1988 within the Canadian Journal of Veterinary Research shows this point clearly. Bighorn sheep were inoculated with *Pasteurella haemolytica* unique to wild bighorns, with *Pasteurella haemolytica* isolated from clinically normal domestic sheep or with *P. haemolytica* through a cattle vaccine. All three inoculations caused bronchopneumonia within the bighorn sheep; even the cattle vaccine.

Summary:

In summary it is premature and inappropriate based upon the complete body of literature and current research investigations to allow domestic sheep to be the focus as a major cause of Big Horn disease and herd decline. Critical to the point are the other parameters found in multiple documents which indicate that there are bighorn sheep die-offs due to pneumonia that have occurred without any association with domestic sheep (quoted in Martin et. al.) and other factors with potential involvement are the presence of bacteria such as *P. haemolytica* and *P. multocida*, types indigenous to bighorn sheep, the presence of stress from sources such as depleted forage or human disturbance, the presence of lungworms, and the presence of viruses. Several BHS population management practices should also come under review; 1) the practice of transferring animals from one herd to another without a complete diagnostic work-up, 2) including a genetic profile of the transplants; 3) the occurrence of BHS disease and major die-offs are often associated with BHS herds reaching peak population (Monello et al., 2001). 4) Stagnant BHS populations in the presence of other 'protected' or 'desirable' wildlife such as wolves or mountain lions. All of these factors affect BHS populations permanently, not just temporarily, like domestic sheep in an adjacent allotment. It is time to allow research to continue and to remove domestic sheep from the focus of bighorn sheep health issues and to make land use decisions based on what is really known under natural conditions and not what is believed to be true.

References:

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Ward, A. C. S., 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. Bienn. Symp. North Wild Sheep and Goat Council 7:109-117.

Ward, A. C., Hunter, D. L., Jaworski, M. D., Benolkin, P. J., Dobel, M. P., Jeffress, J. B. and Tanner, G. A., (1997) *Pasteurella* spp. in sympatric bighorn and domestic sheep. J. Wildlife Dis. 3:544-557

Wright, F. C., Guillot, F. S. and Meleney, W. P. (1981) Transmission of Psoroptic mites from Bighorn sheep (*Ovis Canadensis Mexicana*) to domestic sheep, cattle, and rabbits. J. Wildlife Dis. 17:381-386.

July 12, 2006

To: Pattie Soucek
Forest Planner
Payette National Forest
P.O. Box 1026
McCall, ID 83638

From: Glen C. Weiser, Ph.D.
Research Scientist
University of Idaho, Caine Veterinary Teaching and Research Center
1020 E. Homedale Rd.
Caldwell, ID 83607

Re: Risk Analysis of Disease Transmission Between Domestic Sheep and Bighorn
Sheep on the Payette National Forest (2006).

I have been asked to review and comment on the scientific accuracy of the above
referenced document.

**SECTION A
OVERVIEW:**

Bacteria in the family Pasteurellaceae, mainly the genera *Pasteurella*, and/or *Mannheimia*, have been found in every bighorn sheep herd tested by the Caine Veterinary Teaching Center. This includes hundreds of herds from at least 13 western US states, and Alberta and British Columbia, Canada, from 1988 to present. These organisms have been found in herds regardless of no, known, or suspected contact with domestic sheep.

The potential for transmission of bacterial pathogens or other organisms or viruses between domestic and bighorn sheep is certainly recognized. However, confirmed, large-scale die offs of free-ranging bighorn resulting from contact with livestock have not actually been documented. Documented deaths have only occurred following bighorn exposure to domestics in confined or controlled environments.

Ward et al., 1997 tested one hundred-twenty bacterial isolates from bighorn sheep in four Nevada ranges where domestic sheep had been sighted various times over a four-year period. They demonstrated sharing of only one bacterial strain (*Pasteurella haemolytica* biotype 3 biogroup 11) between the bighorn and domestic sheep. The direction of transmission, i.e. from domestic to bighorn sheep or vice versa, was not verifiable within the constraints of the study. Respiratory disease was not observed in any of these bighorn populations. Changes in populations of bighorn sheep were not found to be correlated to the presence of any one strain of bacteria.

A study in the Hells Canyon National Recreation Area indicated possible transmission of *Pasteurella* spp. bacteria from feral goats to bighorn sheep (Rudolph et al., 2003). The exact direction of the transmission, i.e. from goat to bighorn or vice versa, could not be determined conclusively, but the general conclusion was the former. The shared bacteria studied included strains of *Pasteurella haemolytica* biovariants 1 and U^b, and *Pasteurella multocida multocida a*. Another study of *Pasteurella multocida mult. a*, *mult b*, *mult. gallicida*, and biotype *P. mult. U^b* from the same area and group of animals confirmed sharing of some strains of *P. m. mult. a* (Weiser et al., 2003). However, it is essential to note that in both studies the shared forms were found only in a small number of bighorns in immediate proximity to the goats. No evidence was found to implicate these organisms in the entire die off from which other *Pasteurella* spp. were isolated. See section D for complete citations.

The above information has been summarized from refereed journal articles, citations below. The Risk Analysis document, however, relies heavily on non-refereed sources and misinterprets much of the information. I have gone back to several references cited in the Risk Analysis and have noted significant discrepancies.

SECTION B

SOME SPECIFIC POINTS:

1. Page 2, 2nd paragraph states: "The combined effects of overharvest, habitat loss, competition for forage caused by livestock overgrazing, and diseases transmitted by domestic livestock resulted in precipitous declines in abundance and distribution of bighorn sheep during the late 1800s and early 1900s."

This is a broad generalization not fully supported by statements made in the Goodson paper, which is cited as a reference to the statement. The Goodson paper is also not peer reviewed. For example, scabies is mentioned as a disease that may have been transferred from domestic to wild sheep, but Goodson states in his paper the experimental evidence is "inconclusive." Goodson also states that uncontrolled hunting for sport and market, encroaching civilization with its associated roads, fences and settlements were factors. Goodson also states that "Changes in public and private land management have provided examples of the reduction, removal and introduction of domestic sheep on bighorn ranges and the responses of bighorn herds. Goodson further states: "These were not experiments, however, and it is important to note that other variables were not controlled." (direct quote from Goodson, emphasis added)

With regard to pasteurellosis, Goodson relies heavily on a paper published by Foryet and Jessup, (1982). This reference cites two case histories where domestic sheep were introduced into enclosed areas where bighorn had been placed. No experimental evidence was presented to show that pasteurellosis was transmitted, and Goodson acknowledges this fact by identifying the evidence as "circumstantial."

Goodson concludes with the statement that "Declines and die-offs have occurred in bighorn populations without any known association with domestic sheep" and discusses the bighorn's lack of tolerance to poor range conditions and competition with other wild species. Goodson recommends that domestic sheep be excluded from bighorn range "if enhancement of bighorn status is a management goal." I interpret this statement as one

made as an insurance policy, as Goodson doesn't present any strong scientific support of his recommendation.

The other reference (Valdez and Kraussman, 1999) used to support the original statement is unavailable to this reader, although it too appears to be in a non peer-reviewed publication.

The last paragraph on page 2 contains at least two misleading assumptions.

First, Smith (1954, page 21) is cited in support of bighorn declines coinciding with the introduction of domestic sheep to the range. A plain reading of Smith (1954, page 21) shows that scabies was considered to be the main cause of decline, and competition with domestic livestock for forage and space was also involved. No mention of respiratory disease was made, probably because it was never noted.

Further, on page 53 of Smith (1954), in a section entitled "Inter-relationships with other species" a situation is described where a bighorn ram grazed and was corralled with a band of 60 domestic sheep for 10 days. The ram went back to the woods, appearing very restless, on the tenth day. But, no mention of any signs of respiratory disease was made.

This paragraph concludes with a citation to Toweill and Geist (1999) This concluding sentence is misleading, because while Toweill and Geist (pages 84-85) indicate that disease was a cause of bighorn declines, no specific cause, e.g. contact with domestic sheep, respiratory disease, etc., is mentioned.

2. On page 3, last sentence of paragraph 1, the statement is made that "Because they are so closely related, bighorn sheep are thought to be highly susceptible to diseases carried by domestic sheep."

This may be a thought, but it is not supported by any scientific reference. An equally interesting thought might be that if the two species are so closely related, the bighorn should be able to adapt readily to the pathogens that domestic sheep have been able to live with without disease development. However, this statement is preceded by a comment, unsupported by scientific reference, indicating that "Domestic sheep, an Old World species, has likely evolved resistances to important diseases as a result of domestication and intense artificial selection."

To find support for this statement, I conducted a PubMed (the National Institutes of Health scientific publication service) search of the refereed scientific literature using the key words "sheep pneumonia *Pasteurella*." There were 136 journal articles in the PubMed database, 21 dealing with bighorn sheep, leaving 115 dealing with domestic sheep pneumonia *Pasteurella*. Fifty-eight (50%) of these 115 journal articles were published from 1990 to present. Therefore, respiratory disease in domestic sheep has apparently not demonstrated many resistances or the need for these scientific studies would not exist.

I found the first full paragraph on page 5 to be extremely interesting. The statement "Schommer and Woolever (2001) presented guidelines for and examples of management solutions to domestic sheep/bighorn sheep conflicts." I looked up the Schommer and Woolever reference, and while disappointed that it was not a refereed

report of research, the first sentence of the Introduction was exciting. It stated, "Scientific research has proven that when bighorn sheep intermingle with domestic sheep, large numbers of bighorn sheep die (Ashmanskas, 1995)."

Finally, I thought there was the experimental data to support this idea of definite transmission of disease from domestic sheep to bighorn sheep under range conditions. Unfortunately, the Ashmanskas 1995 reference is a Summary Judgment from the United States District Court in Portland, Oregon, Judge Donald Ashmanskas presiding, and not a journal article. This document was requested from the Court, and we were told that it had been archived and will not be available to us until after the comment period deadline. Therefore, this portion of my review will be supplemented when this document is received.

SECTION C CONCLUSION:

The Payette National Forest Risk Analysis is an interesting essay on numerous aspects of bighorn sheep biology laden with misinformation. It attempts to convey the dangers of commingling domestic sheep and bighorn sheep under any conditions.

After careful scrutiny of this document and its references, I was not able to find one scientifically verifiable instance in which domestic sheep were found to be responsible for a pneumonia outbreak in bighorn sheep under range conditions. The Payette National Forest Risk Analysis seems, for the most part, to rely heavily on conjecture, theory and supposition.

The potential transmission of bacterial pathogens from domestic sheep to bighorn sheep, resulting in bighorn pneumonia, certainly exists and has been empirically determined under non-range, confined conditions. However, large-scale pneumonia episodes have not been shown experimentally under range conditions. No doubt, the reason for this lack of this data is that the risk of large-scale transmission is low. If the risks were high, more definitive examples, rather than circumstantial ones, would be available and scientific data generated from these situations would be available.

SECTION C REFERENCES FOR SECTION A:

Rudolph, K. M., D. L. Hunter, W. J. Foreyt, E. F. Cassirer, R. B. Rimler, 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.

Ward, A. C. S., D. L. Hunter, M. D. Jawarski, 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.

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.

UNITED STATES ANIMAL HEALTH ASSOCIATION – 2007

RESOLUTION NUMBER: 15 Combined with 64 APPROVED

SOURCE: COMMITTEE ON WILDLIFE DISEASES
COMMITTEE ON SHEEP AND GOATS

SUBJECT MATTER: COOPERATIVE RESEARCH AND MANAGEMENT OF
WILDLIFE/LIVESTOCK DISEASE INTERACTIONS

DATES: RENO, NEVADA, OCTOBER 18 – 24, 2007

BACKGROUND INFORMATION:

The significance of diseases involving wildlife and livestock has increased opportunities for conflict between natural resource and livestock interests. The concerns are valid for the potential for disease transmission in either direction between wildlife and livestock. Domestic and wild species frequently share the same habitat and may share several pathogens. This interface creates many complex problems. Unfortunately, these problems are not always easily solved scientifically and so remedy is sought through political and/or legal channels.

Agriculture and wildlife interests share common risks and threats such as foreign animal disease introduction, loss of land/habitat to urban sprawl and land developments. It is imperative that we work together to preserve our common interests. Working together will require extensive cooperation, coordination, communication, and collaboration between several agencies and interest groups. It will also require respect for the responsibilities, authorities, skills, and livelihoods of all partners, and will help to develop trust.

Of immediate concern is domestic sheep/bighorn sheep (*Ovis canadensis* spp.) disease interactions. Bighorn sheep are currently at just 1-2% of their historical numbers with the majority of them inhabiting public lands in the western United States (US) managed by federal and state agencies. In recent years, some but not all bighorn sheep die-offs and declines have been temporally and spatially associated with domestic sheep contact. The complete range of mechanisms/causal agents that lead to epizootic disease events are not fully understood. Separation of wild and domestic sheep has been practiced to reduce the potential for additional bighorn sheep die-offs. Consequently, bighorn/domestic sheep disease interactions and their management impact the domestic sheep industry as well as bighorn sheep conservation.

The United States Animal Health Association (USAHA) Committees on Wildlife Diseases and Sheep and Goats are establishing a working group comprised of representatives of

state and federal animal health agencies, wildlife and public land managements, the American Sheep Industry and Foundation for North American Wild Sheep (FNAWS) to develop best management practices for raising domestic sheep (and goats) on public lands where contact between domestic sheep and bighorn sheep may occur.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Secretary of Agriculture and the United States Secretary of the Interior to seek resources through the President's budget to fund research to better elucidate the epidemiology and pathogenesis of bighorn/domestic sheep disease interactions so informed and effective management decisions can be made.



The Science Source for Food,
Agricultural, and Environmental Issues

Pasteurellosis Transmission Risks between Domestic and Wild Sheep

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Introduction

Disease has contributed significantly to the decline of bighorn sheep (*Ovis canadensis*) populations throughout much of western North America, decreasing many native herds to less than 10% of their historical size and imperiling some populations and subspecies.

Disease has contributed significantly to the decline of bighorn sheep (*Ovis canadensis*) populations throughout much of western North America, decreasing many native herds to less than 10% of their historical size and imperiling some populations and subspecies (Valdez and Krausman 1999). According to historical accounts (e.g., Grinnell 1928; Honess and Frost 1942; Shillinger 1937; Warren 1910), epidemics in some locations coincided with the advent of domestic livestock grazing in bighorn ranges, suggesting that novel pathogens may have been introduced into some bighorn populations beginning in the 1800s.

Native North American wild sheep species—bighorn sheep and thinhorn (Dall's and Stone's) sheep (*O. dalli*)—are very susceptible to pneumonia and particularly to pasteurellosis (Miller 2001). The generic term "pasteurellosis" is used here for disease (often respiratory) caused by bacteria in the family *Pasteurellaceae* but now classified in the genera *Pasteurella*, *Mannheimia*, or *Bibersteinia*. In some recent pneumonia epidemics in bighorns, the cause has been attributed to endemic respiratory pathogens or strains of *Pasteurellaceae* (Rudolph et al. 2007), and in other epidemics the cause has been attributed to *Pasteurellaceae* strains or other pathogens introduced via interactions with domestic sheep (*O. aires*; George et al. 2008). This Commentary reviews current knowledge on pneumonic pasteurellosis in domestic and wild sheep, the risks of transmission between these species, and approaches for lowering the overall risk of epidemics in wild sheep.

Pneumonic Pasteurellosis in Domestic Sheep

Respiratory disease is a serious problem in domestic sheep that can result in substantial economic losses. Pneumonia in domestic sheep is more common in lambs than in adults, and affected animals often die if not treated.

Pasteurellosis in domestic sheep often is described as a disease complex (Alley, Ionas, and Clarke 1999; Donachie 2007; Gilmour and Gilmour 1989) and generally is thought to result from invasion of the lung by *Pasteurellaceae* following a compromise of the respiratory tract. The initiating insult can be from respiratory infection by mildly pathogenic agents such as parainfluenza-3 (PI-3) virus, adenoviruses, respiratory syncytial viruses (RSV), *Chlamydia pecorum*, and *Mycoplasma ovipneumoniae*, as well as from mechanical irritants such as dust (Alley, Ionas, and Clarke 1999; Brogden, Lehmkuhl, and Cutlip 1998; Donachie 2007) and lungworms. In most instances, these insults alone do not result in significant epidemics with high morbidity or mortality; however, when these and other stressors are compounded by infection with *Pasteurellaceae*, the result can be increased disease and death.

The effects of psychological, physiological, and physical environmental stressors are believed to be important components of pasteurellosis in many domestic ruminants (Brogden, Lehmkuhl, and Cutlip 1998; Carroll and Forsberg 2007; Donachie 2007; Gilmour and Gilmour 1989). Although the effects of stressors are difficult to measure, some indicators including increased body temperature, heart rate, and plasma cortisol have been correlated with disease (Carroll and Forsberg 2007; Knowles et al. 1995). Physiological response to stressors (collectively called "stress") includes suppression of the immune system; consequently, prolonged stress may increase susceptibility to pathogens and to morbidity and mortality. Environmental stressors most commonly associated with pasteurellosis in livestock include heat, cold, wind chill, crowding, mixing with new animals, poor ventilation, handling, and transport (Brogden, Lehmkuhl, and Cutlip 1998; Carroll and Forsberg 2007; Knowles et al. 1995). Other predisposing factors, such as lack of sufficient energy or protein, inadequate colostrum consumption, specific vitamins, or certain minerals, also may compromise immunity further (Carroll and Forsberg 2007).

Pasteurella multocida, *Mannheimia haemolytica*, and *Bibersteinia trehalosi* (all formerly in the genus *Pasteurella*) are the three most commonly isolated bacterial agents from pneumonias that result in high rates of illness, morbidity, and mortality in domestic sheep (Brogden, Lehmkuhl, and Cutlip 1998; Donachie 2007; Gilmour and Gilmour 1989). Early treatment with antibiotics effective against *Pasteurellaceae* generally stops a pneumonia outbreak, suggesting that these bacteria are important in the disease process. *Pasteurellaceae* are common inhabitants of the tonsils and oropharynx of a variety of healthy domestic and wild species (Gilmour, Thompson, and Fraser 1974; Jaworski, Hunter, and Ward 1998). In domestic sheep, *Pasteurellaceae* are believed to be opportunistic bacteria that colonize the lung after some predisposing insult (Brogden, Lehmkuhl, and Cutlip 1998). Some *Pasteurellaceae* strains make products (including leukotoxin and endotoxin) that exacerbate disease in the host after colonization of lung tissue (Ackermann and Brogden 2000; Gilmour and Gilmour 1989) and result in increased morbidity and mortality.

The diversity of commensal and disease-associated *Pasteurellaceae* further complicates the epidemiology and control of pasteurellosis. Serotyping and phenotyping based on variations in fermentation patterns (Angen et al. 1999; Frank 1982; Jaworski, Hunter, and Ward 1998) and gene sequencing (Angen et al. 1999; Jaworski et al. 1993;

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Kelley et al. 2007) have been used to distinguish among *Pasteurellaceae* strains. Studies using these approaches have shown that domestic sheep may carry numerous strains of *Pasteurellaceae* (Jaworski, Hunter, and Ward 1998; Ward et al. 1997).

Most *Pasteurellaceae* of sheep are obligate bacteria that die rapidly in the environment outside a living host (Dixon et al. 2002). Environmental sources such as water and soil are not thought to be important in maintaining or spreading these bacteria; consequently, transmission is most likely to occur through direct contact among animals. Because many healthy domestic sheep carry strains associated with disease (Jaworski, Hunter, and Ward 1998), transmission of a specific pathogenic *Pasteurellaceae* strain may not be necessary for a disease outbreak to occur. In some instances, however, mixing individuals from different sources and possibly carrying different strains of *Pasteurellaceae* seems to precipitate outbreaks (Gilmour and Gilmour 1989).

Pasteurellosis in Wild Sheep

As in domestic sheep, *Pasteurellaceae* commonly are associated with pneumonia epidemics in bighorn sheep (Miller 2001), and pasteurellosis frequently results in both all-age die-offs and persistent high rates of pneumonia in lambs (Cassirer and Sinclair 2007; Monello, Murray, and Cassirer 2001). Thinhorn sheep also are susceptible to pneumonia (Black et al. 1988; Foreyt, Silflow, and Lagerquist 1996; Jenkins et al. 2007), but epidemics have not been reported in free-ranging populations.

Pasteurellaceae alone seem to have a more severe effect on wild sheep than on domestic sheep in experimental situations. Wild sheep experience high morbidity and mortality after being intratracheally or intradermally inoculated with relatively high doses (10^4 organisms) of field strains or attenuated strains of *M. haemolytica* from domestic sheep or cattle (*Bos taurus*), or with *B. trehalosi* strains originating from other wild sheep (Foreyt, Silflow, and Lagerquist 1996; Foreyt, Snipes, and Kasten 1994; Onderka, Rawluk, and Wishart 1988). The resulting pathology from experimental inoculations of wild sheep varied among strains used, but all strains caused some form of pneumonia. The observed differences in susceptibility to experimental and natural pasteurellosis between domestic and wild sheep are thought to result from differences in pulmonary host defense mechanisms and greater vulnerability of phagocytes to leukotoxin that apparently increase overall susceptibility to pasteurellosis (Foreyt, Silflow, and Lagerquist 1996; Silflow, Foreyt, and Leid 1993; Silflow et al. 1989).

Pasteurellaceae have been isolated from both healthy and pneumonic wild sheep (Jaworski, Hunter, and Ward 1998; Jenkins et al. 2007; Kelley et al. 2007; Rudolph et al. 2007). Although field investigations often are complicated by delays in detecting cases and by sample availability, two broad epidemic patterns in bighorns have emerged. In some bighorn epidemics, endemic respiratory pathogens including *Pasteurellaceae*, PI-3, RSV, and *M. ovipneumoniae*, as well as lungworms (*Protostrongylus* spp.), with or without other environmental stressors, are believed to have contributed to disease (Rudolph et al. 2007; Spraker et al. 1986). These outbreaks resemble the patterns described in some pasteurellosis epidemics in feedlot lambs (Gilmour and Gilmour 1989). Other epidemics, however, are believed to have been initiated by introductions of novel respiratory pathogens into bighorn populations (Foreyt and Jessup 1982; George et al. 2008). These patterns resemble some pasteurellosis epidemics reported in domestic sheep, particularly feedlot lambs, after transportation and mixing of different groups in confinement settings (Gilmour and Gilmour 1989). Thus, both endemic and introduced pathogens are believed to contribute to contemporary pasteurellosis epidemics in bighorn sheep.

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Both endemic and introduced pathogens are believed to contribute to contemporary pasteurellosis epidemics in bighorn sheep.

Based on evidence from empirical studies and field observations, interactions between wild sheep and domestic sheep increase the probability of mortality and reduced lamb survival in wild sheep populations, primarily because of respiratory disease.

Pneumonia in wild sheep developed after contact with domestic sheep in captive conditions.

Quantifying the risk of interspecies disease transmission between wild sheep and domestic sheep in a natural setting is problematic.

Further work is needed to understand better the magnitude of potential risk to wild sheep arising from interactions with domestic goats, cattle, and other wild ruminant species, as well as potential influences of seasonal and environmental factors on these risks.

The most practical approaches identified thus far for minimizing risk involve preventing interspecies interactions that could result in respiratory pathogen transmission.

Risks to Wild Sheep Associated with Domestic Sheep Interactions

Based on evidence from empirical studies and field observations, interactions between wild sheep and domestic sheep increase the probability of mortality and reduced lamb survival in wild sheep populations, primarily because of respiratory disease (USDA-FS 2006). Interactions between wild sheep and domestic goats (*Capra hircus*), although not as widely reported, seem to pose comparable risks (Garde et al. 2005; Jansen et al. 2006). Similarities in social behavior and physiology between wild and domestic sheep (and, to a lesser extent, goats) probably create a natural attraction that fosters intimate contact between these species.

Pneumonia in wild sheep developed after contact with domestic sheep in captive conditions (Black et al. 1988; Callan et al. 1991; Foreyt 1989; Onderka and Wishart 1988). Moreover, relationships between the onset of some pneumonia epidemics in wild sheep and the concurrent presence of domestic sheep on bighorn ranges have been described (George et al. 2008; Monello, Murray, and Cassirer 2001). Whether introduced *Pasteurellaceae* strains, introduced virulence factors, or other introduced pathogens contribute to precipitating these epidemics remains unclear (Besser et al. 2008; George et al. 2008; Kelley et al. 2007).

Quantifying the risk of interspecies disease transmission between wild sheep and domestic sheep in a natural setting is problematic. Movements of wild sheep may influence the potential for pathogen introductions and transmission from domestic to wild sheep, as may the proximity, duration, movements, management, seasonality, reproductive status, and straying rates of domestic sheep grazing in occupied wild sheep habitats. The increased risk of a pneumonia epidemic in a wild sheep population associated with domestic sheep interaction seems to be the product of the probabilities of multiple events, namely: interactions of sufficient duration and proximity to transmit one or more pathogens; pathogen shedding by the domestic sheep; the ability to transmit an infectious dose to one or more wild sheep; the survival of newly infected wild sheep; and, further shedding and secondary transmission. Seasonal or environmental factors also may somehow modulate the probability of epidemics occurring (Cassirer and Sinclair 2007; George et al. 2008), and the risk attributable to interactions between these species probably is additive and may vary widely among wild sheep populations. Indeed, a common *Pasteurellaceae* strain or other agent directly linking bighorn epidemics to either domestic sheep interactions or to emergence of endemic pathogens has not been demonstrated to date, and thus unequivocal evidence for either process remains elusive. Consequently, the magnitude of such risks may be assessed best on a case-by-case basis (Clifford et al. 2007; Garde et al. 2005). Further work is needed to understand better the magnitude of potential risk to wild sheep arising from interactions with domestic goats, cattle, and other wild ruminant species, as well as potential influences of seasonal and environmental factors on these risks.

Strategies for Minimizing Risk of Interspecies Disease Transmission and Managing Wild Sheep Health

Available data suggest that interactions between wild and domestic sheep carry some inherent risk of precipitating pneumonia in wild sheep under range conditions (USDA-FS 2006). Given the limitations of today's tools, the most practical approaches identified thus far for minimizing this risk involve simply preventing interspecies interactions that could result in respiratory pathogen transmission between wild and domestic sheep (WAFWA 2007). Incomplete knowledge about the epidemiology and some details

To achieve "effective separation" (i.e., separation sufficient to minimize opportunities for pathogen transmission), herdsman and wildlife managers can actively discourage wild sheep from approaching or commingling with domestic sheep, and vice versa.

The risk of interspecies pathogen transmission may be decreased further by ensuring that domestic sheep grazing in wild sheep habitats are healthy and by removing ill sheep of either species.

Not all pasteurellosis epidemics in bighorn sheep can be attributed to contact with domestic sheep.

Wildlife managers should recognize the potential for moving pathogens via translocations and should monitor wild sheep herds routinely for pathogens of concern, using only healthy herds as source stock.

of processes contributing to the risk of interspecies disease transmission, however, remains an obstacle to consensus on acceptable and "best" management approaches.

To achieve "effective separation" (i.e., separation sufficient to minimize opportunities for pathogen transmission [WAFWA 2007]), herdsman and wildlife managers can actively discourage wild sheep from approaching or commingling with domestic sheep, and vice versa. Domestic sheep should be monitored closely and herded to prevent straying and should not be left unattended in wild sheep habitats. In some instances, truck transport may be the best means for moving domestic sheep through critical wild sheep habitats. Similarly, wild sheep that have contacted domestic sheep should not be left to commingle with other wild sheep. On common public lands, land management agencies, wildlife agencies, and domestic sheep producers with grazing leases should develop and agree on plans for handling interactions between the species, with emphasis on preventing interactions that could result in respiratory pathogen transmission between domestic and wild sheep. Ideally, similar plans also should be established between private landowners and wildlife managers where wild sheep may stray onto private land.

The risk of interspecies pathogen transmission may be decreased further by ensuring that domestic sheep grazing in wild sheep habitats are healthy and by removing ill sheep of either species. As vaccines and therapeutics for the prevention and control of infection or disease caused by *Pasteurellaceae* in domestic or wild sheep become available, producers and wildlife managers should seek practical ways to use them. In some instances where these approaches are not effective, one species or the other may need to be given management priority in, or excluded from, a particular range (WAFWA 2007). Although seemingly simple, the latter approach has several potential consequences, including lack of rangeland available to one or the other species, economic impacts, and limitations on restoration efforts.

Not all pasteurellosis epidemics in bighorn sheep can be attributed to contact with domestic sheep (USDA-FS 2006). Because some potentially pathogenic *Pasteurellaceae* and other pathogens are endemic in some wild sheep populations, wildlife managers should examine the implications of interactions between different herds of wild sheep. In doing so, the benefits of outbreeding and genetic diversity must be weighed against the increased risk of disease transmission (WAFWA 2007). In certain instances, wild sheep may need to be maintained at herd densities that minimize dispersal to help lower the risk of pathogen spread.

Augmenting wild sheep herds with individuals from other herds also poses a risk for moving pathogens. Consequently, wildlife managers should recognize the potential for moving pathogens via translocations and should monitor wild sheep herds routinely for pathogens of concern, using only healthy herds as source stock. Protocols for sampling, testing for transplant, and responding to disease outbreaks should be standardized to the extent possible and reviewed and updated as necessary. Moreover, data should be shared and interagency and interdisciplinary communications should be encouraged to develop better strategies for improving overall herd health.

Research Needs

Current understanding about causative agents and the factors allowing these agents to lead to pasteurellosis epidemics in wild sheep is incomplete. Previous work, however, provides some clarity for future research directions. Further study of mechanisms underlying the increased susceptibility of wild sheep to respiratory diseases, as compared with domestic sheep and cattle, could aid in developing and refining approaches for improving

Developing methods that decrease the occurrence or severity of pneumonia and pasteurellosis in either domestic or wild sheep might lead to advances in managing all impacted species.

A broad approach to population health management currently may be the most practical way to decrease the overall likelihood of epidemics in wild sheep populations. Such an approach includes, but does not rely solely on, practices that prevent interactions between wild and domestic sheep that could result in respiratory pathogen transmission.

and maintaining herd health. For developing better disease prevention and control strategies, more information is needed concerning host genetics and immune responses, virulence mechanisms, pathogen transmission dynamics, and the epidemiology of the diseases. The full influence and potential for control or mitigation of other factors such as environmental stressors and nutrition, which seem important in pasteurellosis epidemics in domestic ruminants, also need to be understood better for wild sheep.

Developing methods that decrease the occurrence or severity of pneumonia and pasteurellosis in either domestic or wild sheep, including the development and use of vaccines, immunostimulants, or long-acting therapeutic agents, might lead to advances in managing all impacted species. Outcomes of such research could help decrease risks posed by interspecies interactions, or decrease wild sheep susceptibility to pathogens. In developing biologic and therapeutic agents as tools, the research should focus not only on safety and efficacy of the products, but also on the potential for practical use in free-ranging populations.

Conclusions

Although the authors acknowledge that the current understanding about pasteurellosis in wild and domestic sheep is incomplete, respiratory disease clearly is a serious problem in both. Because the onset of some pneumonia epidemics in bighorn sheep has been associated with the presence of domestic sheep on native range, and because other outbreaks seem to have resulted from pathogens already endemic in affected wild sheep herds, accurately quantifying the risk of interspecies disease transmission in range conditions is problematic. Consequently, a broad approach to population health management currently may be the most practical way to decrease the overall likelihood of epidemics in wild sheep populations. Such an approach includes, but does not rely solely on, practices that prevent interactions between wild and domestic sheep that could result in respiratory pathogen transmission. Preventing contact between wild and domestic sheep, better monitoring of exchanges and interactions between wild sheep populations, and managing population and habitat quality all have some value in improving and maintaining the overall health of wild sheep populations and preventing pneumonia epidemics. Ongoing and planned research also is likely to provide a better understanding and new tools that may further improve approaches for wild and domestic sheep health management on native ranges.

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CAST Member Societies:

AACC INTERNATIONAL ▪ AMERICAN ACADEMY OF VETERINARY AND COMPARATIVE TOXICOLOGY ▪ AMERICAN AGRICULTURAL ECONOMICS ASSOCIATION ▪ AMERICAN ASSOCIATION FOR AGRICULTURAL EDUCATION ▪ AMERICAN ASSOCIATION OF AVIAN PATHOLOGISTS ▪ AMERICAN ASSOCIATION OF PESTICIDE SAFETY EDUCATORS ▪ AMERICAN BAR ASSOCIATION SECTION OF ENVIRONMENT, ENERGY, AND RESOURCES, COMMITTEE ON AGRICULTURAL MANAGEMENT ▪ AMERICAN BOARD OF VETERINARY TOXICOLOGY ▪ AMERICAN DAIRY SCIENCE ASSOCIATION ▪ AMERICAN FORAGE AND GRASSLAND COUNCIL ▪ AMERICAN MEAT SCIENCE ASSOCIATION ▪ AMERICAN METEOROLOGICAL SOCIETY, COMMITTEE ON AGRICULTURAL FOREST METEOROLOGY ▪ AMERICAN PEANUT RESEARCH AND EDUCATION SOCIETY ▪ AMERICAN PHYTOPATHOLOGICAL SOCIETY ▪ AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE ▪ AMERICAN SOCIETY FOR NUTRITION ▪ AMERICAN SOCIETY OF AGRICULTURAL AND BIOLOGICAL ENGINEERS ▪ AMERICAN SOCIETY OF AGRONOMY ▪ AMERICAN SOCIETY OF ANIMAL SCIENCE ▪ AMERICAN SOCIETY OF PLANT BIOLOGISTS ▪ AMERICAN VETERINARY MEDICAL ASSOCIATION ▪ AQUATIC PLANT MANAGEMENT SOCIETY ▪ ASSOCIATION FOR THE ADVANCEMENT OF INDUSTRIAL CROPS ▪ ASSOCIATION OF AMERICAN VETERINARY MEDICAL COLLEGES ▪ COUNCIL OF ENTOMOLOGY DEPARTMENT ADMINISTRATORS ▪ CROP SCIENCE SOCIETY OF AMERICA ▪ INSTITUTE OF FOOD TECHNOLOGISTS ▪ NORTH AMERICAN COLLEGES AND TEACHERS OF AGRICULTURE ▪ NORTH CENTRAL WEED SCIENCE SOCIETY ▪ NORTHEASTERN WEED SCIENCE SOCIETY ▪ POULTRY SCIENCE ASSOCIATION ▪ SOCIETY FOR IN VITRO BIOLOGY ▪ SOCIETY OF NEMATOLOGISTS ▪ SOIL SCIENCE SOCIETY OF AMERICA ▪ SOUTHERN WEED SCIENCE SOCIETY ▪ WEED SCIENCE SOCIETY OF AMERICA ▪ WESTERN SOCIETY OF WEED SCIENCE

Citation:

Council for Agricultural Science and Technology (CAST). 2008. *Pasteurellosis Transmission Risks between Domestic and Wild Sheep*. CAST Commentary QTA2008-1. CAST, Ames, Iowa.

FRED FULSTONE, JR.
MARIANNE F. LEINASSAR
Phone: 775-465-2381
Fax: 775-465-1200

F.I.M. CORP.
Farming and Livestock

P.O. BOX 12
SMITH, NEVADA 89430



27

May 29, 2009

Affidavit

I, Pep Partridge, do here by swear, that in the seven years, from 2001 to 2007, in which

I had been contracted by the California Department of Fish and Game to observe and verify Sierra Nevada Bighorn Sheep locations in the Northern Recovery Unit of the greater SNBS Recovery Area, I have never observed or located, via in-flight telemetry with coordinates or visually, a single Sierra Nevada Bighorn Sheep in the Bodie Hills and Dog Creek areas (Please see enclosed map). Locations of SNBS were collected and recorded by the use of in-flight telemetry and coordinates and the verified. I have never registered a single signal, or "ping" from a collar on our telemetry receivers in the Bodie Hills and Dog Creek areas while attempting to locate SNBS during my seven year contract with the CDFG.

Philip E Partridge
Pep Partridge Partridge
401 Sky Rock Drive
Bishop, CA 93514

06/09/09
Date

Nancy Partridge
Whiteness #1 Signature

6/9/9
Date

Name: Nancy Partridge

Address: 401 Skyrock Drive
Bishop, Ca 93514

FIM Corporation statement of Sierra Nevada Bighorn Sheep management failures October 20, 2014

Mono County is in the unique position to provide CDFW and USFWS with the factual information that forms the County policy. Since our the County completed Resolution No. R07-81, F.I.M. and a number of highly qualified experts in Epidemiology, Microbiology, and Veterinary Sciences have more clearly explained the deficiencies, errors, and even fabrications that are found within decisions regarding SNBS and provided those statements to the US Forest Service. Our statements are provided here for the use and reference of Mono County:

- (1) There is no scientific record of disease transmission from domestic sheep to bighorn sheep in natural habitats, yet disease transmission is used by the agency biologists to urgently “prevent contact” between the species;
- (2) Actions to prevent contact between the bighorn sheep and domestic sheep are regulations that are vigorously enforced to solve a problem that does not exist (disease transmission);
- (3) Actions to completely prevent contact between bighorn sheep and domestic sheep are a waste of Taxpayers’ money, destructive to both F.I.M. business interests and the local economy, and will not result in more bighorn sheep;
- (4) All of the area from Mammoth Lakes to Sonora Pass is too high in elevation to provide year-round habitat for bighorn sheep – there is no dependable winter habitat;
- (5) Because there is no dependable winter habitat, no location within this area constitutes “suitable habitat”. This was recently documented with veterinary diagnosis of bighorn sheep dying from malnutrition (starving to death) in an area labeled as “suitable habitat” in the winter of 2008;
- (6) Agencies including US Fish and Wildlife Service (USF&WS) are fully aware of the 2008 winterkill as well as winter die-offs in 1995, 1998, and 2005, but neither agency has altered their position that the Northern Recovery Unit is suitable for SNBS. Because of winter weather, the Northern Recovery Area or Unit is clearly hostile and dangerous for bighorn sheep;
- (7) Agencies have certified that something called “suitable habitat” for Sierra Nevada Bighorn Sheep (SNBS) exists within the Bridgeport Ranger District but fails to provide technically sound objective measures of habitat attributes that prove that suitable habitat does exist.
- (8) Allegations that “suitable” habitat occurs within the Mono County are false. Each agency has been provided with information that would justify removing the Northern Recovery Area from the Recovery Plan on the basis that it is not suitable habitat for these bighorn sheep. Based on scientific information, Mono County now is in a position to tell the USF&WS that the Recovery Plan goals for the Northern Recovery Area are not attainable;
- (9) Bighorn sheep in the area north of Mammoth Lakes are indistinguishable from Nelson’s bighorn sheep (aka Desert bighorn sheep) based on nuclear DNA analysis;

- (10) The best available scientific data proves that the bighorn sheep in the vicinity of our grazing allotments and leases are Desert bighorn sheep that do not warrant Endangered Species Act protection and the HTNF failed to insist that the US Fish and Wildlife Service agree with that science;
- (11) FIM Corporation and others have provided an abundance of scientific information to the agencies, all of which is backed up and well documented. Much of the information and data provided demonstrates that the USF&WS Recovery Plan is based on faulty information and subsequently the regulatory decisions by the HTNF are in error. The HTNF has failed to question the veracity of the USF&WS statements;
- (12) When the agencies simply ignore scientifically sound reference material it is, at best, ignoring the specific requirements of the Endangered Species Act (ESA) that require every federal agency to use the best scientific data available;
- (13) There are very few surviving SNBS in the Northern Recovery Unit, less than 4% of the 400-600 total numbers reside north of Mammoth Lakes. Loss of any or all of these animals would not jeopardize the continued existence of the species. HTNF has placed very excessive value on this population and failed to adhere to the ESA requirement that actions that will jeopardize the continued existence of the species (all of the animals) are prohibited -- any other level of effect can be managed through the incidental take provisions.
- (14) See the current USFWS direction for jeopardy in the Memorandum to the Director of the USFWS from the USFWS Solicitor dated March 16, 2007 with subject of "*The Meaning of 'In Danger of Extinction Throughout All or a Significant Portion of its Range.'*" File code M-37013. USFWS is in violation of this ESA policy and has put the HTNF in jeopardy of violating this policy too.
- (15) The agencies are failing to follow the standards of the Forest Service and BLM for objective decision making that includes determination of the credibility of reference material used to support regulatory decisions, regardless of whether the authors are University professors, state agency employees, or other federal agencies such as the USF&WS:
- (16) The federal employees have every appearance of violation of 5 CFG 2635 "Standards of Ethical Conduct for employees of the Executive Branch" as well as related Presidential Executive Orders, regulations, and laws. HTNF personnel have failed to perform their jobs with objectivity and impartiality and they have violated the standards that prohibit waste, fraud, and abuse by choosing to ignore scientifically sound and factual information;
- (17) The failure to correct erroneous biological data that now limits management decisions is an immoral and unethical way to conduct Forest Service business.
- (18) Agencies have failed to follow the mandate to "Contribute to the economic and social well being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood."
- (19) Federal and State failed to coordinate their decision with Mono County in accordance with the policy of Mono County.
- (20) Federal agencies have failed to complete NEPA and has failed to account for detrimental economic effects in accordance with various federal court decisions, one of which is the 2001 Court of Appeals decision *New Mexico Cattle Growers Assoc v US Fish and Wildlife Service*. Federal agencies are now

required to complete NEPA including genuine analysis of economic affects for any ESA related actions except for the original listing and the HTNF has failed to modify its actions based on the combined detrimental economic effects and limited or no benefits to a listed species.

(21) Mono County now has been given compelling factual information by F.I.M. Corp and a number of highly qualified experts in Epidemiology, Microbiology, and Veterinary Sciences. Those credible experts clearly explained the deficiencies, errors, and even fabrications that are found within the agency reference materials. CDFW failed to validate or otherwise determine the credibility of the information they cited.

Disease transmission has been accepted as a fact by the CDFW and the CDFW is in error:

Dr. Anette Rink has explained, beginning June 2004, that there are a multitude of strains *Pasteurella sp.* and *Mannheimia sp.* (both referred to as *Pasteurella* below), the bacteria that causes pneumonia in domestic sheep and wild sheep. Specific bacteria must be identified by use of sophisticated microbiological techniques including DNA analysis in order to know if domestic sheep and bighorn sheep carry the same bacteria. It is well known that most mammals have these pathogens in their respiratory tract but they do not become diseased until some stress event weakens the animals immune response. The available information indicates that it is possible for domestic sheep and nearby wild sheep to both exhibit symptoms of respiratory disease (pneumonia), but the respective animals are infected with a taxonomically distinct pathogen.

California Department of Fish and Game Veterinarian Dr. Ben Gonzales reported in 2005 that samples (swabs) from every SNBS that the CDFG has captured, is cultured for respiratory bacteria and *Pasteurella* has been present in every single bighorn. Those animals only had contact with other bighorn sheep or other wildlife which means the source of infection was from wild animals not domestic animals.

October 21, 2014
Regular Meeting

Item #13e

EDD

Air Service

Mammoth Development Partners, LLC

9/25/2014

Mono County Board of Supervisors
452 Old Mammoth Road
3rd Floor
Mammoth Lakes, CA 93546

Members of the Board of Supervisors:

Please allow me to introduce myself as I am relatively new to Mammoth Lakes and Mono County.

My name is Will Gustafson, and we are the purchaser of the 6 acres of land commonly known as the "Village East Property" in Mammoth Lakes. For those not familiar, this is the property extending from Burgers Restaurant along Minaret Road to Forest Trail. In essence this is the property originally intended to be built as the "One" Hotel along with other visitor serving amenities.

While I have invested and developed in other locations throughout the country, I was particularly attracted to Mammoth Lakes, as I believe it has great potential not apparent in most other resort markets.

Part of my decision to invest in the area was my observation of the community making efforts to prepare for the future and to become more competitive with other world class resorts.

Today, I'm specifically writing to express my support for the Mammoth Lakes Airport and expansion of air service. It is my belief that if we are to bring unique, longer-term visitors to the area we must have a practical means for them to travel.

Thank you for your consideration.

Respectfully,



Will Gustafson, Manager
MAMMOTH DEVELOPMENT PARTNERS, LLC

WAG/lw

1154 CHANNEL DRIVE, SANTA BARBARA, CA 93108

Mammoth View, LLC
c/o Britannia Pacific Properties
621 Capitol Mall, Suite 1900
Sacramento, California 95814
Telephone (916) 263-0222

October 17, 2014

Mono County Board of Supervisors
74 School Street
Bridgeport, California 93517

Re: Mammoth Yosemite Airport Service

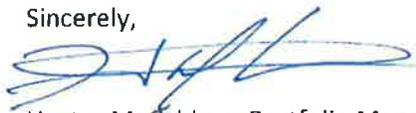
Dear Supervisors:

Reliable and affordable air service to Mono County is a key factor for successful resort development, and successful resort development improves, among other things, the property tax base for the County. Mammoth View plans to develop a 54-room hotel with 52 residences on 5.51 acres in Mammoth Lakes. At full build-out, the new development is expected to generate annual property tax revenue of \$1.35M¹, which is 14.7 times the revenue generated today prior to development.

As Mono County continues to work its way out of the fiscal challenges caused by the Great Recession, we understand that maintaining support for air service must be weighed against the need to implement tough cost-cutting measures such as employee layoffs. Nonetheless, continued support for air service is a long-term investment needed to stabilize and grow Mono County's property tax base, which will improve the County's fiscal condition.

We respectfully ask that you continue to support reliable air service to Mono County.

Sincerely,



Hector M. Caldera, Portfolio Manager
Britannia Pacific Properties, Inc.

¹ Economic & Planning Systems, Inc Mammoth View Feasibility Evaluation; EPS #21008 dated April 28, 2011.