

**APPEAL TO THE REGIONAL FORESTER
USDA FOREST SERVICE
INTERMOUNTAIN REGION**

IDAHO WOOL GROWERS ASSOCIATION,)	
and AMERICAN SHEEP INDUSTRY)	
ASSOCIATION, ARIZONA WOOL)	
GROWERS ASSOCIATION, CALIFORNIA)	
WOOL GROWERS ASSOCIATION,)	
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MONTANA WOOL GROWERS)	
ASSOCIATION, NATIONAL LAMB)	
FEEDERS ASSOCIATION, NEVADA)	
WOOL GROWERS ASSOCIATION, NEW)	
MEXICO FEDERAL LANDS COUNCIL,)	
NEW MEXICO WOOL GROWERS)	
ASSOCIATION, OREGON WOOL)	
GROWERS ASSOCIATION, PUBLIC)	
LANDS COUNCIL, RONALD & LESLIE)	
SHIRTS, SHIRTS BROTHERS SHEEP,)	
SOULEN LIVESTOCK COMPANY, TEXAS)	
SHEEP & GOAT RAISERS ASSOCIATION,)	
UTAH WOOL GROWERS ASSOCIATION,)	
WASHINGTON STATE SHEEP)	
PRODUCERS and WYOMING WOOL)	
GROWERS ASSOCIATION,)	
)	
Appellants.)	
)	

In the Matter of Forest Supervisor
Suzanne Rainville's Record of
Decision for the Final Supplemental
Environmental Impact Statement and
Forest Plan Amendment Identifying
Suitable Rangeland for Domestic Sheep
and Goat Grazing to Maintain Habitat
for Viable Bighorn Sheep Populations

**APPELLANTS' NOTICE OF APPEAL
AND
STATEMENT OF REASONS**

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Introduction

Pursuant to 36 C.F.R. § 219.14(b)(2) and the Optional Appeal Procedures¹ available during the planning rule transitions period, the Idaho Wool Growers Association,² together with all of the organizations and individuals listed on the cover page to this Notice of Appeal (collectively “IWGA” or “Appellants”), appeal the July 20, 2010 Record of Decision (“ROD”)³ of Payette National Forest Supervisor Suzanne Rainville to adopt Alternative 7O with implementation modifications (7O modified) contained in the Final Supplemental Environmental Impacts Statement and Forest Plan Amendment Identifying Suitable Rangeland for Domestic Sheep and Goat Grazing to Maintain Habitat for Viable Bighorn Sheep Populations (“FSEIS”).⁴ The mailing address and telephone number of the Idaho Wool Growers Association is:

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¹ “Optional Appeal Procedures Available During the Planning Rule Transition Period” (“Optional Appeal Procedures”), (Aug. 2009), available at www.fs.fed.us/emc/.../PlanAppealProceduresDuringTransition (last visited Aug. 26, 2010).

² The mission of the Idaho Wool Growers Association is to forward the production and consumption of lamb and wool and to assist all persons engaged in the sheep industry in Idaho. IWGA was founded in 1893 and is a resource exchange as well as a voice for this sector of the agricultural industry.

³ Suzanne C. Rainville, Forest Supervisor, Payette National Forest, “Record of Decision for the: Final Supplemental Environmental Impact Statement and Forest Plan Amendment Identifying Suitable Rangeland for Domestic Sheep and Goat Grazing to Maintain Habitat for Viable Bighorn Sheep Populations” (“ROD”), (July 20, 1010), available at http://www.fs.fed.us/r4/payette/publications/big_horn/index.shtml (last visited Aug. 26, 2010).

⁴ USDA Forest Service, Intermountain Region, “Final Supplemental Environmental Impact Statement for the Southwest Idaho Ecogroup Land and Resource Management Plans” (“FSEIS”), (July 2010), available at http://www.fs.fed.us/r4/payette/publications/big_horn/index.shtml (last visited Aug. 26, 2010).

The Idaho Wool Growers Association may be contacted in the daytime by telephone through counsel at (208) 342-5000. The names, mailing addresses and telephone numbers of the remaining Appellants are provided in Appendix 1.⁵ This administrative appeal of the ROD is authorized by the Optional Appeal Procedures § 3(a)(1), and is timely filed in accordance with the procedures.

IWGA, and the numerous sheep producer-members the Appellants represent, are significantly and adversely affected by the ROD and the Forest Service's reduction of suitable rangeland for domestic sheep grazing on the Payette National Forest ("PNF"). Under that ROD, the Forest Service would reduce grazing of domestic sheep on the forest by roughly 70%. *See* ROD at 22; FSEIS at 2-12, 2-15. The ROD calls for designation of an additional 346,696 acres within the forest as bighorn habitat over the next three years, and reducing the area permitted for domestic sheep by 68,718 acres. *See* ROD at 22; FSEIS at 2-12, 2-15. Systematically and increasingly, the Forest Service is forcing sheep ranchers dependent upon their forest grazing permits off allotments and out of business. The ROD has the potential to affect sheep producers nationwide as any loss of grazing acreage would cause the entire sheep industry to lose infrastructure.

Pursuant to the Optional Appeal Procedures § 12(a), IWGA requests the opportunity to meet with Forest Supervisor Suzanne Rainville to discuss this appeal and explore opportunities to resolve the issues raised. Additionally, pursuant to the Optional Appeal Procedures § 13(a), IWGA requests the opportunity to make an oral presentation on this appeal to the Reviewing

⁵ The mailing addresses and telephone numbers of individual persons named as Appellants in this appeal have been withheld to maintain privacy. This information is available through counsel at (208) 342-5000.

Officer. IWGA reserves the opportunity to file a reply to the Deciding Officer's responsive statement pursuant to the Optional Appeal Procedures § 15(b)-(c).

The ROD provides that implementation of the ROD "will occur after the 30th calendar day following publication of the legal notice of decision in the Newspaper of record." ROD at 29. However, the ROD also states that "[d]ecisions on site specific projects are not made in the Forest Plan as amended"—"[t]hose decisions will be made with site-specific analysis and appropriate documentation in compliance with NEPA." *Id.* Because site specific decisions, including reduction of suitable rangeland for domestic sheep, are not made in the Forest Plan as amended, IWGA is not seeking a stay of any such decisions under the Optional Appeal Procedures § 10 at this time. However, should the Forest Service act to implement the ROD through site specific decisions prior to resolution of this appeal, IWGA requests that it be provided with notice of such intent and IWGA, including any of the affected Appellants, reserves its right to seek a stay of those site specific decisions pending resolution of the appeal.

Background

The Intermountain Regional Forester received five appeals of the decision to implement Alternative 7 as described in the Record of Decision approving the 2003 Southwest Idaho Ecogroup Land and Resource Management Plans ("2003 LRMP"), with appellants contending that the Regional Forester violated the National Forest Management Act ("NFMA") and the Hells Canyon National Recreation Area ("HCNRA") Act on the PNF by allowing grazing of domestic sheep within or near the range of bighorn sheep, allegedly threatening the viability of bighorn sheep through disease transmission. *See* ROD at 1; *see also* FSEIS at xv – xvi, 1-1 through 1-3. On March 9, 2005, the Chief of the Forest Service concurred that the effects analyses and cumulative effects discussion pertaining to bighorn sheep presented in the Final Environmental Impact Statement ("FEIS") for the 2003 LRMP did not adequately address

viability and thus, reversed the Regional Forester's 2003 decision to approve the revised management direction for the Hells Canyon Management Area as it pertains to bighorn sheep and its habitat. ROD at 1. The Regional Forester was instructed to analyze bighorn sheep viability on the PNF commensurate with the concerns and questions discussed in the appeal review and to amend the 2003 LRMP accordingly to ensure bighorn sheep viability. *Id.* The Chief also required a compatibility determination be made under the HCNRA Act. *Id.*

In response to the Chief's instructions, in September 2008, the PNF released a Draft Supplemental Environmental Impact Statement ("2008 DSEIS") that proposed to modify, delete, and add to the management direction in the 2003 LRMP. *Id.* IWGA submitted comments on the 2008 DSEIS on February 25, 2009, and provided notice to the Forest Service of a court judgment affecting the 2008 DSEIS on July 14, 2009. *See* "Comments on the Draft Environmental Impact Statement for the Payette National Forest Revised Land and Resource Management Plan," submitted by IWGA, et al. (Feb. 25, 2009); Letter from William G. Myers III on behalf of the American Sheep Industry Ass'n, et al., to Payette National Forest regarding "Supplemental Comments on Draft EIS" (July 14, 2009).⁶

On January 25, 2010, the PNF announced the release of a supplemental report to the 2008 DSEIS ("Updated DSEIS"). ROD at 1. Interested parties were notified of the supplemental report via letter and encouraged to comment on the Updated DSEIS and draft amendment to the 2003 LRMP. *Id.* IWGA submitted comments on the Updated DSEIS on March 19, 2010. *See* "Comments on the Update to the Draft Supplemental Environmental Impact Statement to the Final Environmental Impact Statement of the 2003 Payette National Forest Land and Resource Management Plan," submitted by IWGA, et al. (Mar. 19, 2010).

On July 20, 2010, Payette National Forest Supervisor Suzanne Rainville issued the “Record of Decision for the: Final Supplemental Environmental Impact Statement and Forest Plan Amendment Identifying Suitable Rangeland for Domestic Sheep and Goat Grazing to Maintain Habitat for Viable Bighorn Sheep Populations” (“ROD” and “FSEIS”). Legal notice of the ROD appeared in “The Idaho Statesman” newspaper on July 30, 2010. *See* <http://www.mypublicnotices.com/Idahostatesman/PublicNotice.asp?Page=PublicNotice&AdId=2009342> (last visited Aug. 26, 2010).

Summary of Reasons for Appeal

The Forest Supervisor selected Alternative 7O with implementation modifications (7O modified) in the ROD. *See* ROD at 9. That decision amends the 2003 LRMP for the PNF as described in Appendix O to the FSEIS. *See* FSEIS, Appendix O. The amendments provide management direction for the Forest Service to curtail and eliminate domestic sheep grazing on the PNF. *See id.*, Appendix O at III-1 through III-3.

Alternative 7O eliminates 68,718 acres of suitable rangeland for domestic sheep grazing from the PNF, leaving only 31,592 acres of suitable rangeland on the forest. FSEIS at 2-12. This reduces the rangeland for domestic sheep grazing on the PNF by roughly 70%. On the west side of the PNF, the Curren Hill, Surdam and Boulder Creek Allotments would be closed to domestic sheep grazing. *Id.* A portion of the Smith Mountain Allotment and most of the Price Valley Allotment would be closed. *Id.* On the east side of the PNF, the Shorts Bar, Grassy Mountain, Vance Creek, Hershey-Lava, Little French Creek, French Creek, Josephine, Bear Pete, Marshall Mountain, Victor-Loon, North Fork Lick Creek, and Lake Fork Allotments would

⁶ IWGA was among the American Sheep Industry Ass’n, et al. commenters.

be closed to domestic sheep grazing. *Id.* A portion of the Twenty Mile Allotment and most of the Jughandle Allotment would also be closed. *Id.*

Alternative 7O is “modified” because rather than eliminating domestic sheep grazing on the PNF instantly, it phases out grazing over a three-year period. *See* ROD at 9 - 10. In 2011, an estimated 46,106 acres will be suitable for grazing, decreasing to 38,392 acres in 2012 and finally to 31,592 acres in 2013 when Alternative 7O is fully implemented. *Id.* By contrast, prior to the ROD, 100,310 acres on the PNF were suitable for domestic sheep grazing. *See* FSEIS at 2-8 through 2-9 (describing alternatives that do not close allotments to domestic sheep grazing on the PNF).

The parties impacted by the Forest Supervisor’s decision are the sheep ranchers and communities who have depended upon federal grazing allotments for nearly a century. These allotments are to be closed to domestic sheep grazing by that decision. Loss of so much rangeland in the short-term will result in significant economic losses to the sheep ranchers and to the communities across Idaho and Oregon where they do business. Numerous jobs in the sheep production industry will be lost as a result.

In the near-term, the Forest Service’s management direction will affect sheep producers nationwide as any loss of grazing acreage would cause the entire sheep industry to lose infrastructure. Such an extreme loss of rangeland, as results from Alternative 7O, can not be substituted by other lands. Sheep producers who relied on the lost rangeland are likely to be forced out of business. Complete closure of ranching operations would have drastic impacts on the PNF, resulting in the predictable subdivision and development of private ranchland for uses other than grazing. This foreseeable loss of open space adjacent to the PNF, where ranchers had

grazed domestic sheep, would have serious adverse impacts on wildlife, including bighorn sheep on the PNF.

All of these adverse consequences flow from the ROD and FSEIS without proper compliance with NEPA's informed decision-making and informed public participation requirements. Forest Supervisor Rainville selected an alternative that is unlikely to achieve the intended result of blocking hypothetical disease transmission between domestic sheep and bighorn sheep. Like the Forest Service's consideration of losses to sheep ranches and the impacts of those losses on communities in Idaho and Oregon, and on the PNF itself, the Forest Service's consideration of the issues concerning disease transmission between domestic sheep and bighorn sheep is also short-sighted. The FSEIS failed to consider properly the scientific uncertainty surrounding disease transmission between domestic sheep and bighorn sheep, including the mechanisms through which such transmission occurs. Rather, the FSEIS simply assumes that disease transmission from domestic sheep is occurring, and will occur, on the PNF.

This assumption is flawed for several reasons. First, it is unsupported by science and field observations. The mechanisms through which disease is transmitted to bighorn sheep is not understood. However, the best available science indicates that mere contact between domestic sheep and bighorn sheep does not lead to disease transmission from domestic sheep, rather prolonged commingling of the species is required for disease transmission to occur. Second, the assumption singles out domestic sheep as the only vector for disease transmission. In reality, many other species on the PNF carry disease, including bighorn sheep themselves. The impact of disease transmission from these other species and from bighorn sheep to other bighorn sheep is not addressed in the FSEIS.

Additionally, the analysis of effects in the FSEIS is limited to effects on the PNF. Under NEPA, consideration of the effects of contact between domestic sheep and bighorn sheep on adjacent National Forest, Bureau of Land Management (“BLM”) and private lands must be provided. Such analysis is likely to reveal the unlikelihood of achieving complete separation between domestic sheep and bighorn sheep, thereby leading to the conclusion that disease transference between domestic sheep and bighorn sheep, between other species and bighorn sheep, or amongst populations of bighorn sheep is likely regardless of the Forest Service’s elimination of grazing on the PNF. Thus, Alternative 70 will be ineffective at stopping disease transmission to bighorn sheep.

Instead, in accordance with NEPA, the Forest Service must consider alternatives other than simple elimination of grazing on the PNF. The FSEIS must consider alternatives that include use of best management practices and annual operating instructions. Further, alternatives need to be evaluated that address the development of a comprehensive bighorn sheep health policy and use of vaccines, nutritional supplements and other mechanisms for ensuring the long-term health of bighorn sheep populations.

These alternatives are not only required by NEPA, but also by the Multiple-Use Sustained-Yield Act (“MUSYA”), the National Forest Management Act (“NFMA”), and the Hells Canyon National Recreation Area (“HCNRA”) Act, which limit the Forest Service’s authority to eliminate grazing on the PNF. These acts require the Forest Service to manage the PNF *for* grazing, not *against* it. The Forest Service does not have the wholesale authority to eliminate grazing on the PNF in favor of another forest use.

Likewise, the decision to select Alternative 70 modified in the ROD is in violation of Forest Service directives, guidance and policy, which must be considered and adhered to by the

Forest Service. The Forest Service has limited ability to curtail grazing on the PNF and must hold domestic sheep operations harmless from introduction of bighorn sheep as part of the Hells Canyon Initiative and resulting impacts to bighorn sheep on the PNF.

Finally, the Forest Supervisor's decision is flawed because it was made without adherence to the procedures governing forest plan amendments under NEPA, NFMA and Forest Service regulations, including the Optional Appeal Procedures. It was also made in violation of the judgment of the U.S. District Court in *Idaho Wool Growers Assoc. v. Schafer*, 637 F. Supp. 2d 868 (D. Idaho 2009).

IWGA has repeatedly informed Forest Supervisor Rainville of these issues, but the agency has refused to implement a decision consistent with the evidence concerning disease transmission between domestic sheep and bighorn sheep and consistent with the law, regulations and guidance governing the Forest Service's management of grazing on the PNF. Thus, IWGA has been forced to file this appeal to ensure the ROD and FSEIS are reversed and remanded with directions to comply with the applicable substantive and procedural legal requirements in developing a new ROD and FSEIS adequately supported by the administrative record.

Statement of Reasons for Appeal

I. The Forest Service's Elimination of Grazing on the PNF Exceeds the Agency's Regulatory Authority and is Contrary to Law

Agency decisions made under NEPA and NFMA which are "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law" are prohibited by the Administrative Procedure Act ("APA"), 5 U.S.C. § 706. In issuing the ROD and preparing the FSEIS, the Forest Service exceeded its authority. The decision reached by the Forest Supervisor eliminating grazing on the PNF is not authorized by law and is contrary to the Forest Service's own agreements and guidance.

A. The ROD and FSEIS Fail to Comply with the Multiple-Use Sustained-Yield Act; the National Forest Management Act; the Hells Canyon National Recreation Area Act and the Federal Land Policy and Management Act

1. Multiple-Use Sustained-Yield Act (“MUSYA”) (16 U.S.C. §§ 528-531)

The MUSYA provides that “it is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, *range*, timber, watershed, and wildlife and fish purposes.” 16 U.S.C. § 528 (emphasis added). In other words, the national forests are to be administered for “multiple use,” which includes management of range resources, along with management of wildlife. *See* 36 C.F.R. § 219.12 (“National Forest System lands are generally suitable for a variety of multiple uses, such as . . . range . . . and wildlife and fish purposes.”); *see also* 36 C.F.R. § 219.1(b)(National Forest System to be managed for multiple uses). The selected alternative in the ROD does not manage for “multiple use” as it completely eliminates range resources for domestic sheep grazing. Thus, implementation of the alternative violates the MUSYA. The ROD and FSEIS must be remanded for proper evaluation of an alternative that is consistent with the MUSYA.

2. National Forest Management Act (“NFMA”) (16 U.S.C. §§ 472A, 476, 500, 513-516, 518, 521b, 528 (note), 576B, 594-2 (note), 1600 (note), 1601 (note), 1600-1602, 1604, 1606, 1608-1614)

NFMA references the MUSYA, 16 U.S.C. §§ 528-531, and requires that plans developed for units of the National Forest System “provide for multiple use and sustained yield of the products and services obtained therefrom . . . and [must] include coordination of outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness[.]” 16 U.S.C. § 1604(e)(1). “Thus, the NFMA is explicit that wildlife viability is not the Forest Service’s only consideration when developing site-specific plans for National Forest System lands.” *The Lands Council v. McNair*, 537 F.3d 981, 990 (9th Cir. 2008). Further, nothing in NFMA requires the

Forest Service “to *improve* a species’ habitat to prove that it is maintaining wildlife viability.”
Id. at 995.

The ROD and FSEIS are inconsistent with NFMA because the PNF only considers wildlife viability and does not give any consideration to the continuation of domestic sheep grazing on the PNF. Further, the PNF’s selected alternative and management direction in the ROD and FSEIS are targeted at “improving” bighorn sheep habitat, which is not required under NFMA to establish that the PNF is maintaining wildlife viability. Consequently, the PNF’s proposed termination of grazing allotments to improve bighorn sheep habitat is unwarranted and inconsistent with NFMA. Thus, the ROD and FSEIS must be remanded for proper evaluation of an alternatives that allows for the continuation of domestic sheep grazing on the PNF.

3. Hells Canyon National Recreation Area (“HCNRA”) Act (16 U.S.C. §§ 460gg-460gg-13)

Elimination of domestic sheep grazing in the HCNRA and surrounding area is not compatible with the HCNRA Act. The HCNRA Act specifically requires that the Secretary must give full consideration to the continuation of grazing in the HCNRA and surrounding area. 16 U.S.C. §§ 460gg-4, -5, -7. The HCNRA Act recognizes that “[r]anching, grazing, farming, timber harvesting, and the occupation of homes and lands associated therewith, as they exist on the date of enactment of the [HCNRA Act], are recognized as traditional and valid uses of the recreation area.” *Id.* § 460gg-10. Grazing is recognized as a traditional and valid use of the recreation area, and thus, a use of the HCNRA and surrounding area that is compatible with the HCNRA Act. The PNF does not have the authority to eliminate a traditional and valid use that is provided for by the HCNRA Act. Elimination of grazing on the HCNRA and surrounding area conflicts with 16 U.S.C. §§ 460gg-4, -5, -7, -10.

Moreover, the HCNRA Act provides that the Secretary shall promulgate rules and regulations to accomplish the purposes of the Act, and such rules and regulations shall include “standards for such management, utilization, and disposal of natural resources on federally owned lands, including, but not limited to, timber harvesting by selective cutting, mining, and grazing and the continuation of such existing uses and developments as are compatible with the provisions of this Act.” 16 U.S.C. § 460gg-7. The HCNRA Act clearly recognizes that grazing and existing uses (such as grazing) which are compatible with the Act are to continue. *See id.*; *see also id.* § 460gg-10. According to 36 C.F.R. § 292.48(b), “[w]here domestic livestock grazing is incompatible with the protection, restoration, or maintenance of fish and wildlife or their habitats ... the livestock use shall be *modified* as necessary to eliminate or avoid the incompatibility.” (emphasis added). “In the event an incompatibility persists *after the modification* or modification is not feasible, the livestock use shall be terminated.” 36 C.F.R. § 292.48(b) (emphasis added).

The PNF has failed to establish that domestic livestock grazing on the PNF is incompatible with the protection, restoration, or maintenance of fish and wildlife or their habitats. To the extent that is the conclusion of the ROD and FSEIS, then “livestock use shall be *modified as necessary* to eliminate or avoid the incompatibility.” 36 C.F.R. § 292.48(b). Under 36 C.F.R. § 292.48(b), the PNF is only first authorized to “modify” livestock use when an incompatibility is identified. The selected alternative in the ROD and FSEIS will have the effect of completely eliminating such use across most of the PNF. Such wholesale elimination of grazing is in violation of 36 C.F.R. § 292.48(b).

Rather than eliminating grazing on the PNF, the PNF must “modify” livestock use or minimize and mitigate the impacts of livestock use. Numerous best management practices and

mitigation measures are available to “modify” livestock use in this manner. *See, for example, infra* § IV.D.1. Only in the event that an incompatibility persists “after the modification” shall livestock use be terminated. 36 C.F.R. § 292.48(b). The PNF has not demonstrated that a modification is infeasible, nor does the selected alternative in the ROD and FSEIS employ modifications to livestock use prior to eliminating such use as is required under 36 C.F.R. § 292.48(b). The preferred alternative in the ROD and FSEIS thus violates the HCNRA Act and 36 C.F.R. § 292.48(b). Consequently, the ROD and FSEIS must be remanded for proper evaluation of an alternative that employs modifications to livestock use prior to eliminating such use on the PNF.

4. Federal Land Policy and Management Act (“FLPMA”) (43 U.S.C. §§ 1701-1787)

Under 43 U.S.C. § 1752(g), the Forest Service is directed to compensate a permittee or lessee with “reasonable compensation . . . of his interest in authorized permanent improvements placed or constructed by the permittee or lessee on lands covered by such permit or lease” “[w]henever a permit or lease for grazing domestic livestock is canceled in whole or in part, in order to devote the lands covered by the permit or lease to another public purpose.” The Forest Service ignores this directive in the ROD and FSEIS. The ROD and FSEIS must be remanded to consider the compensation required to be provided to permittees for loss of grazing acreage on the forest. Further, should any loss of grazing acreage result from the Forest Service’s decision on appeal, permittees must be compensated for the fair market value of their range improvements.

Additionally, FLPMA provides that “[e]xcept in case of emergency, no permit or lease shall be canceled under this subsection without two years’ prior notification.” 42 U.S.C. § 1752(g). FLPMA also provides the mechanism for cancelling, suspending, or modifying a

grazing permit or lease. *See id.* § 1752(a)-(b). The ROD calls for cancellation of grazing permits without two years' prior notification, or otherwise fails to establish that an "emergency" situation is present. Likewise, the ROD fails to discuss and follow the established mechanism for cancelling, suspending, or modifying a grazing permit or lease prior to expiration of the permit. Cancellation during the term of a permit may be warranted for "any violation of a grazing regulation or of any term or condition of such grazing permit or lease." *Id.* § 1752(a). None of the circumstances are present here or discussed in the ROD and FSEIS. As a result, the ROD and FSEIS must be remanded for proper compliance with FLPMA.

B. The ROD and FSEIS are Contrary to the Forest Service's Own Guidance, Policy and Agreements

1. The ROD and FSEIS Fail to Comply with a Forest Service Directive

On September 23, 2008, Mark Rey, Under Secretary, Natural Resources and Environment, United States Department of Agriculture, sent a letter to Abigail R. Kimbell, Chief, Forest Service, United States Department of Agriculture, stating the following:

Federal land management agencies are in the process of reviewing and updating their respective management policies where domestic sheep and goats graze in proximity to wild sheep, with the intention of developing a federal policy framework consistent with state wildlife objectives. Due to the presence of federal lands managed by various agencies within wild sheep ranges and the high risk of disease transmission from domestic sheep and goats to wild sheep, a consistent set of management policies for minimizing this risk is desirable. Through these policies, the agencies will seek to promote and protect the ecological integrity of wild sheep, as well as support the economic sustainability of sheep producers where these animals potentially co-mingle.

Until an action plan to address the risk of disease transmission is developed with the relevant state wildlife agencies, I am directing the Forest Service to suspend participation in, or support of efforts to, transplant wild sheep onto National Forest System lands in areas where there is likelihood that wild sheep might come into contact with domestic sheep or goats.

(Emphasis added). The Forest Service was required to develop an action plan with the relevant state wildlife agencies to address the risk of disease transmission prior to participating in further efforts to prevent disease transmission. The Forest Service failed to do this, or the PNF failed to disclose the contents of its plan in its NEPA analysis in violation of NEPA.

2. The ROD and FSEIS Fail to Comply with the Forest Service Open Space Conservation Strategy

On December 6, 2007, the Forest Service announced the release of the Forest Service's Open Space Conservation Strategy. See USDA Forest Service, News Release, *Forest Service Announces Open Space Conservation Strategy* ("News Release"), Release No. 0726, Dec. 6, 2007, available at <http://www.fs.fed.us/news/2007/releases/12/openspace.shtml> (last visited Aug. 26, 2010); USDA Forest Service, *Forest Service Open Space Conservation Strategy*, Nov. 2007, available at http://www.fs.fed.us/openspace/national_strategy.html (last visited Aug. 26, 2010). This strategy charts a path forward for the Forest Service to conserve forests, grasslands, farms, ranches, and urban green spaces that provide vital ecosystem services and benefits for society. *News Release* at 1.

The strategy was developed in response to the threat of loss of open space on the sustainability of the Nation's forests and grasslands. *Id.* As the Forest Service reports:

We lose approximately 6,000 acres of open space each day across the United States—a rate of four acres per minute. Land development is outpacing population growth, especially in rural areas where the trend is low density, dispersed growth. The new Forest Service report "National Forests on the Edge" projects that over 21 million acres of rural private lands near national forests and 44 million acres of private forest land will undergo increases in housing density by 2030.

News Release at 1.

The Forest Service recognizes in the Open Space Conservation Strategy that development of ranches and other such open space affects the Forest Service's ability to manage national

forests and grasslands and increases the risk of wildfire; raises the cost of fighting fires; contributes to the spread of invasive species; increases conflicts among recreational users; reduces access to recreation lands; and fragments fish and wildlife habitat. *Open Space Conservation Strategy* at 3. With loss of open space, at stake is the ability of private and public forests and rangelands to provide clean water, scenic beauty, biodiversity, outdoor recreation, natural-resource-based jobs, forest products, and carbon sequestration. *Id.*

Despite a clear call to action in the Open Space Conservation Strategy for the Forest Service to work with ranchers and other landholders to contribute to the protection and stewardship of the Nation's open spaces, the ROD and FSEIS fail to employ the strategy, or even mention its application to the ranches and landholdings adjacent to the PNF that are affected by ROD and FSEIS. Certainly, the ROD and FSEIS fail to implement the Open Space Conservation Strategy. The PNF's proposed management direction does not promote the strategy.

Specifically, the goal of the Open Space Conservation Strategy is to conserve open space. *Id.* at 5. This is to be accomplished by sustaining the environmental, social, and economic benefits of forests and grasslands across the landscape by: protecting the most ecologically and socially important lands; and conserving working lands as sustainable forests and grasslands. *Id.* The priority actions for accomplishing the conservation of open space, include: convening partners to identify and protect priority open space; and promoting national policies and markets to help private landowners conserve open space. *Id.*

The ROD and FSEIS completely disregard the goals and actions set forth in the Open Space Conservation Strategy. Rather than protecting ecologically and socially important lands, and conserving working lands, the PNF has chosen though its decision to close grazing

allotments and potentially force ranchers out of business while crippling the sheep industry on and around the PNF. As a result, many ranches will likely be sold for development, causing a large loss of open space with drastic negative effects on fish and wildlife habitat. This is precisely the sort of outcome the Open Space Conservation Strategy seeks to avoid.

Consequently, the ROD and FSEIS must be remanded to allow the PNF to conserve working lands and avoid impacts to ranches. The PNF's current approach is unsustainable and extremely harmful to open space.

Additionally, the Open Space Conservation Strategy calls for the Forest Service to work with ranchers to protect open space. *Id.* at 6-7. Yet, the PNF is not working with the ranchers affected by the ROD and FSEIS to promote conservation of open space. The selected alternative in the ROD discourages protection of open space and the FSEIS fails to consider ranching in the development of reasonable alternatives. Further, the PNF fails to promote policies and markets to help private landowners conserve open space, as is called for in the Open Space Conservation Strategy.

The Open Space Conservation Strategy specifically calls for the PNF to:

- Provide assistance to help sustain existing forest-based markets and products.
- Provide assistance and supportive policies to help public land ranchers maintain viable ranching businesses and continue owning the private ranch lands associated with their National Forest System grazing permits.

Id. at 9.

The PNF completely fails to undertake and discuss these actions in the ROD and FSEIS. The ROD and FSEIS must be remanded so the PNF can indicate how the it is providing assistance to help sustain the forest-based sheep industry. Further, the ROD and FSEIS must include assistance and policies to help ranchers maintain viable ranching businesses. The PNF's

selected management direction destroys ranching businesses. The PNF must promote the Open Space Conservation Strategy and revise the ROD and FSEIS accordingly.

3. The ROD and FSEIS Do Not Implement Any Adaptive Management or Separation Strategies Prepared by the State of Idaho

The PNF entered a memorandum of understanding (MOU), "Memorandum of Understanding between the State of Idaho and the United States Department of Agriculture Forest Service, Payette National Forest," in 2007 that provides a framework for cooperation between the State of Idaho and the PNF in preparation of the FSEIS. *See* FS Agreement No. 07-MU-11041200-041. The MOU states that the PNF shall provide the opportunity for the State of Idaho to develop adaptive management strategies that will be considered for the LRMP amendment and that information provided by the State will be considered to the maximum extent possible. MOU at 2. Further, the MOU provides that the State shall, among other things, develop adaptive management strategies for occupation of bighorn sheep habitat and develop separation strategies between bighorns and domestic sheep. MOU at 2.

The ROD and FSEIS do not contain discussion of any adaptive management strategies or separation strategies prepared by the State of Idaho in consultation with affected permittees in 2008. The PNF must consider these strategies. Further, the ROD and FSEIS should have explained how the PNF met its obligations in the MOU and how the ROD and FSEIS complied with the terms of the MOU.

4. The Forest Service is Required by the Hells Canyon Initiative, Idaho State Statute, and the Letter of Agreement Between the Forest Service and the Idaho Wool Growers Association to Hold Domestic Sheep Grazing Harmless from Bighorn Sheep Transplants

In 1997, a "long term project" transplanting bighorn sheep to the Hells Canyon area of Oregon, Idaho, and Washington began. Bureau of Land Management, *Restoration of Bighorn Sheep to Hells Canyon: The Hells Canyon Initiative*, Technical Bulletin No. 97-14, Sept. 1997,

available at http://www.blm.gov/id/st/en/info/publications/technical_bulletins/TB_97-14.html (last visited Aug. 26, 2010). It became known as the “Hells Canyon Initiative.” The Initiative was preceded by a Memorandum of Agreement formalizing cooperation among three state wildlife agencies, the Forest Service, the Bureau of Land Management, and the Foundation for North American Wild Sheep. Memorandum of Agreement (MOA) among Oregon Dep’t of Fish and Wildlife, Idaho Dep’t of Fish and Game, Washington Dep’t of Fish and Wildlife, USDA Forest Service, Wallowa-Whitman Nat’l Forest, Bureau of Land Mgmt., and the Found. for North American Wild Sheep for Restoration of Bighorn Sheep Populations in the Hells Canyon Area at Appendix 5, pp. 72-75, available at www.dfw.state.or.us/wildlife/management_plans/docs/sgplan_1203.pdf (last visited Aug. 26, 2010). This MOA established interagency guidelines on staffing, funding, communicating, and other non-substantive aspects of agency cooperation. *Id.*

The Hells Canyon Initiative established a “Project Area” encompassing more than 5.5 million acres in the Snake River drainage of Idaho, Washington, and Oregon as depicted on a map accompanying the Initiative. Consequently, while the MOA described interagency cooperation, the subsequent Hells Canyon Initiative implemented the bighorn sheep restoration goals for the entire Project Area. The Project Area encompasses grazing allotments that are at issue in the ROD and FSEIS.

Concurrent with the development of the Hells Canyon Initiative, the State of Idaho enacted a statute to hold domestic sheep operations harmless from the negative impacts of transplanting bighorn sheep into areas where domestic sheep had grazed for decades. The Idaho statute directed one of the Hells Canyon Initiative committee members—the Idaho Department of Fish and Game—

to provide any federal grazing permittee with a letter signed by all federal, state and private entities responsible for the transplant [of bighorn sheep into areas they do not now inhabit] stating that the existing sheep or livestock operations in the area of any such bighorn sheep transplant are recognized and that the potential risk, if any, of disease transmission and loss of bighorn sheep when the same invade domestic livestock or sheep operations is accepted [by those entities responsible for the transplant].

Idaho Code Ann. § 36-106(e)(5)(D) (2006); Statement of Purpose, House Bill 337, Fifty-fourth Legislature of the State of Idaho.

In compliance with this statutory mandate, the Hells Canyon Initiative committee sent a letter to the Idaho Wool Growers Association. *See* Exhibit D to Amicus Brief of Idaho Wool Growers Association in *Western Watersheds Project v. Forest Service*, 07-CV-151-E-BLW (D. Idaho). The letter is important in many respects because it reiterates the position of the Forest Service and other committee members that domestic sheep operations would be held harmless from introduction of bighorn sheep, as illustrated by the following passages:

The [Hells Canyon Initiative committee] understands that bighorns may occasionally migrate outside of their designated range and come into contact with domestic sheep. These bighorns will be considered 'at risk' for potential disease transmission and death.

....

Bighorns straying into currently active sheep allotments will be considered 'at risk' by all of the Committee entities. This means that the Committee recognizes the existing domestic sheep operations in or adjacent to the Hells Canyon complex, on both national forest and private lands, and accepts the potential risk of disease transmission and loss of bighorn sheep when bighorns invade domestic sheep operations.

See id.

The Forest Service signatory to this letter was the Wallowa-Whitman National Forest Supervisor, Robert Richmond. *See* Decl. of Robert M. Richmond at ¶ 5 in *Western Watersheds Project v. Forest Service*, 07-CV-151-E-BLW (D. Idaho). Supervisor Richmond was authorized

to sign the letter on behalf of the Wallowa-Whitman National Forest as well as the Nez Perce National Forest and the PNF. *Id.* The letter and its hold-harmless provisions were intended to and in fact did apply to those national forests as well. *Id.* The intention of the letter was to hold the domestic sheep industry harmless if health risks were associated with domestic sheep and bighorn sheep interaction so that domestic sheep operators would not be held accountable for or liable for any such risk. *Id.* at ¶ 3. This hold harmless provision applied not only to domestic sheep operations in the Hells Canyon complex but also to those sheep operations adjacent to the complex on both national forest and private lands in the Wallowa-Whitman National Forest and the Nez Perce National Forest. *Id.* at ¶ 4.

The Idaho Department of Fish and Game's understanding of the 1997 agreement was explained when the Department was specifically asked whether the Hells Canyon Initiative committee agreed "to limit management activities reducing disease transmission between bighorns and domestic sheep so as to not adversely impact domestic sheep operators in the Payette [National Forest]." Letter from Idaho Fish and Game Department to Hells Canyon Preservation Council dated August 12, 2004, at 4. The Idaho Department of Fish and Game responded to the question thusly:

In March 1997, the committee signed an agreement with the Idaho Woolgrowers Association acknowledging that bighorns could come into contact with domestic sheep on existing grazing allotments, and that this could result in disease and death of bighorns. The wildlife agencies of Idaho, Oregon, and Washington agreed to assume responsibility for the bighorns losses should this occur, and to take action to reduce further losses of bighorn sheep without adversely impacting existing domestic sheep operators.

Id.

In the ROD and FSEIS, the PNF circumvents the letter agreement of the state and federal governments with the Idaho Wool Growers Association regarding the impact of bighorn sheep

on domestic sheep operators. *See, for example*, FSEIS, Appendix A, at A-78 through A-79. Specifically, the Hells Canyon Initiative is based upon an objective to transplant and continue to transplant bighorn sheep within and/or adjacent to the Payette National Forest to maintain and sustain bighorn sheep populations.⁷ The Forest Service must consider, but failed to consider, as part of its purpose and need (and any viability or compatibility analysis) a reliance upon the 1997 commitment and Idaho Code 36-106(e)(5)(D) to continue that objective. Absent the perpetuation of that objective, it is the position of the Hells Canyon Initiative, to which the Forest Service is a part, that bighorn sheep can not remain viable. As such, the ROD and FSEIS must discuss this letter agreement's impact on the responsibilities of the Forest Service and how these responsibilities affect the environment.

Furthermore, as a matter of public policy, the Forest Service's agreement to hold domestic sheep grazing harmless from bighorn sheep transplants as required by the Hells Canyon Initiative, the Idaho state statute, and the letter agreement between the Forest Service and the Wool Growers, must be upheld. The PNF has agreed not to close grazing allotments on the PNF as a result of bighorn sheep transplants, thus, the ROD and FSEIS and resulting management direction must not involve the closure of grazing allotments on the PNF. To do so would be a breach of the Forest Service's independent duties that it voluntarily assumed in the letter agreement.⁸

⁷ *See* "The Hells Canyon Initiative," Hells Canyon Bighorn Sheep Restoration Plan, 2004, which the "Initiative" documents that part of its "Future direction" at pages 13-14 is the continued reintroduction and relocation of bighorn sheep.

⁸ Note that this responsibility assumed by the Forest Service is independent from the responsibility of the State of Idaho to "take whatever action is necessary to reduce further losses of bighorn sheep without adversely impacting existing domestic sheep operators."

II. The Forest Service Failed to Observe Procedures Required by Law in Issuing the ROD and Preparing the FSEIS

Agency decisions which fail to observe procedures required by law, such as those prescribed under NFMA and the Federal Advisory Committee Act (“FACA”), are prohibited under the APA, 5 U.S.C. § 706. The PNF failed to follow prescribed procedures in preparing the FSEIS and issuing the ROD.

A. The Amendments to the 2003 Forest Plan are Significant

NMFA provides for the “development and maintenance of land management plans for use on units of the National Forest System.” 16 U.S.C. § 1604(b); *see Lamb v. Thompson*, 265 F.3d 1038, 1042 (10th Cir.2001). “NFMA establishes a two-step process for forest planning.” *Id.* First, the Forest Service prepares a forest plan. The creation of a forest plan requires the preparation of an EIS. 16 U.S.C. § 1604(g)(1); 42 U.S.C. § 4332(2)(C); *see Colo. Off-Highway Vehicle Coal. v. U.S. Forest Serv.*, 357 F.3d 1130, 1132 (10th Cir.2004). “Second, the Forest Service is required to implement the forest plan by approving or disapproving specific projects. Projects must be consistent with the governing forest plan and are subject to the procedural requirements of NEPA.” *Lamb*, 265 F.3d at 1042 (citing 16 U.S.C. § 1604(i)).

NFMA provides that forest plans may:

be amended in any manner whatsoever after final adoption after public notice, and, if such amendment would result in a *significant change* in such plan, in accordance with the provisions of subsections (e) and (f) of this section and public involvement comparable to that required by subsection (d) of this section.

16 U.S.C. § 1604(f)(4) (emphasis added). “Any significant amendments to a forest plan must also follow the same procedures required for the creation of the original forest plan.” *Colo. Off-Highway Vehicle Coal.*, 357 F.3d at 1132 (citing 36 C.F.R. § 219.8(b)); *see also* 36 C.F.R.

§ 219.10(f) (2000).⁹ “Significant” amendments must not only follow the same procedures required for the creation of the original forest plan, but they are also subject to different administrative review procedures than non-significant amendments. *See, for example*, Optional Appeal Procedures § 8(a)(3) (providing 90-day period to file notice of appeal for “significant amendments” and a lesser period for insignificant amendments); *id.* § 15(a) (discussing appeal record for “significant amendments”).

The Forest Service Handbook describes four factors that are relevant to assessing the significance of a proposed plan amendment: (1) the timing of the proposed change relative to the expiration or next scheduled revision of the plan; (2) the location and size of the area involved in the change compared to the overall planning area; (3) the long-term significance of the project relative to the goals of the plan; and (4) the impact of the amendment on “management prescription” (i.e., whether the change applies only to specific situations or will likely affect future decisions). *See Citizens’ Comm. to Save Our Canyons v. United States Forest Serv.*, 297 F.3d 1012, 1033 (10th Cir. 2002) (*citing* FSH 1909.12 § 5.32(3)(a)-(d)).

In the ROD, the Forest Supervisor concludes that the amendment to the 2003 Forest Plan “does not constitute a significant amendment.” ROD at 25. This decision by the Forest

⁹ The regulations which implement NFMA have been frequently amended. At the time the Forest Service issued the ROD, it claims to have been operating under an interim revised planning rule that the Department of Agriculture had promulgated in 2000. ROD at 22-30; *see* 65 Fed. Reg. 67,514 (Nov. 9, 2000) (codified at 36 C.F.R. pt. 219 (2001)); *see also* 66 Fed. Reg. 1864 (Jan. 10, 2001) (interpretive rule). Under the 2000 rule, the Forest Service could elect to prepare forest plan amendments under either the provisions of the 1982 planning rule, *see* 47 Fed. Reg. 43,026 (Sept. 30, 1982) (codified at 36 C.F.R. pt. 219 (2000)) or the provisions of the 2000 rule, *see* 36 C.F.R. § 219.35(b) (2001). The current 2010 version allows the Forest Service to prepare forest plan amendments or revisions initiated before or during the transition period established by the 2000 rule under the provisions of either the 1982 rule or under the 2005 rule. 36 C.F.R. § 219.14(d)-(e) (2010). The forest plan amendments here were reportedly prepared under the 1982 rule. *See* ROD at 22-30.

Supervisor to classify the amendment as non-significant is “arbitrary, capricious, and abuse of discretion, or otherwise not in accordance with law.” *See Citizens’ Comm. to Save Our Canyons*, 297 F.3d at 1033 (*citing* standard of review) (citation omitted).

The amendment at issue has been the subject of nearly 10 years of forest planning, has spawned several court judgments and has resulted in several draft EISs and draft amendments to the Forest Plan. *See* ROD at 1 (discussing development of the amendment). Over 14,000 comments were received on the DSEIS. ROD, Appendix A at A-1. The proposed amendment interrupts grazing allotments on the forest that have been in place for nearly a century.

Undoubtedly, the Forest Supervisor’s decision could put ranchers dependent upon grazing allotments on the forest out of business. The decision is life-changing for many, particularly, those sheep producer-members of IWGA who are the primary parties affected by the Forest Supervisor’s decision. The Forest Supervisor stated: “I know that my decision regarding rangeland suitability determination will require affected permittees to adjust as sheep grazing has been their way of life for generations.” ROD at 31. On its face, the proposed amendment to Forest Plan is clearly significant.

The same conclusion is reached by analyzing the four factors that are relevant to assessing the significance of a proposed plan amendment from the Forest Service Handbook. FSH 1909.12 § 5.32(3)(a)-(d). Considering the “timing” of the amendment, implementation of the amendment is to take place in the next grazing season (2011) and continue for up to eight years, assuming the Forest Service completes an amendment of its forest plan on time. ROD at 24. Thus, the amendment will continue for over half the life of the current forest plan. *Id.*

Concerning “location and size,” the Forest Supervisor provides that “[t]he proposed range suitability determination for domestic sheep and goats covers *approximately 75 percent* of the

Payette National Forest.” *Id.* (emphasis added). Clearly, an amendment that affects 75 percent of the entire forest is sizeable. Moreover, the Forest Supervisor’s decision would reduce grazing of domestic sheep on the forest by roughly 70%. *See* ROD at 22; FSEIS at 2-12, 2-15. The ROD calls for designation of an additional 346,000 acres within the forest as bighorn habitat over the next three years, and reducing the are permitted for domestic sheep by roughly 68,000 acres. ROD at 22; FSEIS at 2-12, 2-15.

With regard to “goals, objectives, and outputs,” the Forest Supervisor concludes that “[t]his decision applies to existing, proposed, or new projects and *will have a measureable effect on the rangeland resources, or suitable domestic sheep and goat grazing . . .*” ROD at 24 (emphasis added). The proposed amendment would upset the balance of multiple-use resources change several resource sections of the forest plan, including wildlife resources, non-native plants and rangeland resources. *Id.*

An amendment that the Forest Supervisor acknowledges will change management of the PNF for over half the life of the existing forest plan, will impact nearly 75 percent of the entire forest, and will have a great effect on the rangeland resources is clearly a significant amendment. The loss in grazing acreage to result from the proposed amendment and the impact on sheep ranchers is unprecedented. As a result, the ROD and the amendment to the forest plan should be remanded to the Forest Supervisor for analysis and decision-making consistent with that required under NFMA and its implementing regulations for “significant” amendments.

B. The FSEIS Improperly Relies on the Findings of the RADT Committee

On July 1, 2009, U.S. District Court Judge B. Lynn Winmill issued a decision in *Idaho Wool Growers Assoc. v. Schafer*, 637 F. Supp. 2d 868 (D. Idaho 2009). On November 9, 2009, Judge Winmill issued another memorandum and order clarifying that decision. *See Idaho Wool Growers Assoc. v. Schafer*, 08-394-S-BLW, Doc. 46 (D. Idaho). Plaintiffs challenged the Forest

Service's establishment and use of two committees and their reports as violations of the Federal Advisory Committee Act, NFMA, and the APA. These committees are known as the RADT Committee and the Payette Principles Committee. The report from the RADT Committee is referenced in the FSEIS at USDA Forest Service 2006. *See* FSEIS, Literature Cited at 14.

Judge Winmill entered an order granting plaintiffs' motion for summary judgment. In so doing, Judge Winmill wrote "[t]he issue here is whether the Forest Service's Committees violated FACA's and NFMA's procedural requirements and, if so, whether the Committees' reports should be utilized for any *future* Forest Service Decisions." *Idaho Wool Growers*, 637 F. Supp. 2d at 877. The Court ordered that "[t]he Committees' findings and/or conclusions are not to be relied upon by the Forest Service *with respect to any future agency decisions.*" *Id.* at 880 (emphasis added). This includes the ROD and FSEIS at issue here.

Despite Judge Winmill's decision, the Forest Service still relies upon the findings and conclusions of the RADT Committee in the FSEIS. *See* FSEIS at 2-1 through 2-8. The Forest Service still uses the findings and conclusions of the RADT Committee to develop alternatives. *See, for example*, FSEIS at 2-4 (Alternative 7A), 2-5 (Alternative 7B), 2-7 (Alternative 7K), 2-10 (Alternative 7G).

The Forest Service's continued use of such findings and conclusions is also prohibited by Judge Winmill's clarification memorandum and order. *See Idaho Wool Growers Assoc. v. Schafer*, 08-394-S-BLW, Doc. 46 (D. Idaho). There, Judge Winmill explained that the Forest Service should not "grandfather" RADT Committee findings and conclusions to support any decision via the Final SEIS and ROD—" [s] imply put, and consistent with the Court's existing directive, the Forest Service may not rely upon the Committees' findings and/or conclusions in reaching future agency decisions – either directly or indirectly, through an end-run around the

Court's mandate by relying upon those portions of the Draft SEIS that relied solely, or even primarily, upon the violating Committee reports." *Id.* at 6. Judge Winmill stated: "[t]he Forest Service may not rely upon the Committee's findings and/or conclusions in reaching future agency decisions." *Id.* at 11. Clearly, that is what the Forest Service has done here. As Judge Winmill further provided, "[i]f the Final SEIS and ROD cannot be drafted without relying upon those portions of the Draft SEIS that relied solely, or primarily, upon Committees' findings and/or conclusions, the Final SEIS and ROD cannot be based upon the Draft SEIS." *Id.* Consequently, a new Draft SEIS and subsequent Final SEIS and ROD must be drafted without reliance on the RADT Committee's findings and conclusions.

The Forest Service's reliance on the RADT Committee's findings and conclusions also constitutes a NEPA violation. The CEQ regulations implementing NEPA require that an EIS contain a "reasonable range" of alternatives. 40 C.F.R. § 1502.14(a); *Mayo Foundation v. Surface Transportation Board*, 472 F.3d 545, 550 (8th Cir. 2006). What is required is information sufficient to permit "a reasoned choice of alternatives" *Natural Resources Defense Council v. Morton*, 458 F.2d 827, 836 (D.C. Cir. 1972). An agency should not consider alternatives that "are unlikely to be implemented" or that are infeasible. *See Seattle Audubon Society v. Moseley*, 80 F.3d 1401, 1404 (9th Cir. 1996); *Vermont Yankee Nuclear Power Plant v. NRDC*, 435 U.S. 519, 551 (1978); *see also Citizens for a Better Henderson v. Hodel*, 768 F.2d 1051, 1057 (9th Cir. 1985) ("viable" alternatives should be examined). The touchstone is whether the selection and discussion of alternatives fosters informed decision-making and informed public participation. *California v. Block*, 690 F.2d 753, 767 (9th Cir. 1982).

Here, the Forest Service has selected alternatives—some of which were considered but eliminated from detailed study, FSEIS at 2-4 through 2-7, and some of which were considered in

detail, FSEIS at 2-8 through 2-13—that could not have been implemented. Use of these alternatives reliant on the findings and conclusions of the RADT Committee is prohibited by Judge Winmill’s order. *Idaho Wool Growers*, 637 F. Supp. 2d at 880. Alternatives that can not be implemented are not “reasonable” alternatives. “Consideration” of these alternatives led to a foregone conclusion; that such alternatives were not viable. Use of these alternatives did not permit a “reasoned choice of alternatives” or otherwise foster “informed decision-making.” The choices are limited, and the decision constrained, when a portion of the alternatives would render the decision illegal. Based on the Forest Service’s unreasonable choice of alternatives in the FSEIS, the ROD and FSEIS should be remanded to the PNF for further analysis and decision-making. *See, for example, Utah v. Norton*, 2006 WL 2711798, at *25 (D. Utah 2006) (“Clearly an illegal or unauthorized alternative cannot be considered reasonable” and should not be contemplated by an agency as a reasonable alternative under NEPA.).

III. The Forest Service’s Decision is Arbitrary and Capricious Because it Fails to Consider the Most Important Aspect of the Problem

Under the APA, agency decisions under NEPA and NFMA will be set aside if they are “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.” 5 U.S.C. § 706(2)(A). Under this standard, judicial review of agency action seeks to determine whether an agency “has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.” *See Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983); *Utah Environmental Congress v. Bosworth*, 443 F.3d 732, 739 (10th Cir. 2006).

In its ROD and FSEIS, the Forest Service has failed to consider and acknowledge that the selected alternative is unlikely to control disease transmission and is implausible. The PNF readily admits that “disease could still be a factor for bighorn sheep populations on the PNF, regardless of how much domestic sheep grazing remains within the PNF. The effects to the two metapopulations are unknown, since the potential risk of contact from lands other than the Payette National Forest is not completely known.” FSEIS at 3-83. Although the Forest Service attempts to disguise this issue by discussing “risk of contact” between bighorn sheep and domestic sheep on the PNF, and leading the reader of the ROD and FSEIS to believe that as the risk of contact approaches zero, the threat of disease transmission to bighorn sheep similarly approaches zero; the reality is that this is not true. *See* ROD at 14 (“The implications of these additional contacts, particularly from adjacent Federal Lands, are substantial and contribute more to contact risk between the species than any of the action alternatives.”); FSEIS at 3-88 (same); *id.* at 3-88 (“they would dramatically increase the extinction probabilities for all scenarios”). Regardless of whether risk of contact between bighorn sheep and domestic sheep on the PNF approaches zero, the threat of disease transmission to bighorn sheep on the PNF will exist. *See* ROD at 14; *id.* at 15 (“What I do know is that zero risk is unattainable without removing all domestic sheep from the landscape.”); FSEIS at 3-85 (“other ownerships that graze domestic sheep can be a potential source of disease to populations of bighorn sheep on the Payette National Forest, regardless of the alternative implemented by the Payette National Forest Service.”); *id.* at 3-103 (“Private, State, and other Federal lands located within and adjacent to the Payette National Forest that continue to graze domestic sheep will perpetuate the risk for contact and potential for disease transmission between the two species.”).

While the FSEIS states at page 3-8 that “domestic sheep are often carriers of (pathogens that can lead to disease)”, the FSEIS fails to address or adequately address the fact that

- the bighorn sheep themselves within the Hells Canyon Area and Salmon River Area of the PNF already carry the pathogens that can lead to disease (according to Idaho Fish and Game Department data),
- the bighorn sheep are at risk of contacting other bighorn sheep that carry the pathogens that can lead to diseases, or
- other animals, like birds, on the PNF carry the pathogens that can lead to diseases.

In addition, the FSEIS fails to acknowledge that bighorn sheep are at risk of contact with domestic sheep and other animals off the PNF. *See* FSEIS at 3-91 (“This SEIS only considers risks from the Payette National Forest commercial livestock grazing allotments. Pack animals, other classes of livestock, and other potential disease sources are not considered and could also occur across other land ownerships.”); *id.* at 3-7 (“*Pasteurella* and *Mannheimia* spp. infect most mammalian families, as well as many if not all non-vertebrates (Miller 2001). They are common commensals on the mucous membranes of animal species in all climatic zones, most of whom are asymptomatic carriers (Biberstein 1979).”); *see also id.* at 3-7 (noting that bison, elk, moose, mountain goats, mule deer, and pronghorn are known carriers). Because bighorn sheep are carriers of the pathogens that can lead to disease, contact with other bighorn sheep not only puts bighorn sheep populations at risk, but renders irrelevant domestic sheep as the vector for transmission of the pathogens (assuming the domestic sheep themselves grazing on the PNF are carries of the pathogens, which the Forest Service also fails to address). *See* FSEIS at 3-37 (“It has been speculated that once *Pasteurella* has been introduced to bighorn populations, they may become endemic and continue cycling for decades [.]”); *id.* at 3-42 (“organisms that cause respiratory disease may be endemic in some bighorn sheep herds”). This misleads readers to

believe that eliminating risk of contact on the PNF between bighorn sheep and domestic sheep will eliminate the threat of disease transmission. Under this misleading premise, the disease model employed in the FSEIS was designed to depict domestic sheep as the sole cause of disease transmission, which is not accurate. FSEIS at 3-42. The alternatives and the discussion in the FSEIS must acknowledge the potential futility of the alternatives and explain the need for a more comprehensive solution to the problem of disease transmission, such as the development of a vaccine or such as the transplanting of bighorn sheep that are immune/resistant to the offending pathogens.

Strikingly, the Forest Service concludes that “[t]he largest bighorn sheep populations . . . under Alternatives 7N and 7O, which were the most favorable action alternatives, would likely not persist under this cumulative effects scenario.” FSEIS at 2-18. This is reality, not just a “cumulative effects scenario.” *See* FSEIS at 2-18 (“cumulative effects would dramatically increase the extinction probabilities for all scenarios”); *id.* at 3-55 (“the consequences of low levels of interspecies contact are potentially severe for bighorn sheep”); *id.* at 3-91 (“The cumulative effects analyses do infer that habitat and population connectivity risks between the Payette National Forest and other ownerships do occur.”). The Forest Service concludes that its selected alternative will not achieve the desired result of preventing hypothetical disease transmission between domestic sheep and bighorn sheep. Yet, it also claims that “[e]liminating domestic sheep grazing from protected bighorn sheep summer source habitat on the Payette National Forest may prevent contact and disease transmission between the two species.” FSEIS at 3-103. These statements are contradictory and thus render the Forest Service’s FSEIS arbitrary and capricious.

Along these lines, the selected alternative in the ROD and FSEIS has already been shown to be untenable, but the Forest Service selected it nevertheless. Sheep grazing was eliminated on the Oregon side of the HCNRA and bighorn sheep still experienced a die-off. This indicates that removal of grazing acreage does not work to establish or maintain bighorn populations. It was arbitrary and capricious for the PNF to adopt the approach in the selected alternative, which has already been proven to be a flawed and unsuccessful alternative.

Even if successful in the short-term, the selected alternative ultimately fails to secure the future viability of bighorn sheep. The FSEIS explains that “future movement of bighorn sheep can change during population growth or exploration by rams seeking mates.” FSEIS at 3-92. Further the FSEIS states: “[a]s bighorn sheep numbers increase and populations expand their geographic range, probabilities of domestic sheep contact could increase [.]” *Id.* at 3-92; *see also id.* at 3-102 (“As the bighorn populations increase because their vulnerability to disease transmission is reduced, they may enter into new source habitats they have not recently utilized that are occupied by domestic sheep. As suitable bighorn sheep summer source habitat availability increases and populations grow, bighorn sheep are expected to roam or foray more and may come into contact with domestic sheep on lands outside the Payette National Forest.”); *id.* at 3-103 (similar). These statements indicate that even if the PNF’s elimination of grazing on the forest is successful in recovering bighorn sheep populations, it will only increase the risk of contact with domestic sheep, thereby jeopardizing whatever recovery may have been purportedly achieved. The PNF even admits that its plans are short-term and do not account for any risk posed by domestic sheep grazing on private, State or other federal lands located within or adjacent to the PNF. *Id.* at 3-83.

Because the ROD and FSEIS wholly fail to consider the risks of disease transmission off the PNF, and risks of disease transmission from other sources, the Forest Supervisor's decision is arbitrary and capricious. As a result, the decision must be remanded to the Forest Supervisor to consider the risks of disease transmission off the PNF and from other sources. Without analysis of these risks, it is premature to eliminate domestic sheep grazing on the PNF.

IV. The FSEIS Fails to Satisfy NEPA's Informed Decision-Making and Informed Public Participation Purposes

The twin goals of NEPA are informed decision-making and informed public participation. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989). An agency's preparation of an environmental analysis must satisfy these goals by complying with the Council on Environmental Quality ("CEQ") regulations and NEPA's statutory requirements. *See Citizens for Better Forestry, et al. v. U.S. Dep't. of Agric.*, 341 F.3d 961, 971 (9th Cir. 2003); *California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982). The Forest Service has not met these goals in issuing the ROD and preparing the FSEIS.

A. The Forest Service Should Have, and Must Now, Provide a Supplemental FSEIS to Address the Findings of Lawrence et al.

NEPA requires the agency to describe in the EIS all of the environmental consequences of its proposed action. 40 C.F.R. § 1502.16. This is to ensure that the agency takes a "hard look" at the effects of the proposed project. *Westland Water Dist. v. United States Dept. of Interior*, 376 F.3d 853, 872 (9th Cir. 2004). Supplemental EISs are required when there are significant new circumstances or information relevant to environmental concerns that bear on the proposed action or its impacts. 40 C.F.R. § 1502.9(c)(1)(ii). In other words, a supplemental EIS "is required if a new proposal will have a significant impact on the environment in a manner not previously evaluated and considered." *Westland Water Dist. v. United States Dept. of Interior*, 376 F.3d 853, 873 (9th Cir. 2004) (internal quotation and citation omitted).

Although the Forest Service recognizes the study performed by Lawrence et al.,¹⁰ it wholly fails to consider the findings of the study and address the implications of the findings in the ROD and FSEIS. See FSEIS at xx - xxii, 2-3, 3-9 through 3-10, 3-12 through 3-14, 3-43. Lawrence et al. provide significant new information relevant to the environmental concerns of the action proposed in the ROD and alternatives discussed in the FSEIS. As a result, the Forest Service should have, and must now, provide a supplemental EIS to address the information from Lawrence et al.

The data from Lawrence et al. show:

1. Transmission of *M. haemolytica* did not occur between domestic and bighorn sheep maintained at a distance of 10 meters for 1 month.
2. Transmission, but not clinical disease occurred when these same groups of domestic and bighorn sheep were maintained with fence line contact for 2 months. During this period three of the bighorn sheep acquired infection.
3. These domestic sheep and bighorn sheep were allowed to commingle and all 4 bighorn sheep developed clinical disease and died with 2 to 9 days of commingling.

These results are highlighted for the Forest Service in a letter from report author, Donald Knowles of the USDA Agricultural Research Service, to the Regional Forester, Intermountain

¹⁰ Pauraj K. Lawrence, Sudarvili Shanthalingam, Rohana P. Dassanayake, Renuka Subramaniam, Caroline N. Herndon, Donald P. Knowles, Fred R. Rurangirwa, William J. Foreyt, Gary Wayman, Ann Marie Marciel, Sarah K. Highlander, and Subramaniam Srikumaran, "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), 2010, pp. 706-717 (Attached at Appendix 2).

Region, dated August 22, 1010 (“Letter from Donald Knowles”). This letter is attached as Appendix 3.

The findings of Lawrence et al. show that mere contact between domestic sheep and bighorn sheep does not result in disease transmission to bighorns or death of bighorns. Somehow, the Forest Service comes to the opposite conclusion that “specific pathogens are transmitted from domestic sheep to bighorn sheep, resulting in bighorn sheep mortality.” See FSEIS at xxi. The data show that even extended fence line contact of 2 months did not lead to disease and death. Rather, disease required commingling between domestic sheep and bighorn sheep for a minimum of 48 hours and this was after transmission had already occurred in three of the bighorn sheep. The data leave open the possibility that if left at fence line contact the bighorn sheep would have developed immunity instead of disease. Letter from Donald Knowles at 1. However, the data show that “the contact time requirement for transmission and disease is complex and required extended time periods *followed by at least 48 hours of co-mingling.*” *Id.* at 1.

The study by Lawrence et al. has important implications for the Forest Service’s management of domestic sheep and bighorn sheep on the PNF. In fact, the study rebuts the Forest Service’s assumption in the ROD and FSEIS that contact between domestic sheep and bighorn sheep leads to disease transmission and death of bighorns. See FSEIS at 2-3; *id.* at 2-13 (“we infer that overlap between bighorn sheep core herd home ranges and domestic sheep allotments will result in repeated contacts that will result in disease outbreak”); *id.* at 3-19 (“a principal assumption . . . is that direct contact between domestic sheep and bighorn sheep results in a high likelihood of disease transmission to bighorn sheep and disease outbreaks in local bighorn sheep herds.”). Disease transmission may not occur between domestic sheep and

bighorn sheep in close proximity. The inference made by the Forest Service that large distances must be kept between domestic sheep and bighorn sheep to prevent disease transmission is incorrect. Further, “transmission of an organism doesn’t necessarily lead to disease.” Letter from Donald Knowles at 2. Transmission may actually lead to immunity. *Id.* The Forest Service’s assumption that overlap of geographic spaces will result in repeated contacts that cause disease in bighorn sheep ignores the available science on disease transmission which concludes that for disease to occur there needs to be extended contact between domestic sheep and bighorn sheep.

The likelihood that a bighorn sheep would contact domestic sheep on the PNF is remote, particularly on the Westside of the PNF where comments by Oregon Department of Fish & Game note that the McGraw Head has been extirpated and where the telemetry data does not disclose the presence of bighorn sheep on the Smith Mountain, Curren Hill, Price Valley, Boulder Creek and Surham Allotments since at least 2004. *See* Shirts Comments dated March 22, 2010, Exhibit “D”. It is even more unlikely that a bighorn sheep would contact an infected domestic sheep (assuming information that domestic sheep on the PNF are “infected” with the offending pathogens, which the FSEIS fails to either address or document). Finally, for disease transmission to occur, the bighorn sheep would have to commingle with the infected domestic sheep for at least 48 hours. Such an occurrence is exceedingly unlikely.¹¹ With implementation of best management practices and annual operating instructions designed to prevent contact between domestic sheep and bighorn sheep the probability of extended contact between domestic

¹¹ This occurrence is more implausible when considered with the 7-step process described in the FSEIS that would have to occur for disease transmission. *See* FSEIS at 3-26.

sheep and bighorn sheep leading to disease transmission approaches zero, or alternatively mirrors the 4% risk accepted and assumed by the accepted alternative. *See* ROD at 25.

The Forest Service must consider the Lawrence et al. study in a supplemental EIS and adjust the management direction in the Forest Plan accordingly. Further consideration should not only address the probability of disease transmission between domestic sheep and bighorn sheep, but also the probability that disease transmission may actually lead to immunity in bighorn sheep.

B. The Scope of the Cumulative Impact Analysis in the FSEIS is Inadequate

Once the resources affected by a project have been identified, the geographic range occupied by those resources can be used to determine the appropriate geographic range for the cumulative impact analysis. Determining the appropriate geographic limits of an EIS “requires a complicated analysis of several factors, such as the scope of the project considered, the features of the land, and the type of species in the area.” *Selkirk Conservation Alliance v. Forsgren*, 336 F.3d 944, 958 (9th Cir. 2003). The proper scope of a cumulative impact analysis is limited to those past, present and reasonably foreseeable future actions that involve effects on a resource value that will overlap with the proposed project’s effects on that same resource value. 40 C.F.R. § 1508.7.

The CEQ Guidebook¹² suggests that the appropriate scope should be defined by determining the largest geographic area that is occupied by the resources that could be affected by the proposed action. CEQ Guidebook at 15; *see also id.* at 12 (noting that cumulative impact analysis “should be conducted on the scale of human communities, landscapes, watersheds, or air sheds.”); *Habitat Education Center, Inc.*, 381 F. Supp. 2d at 849 (“The presence of species habitat outside the project area is also a relevant consideration in determining the relevant scope of a cumulative impacts analysis for wildlife; *Idaho Sporting Congress v. Rittenhouse*, 305 F.3d 957, 974 (9th Cir. 2002) (Forest Service was arbitrary and capricious in using the “home range” of wildlife species as geographic area for cumulative impact analysis where Forest Service’s own scientists had concluded that habitat needs must be addressed at “landscape” level, and Forest Service failed to explain why it disregarded such information). Once the appropriate geographic boundary for a cumulative impacts analysis has been defined, actions that occur outside of that area and whose impacts on a particular resource value overlap with the anticipated effects of the proposed action on that resource value need to be considered in that analysis.

Determining which resources to consider and which actions to include in the cumulative impact analysis does not end the agency’s inquiry. The purpose of cumulative impact review is to provide “useful analysis” so that significant cumulative effects can be minimized. *See Kern*, 284 F.3d at 1075; CEQ Guidebook at 45. An agency must ensure that its cumulative impact

¹² The CEQ Guidebook, *Considering Cumulative Impacts Under the National Environmental Policy Act* (January 1997), is available at http://ceq.eh.doe.gov/nepa/regs/Guidance_on_CE.pdf. Courts look to the guidebook when considering a variety of cumulative impacts issues. *See e.g., Native Ecosystems*, 304 F.3d at 896 (CEQ Guidebook cited by Ninth Circuit for need to consider cumulative impacts in EAs); *American Rivers v. FERC*, 201 F.3d 1186, 1195 n.15 (9th Cir. 1999) (CEQ Guidebook cited by Ninth Circuit for need to establish baseline conditions for environmental analysis); *Habitat Education Center, Inc. v. Bosworth*, 381 F. Supp. 2d 842, 849-

analysis is “more than perfunctory; it must provide a useful analysis of the cumulative impacts of past, present, and future projects.” *Ocean Advocates v. U.S. Army Corps of Eng’rs*, 402 F.3d 846, 868 (9th Cir. 2005); *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1075 (9th Cir. 2002); *Muckleshoot Indian Tribe v. U.S. Forest Service*, 177 F.3d 800, 810 (9th Cir. 1999).

In considering cumulative impacts, an agency must provide “some quantified or detailed information; . . . [g]eneral statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided.” *Ocean Advocates*, 402 F.3d at 868 (agency finding that dock extension at refinery would not increase oil tanker traffic did not constitute hard look required by NEPA where it relied exclusively on unsubstantiated letter from project applicant) (citing *Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1379 (9th Cir. 1998)). The EIS must provide enough information concerning other area projects and their impacts to allow the decision-maker to decide whether or how to alter the proposed project to lessen cumulative environmental impacts. *City of Carmel v. U.S. Dep’t of Transp.*, 123 F.3d 1142, 1160-1161 (9th Cir. 1997).

1. The Cumulative Impacts Analysis Fails to Adequately Consider the Effects of Sheep Grazing on Lands Off the PNF

Although the FSEIS recognizes that “[d]omestic sheep are currently grazed on adjacent National Forests, the BLM, and private farms,” it fails to adequately consider the effects of these actions in its cumulative impacts analysis. See FSEIS at 3-82 through 3-93. Rather, the Forest Service simply concludes that “disease could still be a factor for bighorn sheep populations on the Payette National Forest, regardless of how much domestic sheep grazing remains within the

50 (E.D.Wis. 2005) (CEQ Guidebook cited by district court when determining proper scope of cumulative impact analysis for wildlife).

Payette National Forest.” *Id.* at 3-83. The Forest Service also avoided analysis by complaining that “[a]ctivities that occur on private lands are outside my control.” ROD at 15.

In addition to the National Forest, BLM and private land adjacent to the PNF, there is private land within the boundary of the PNF, which the PNF fails to account for in the FSEIS. *See* ROD at 15 (“Activities that occur on private lands are outside my control.”). Domestic sheep grazing occurs on this land. Existence of such grazing acreage within the PNF further shows how elimination of grazing on the PNF will not eliminate the risk of disease.

If disease transmission between domestic sheep and bighorns is a factor on the PNF, then it is certainly a factor off the PNF. It is illogical to conclude that disease transmission between domestic sheep and bighorns is somehow constrained by land ownership. Failing to model risk across the relevant landscape is misleading and taints the Forest Service’s analysis and conclusions regarding risk. *See* FSEIS at 2-18 (“the disease model was not run for the cumulative effects analysis”). The Forest Service’s own assessment shows that the proposed alternative fails when cumulative effects are considered. *See* ROD at 14-15; FSEIS at 2-18 (“cumulative effects would dramatically increase the extinction probabilities for all scenarios”); *see also supra* § III. Remarkably, the Forest Service concludes that “[t]he largest bighorn sheep populations . . . under Alternatives 7N and 7O, which were the most favorable action alternatives, would likely not persist under this cumulative effects scenario.” FSEIS at 2-18. This is reality, not just a “cumulative effects scenario.” “The implications of these additional contacts, particularly from adjacent Federal lands, would be substantial and contribute more to contact risk between the species than any of the action alternatives.” *Id.*

The analysis of risk and conclusions about disease transmission reached in the FSEIS do not provide a “useful analysis” of the cumulative impacts of present and future grazing on lands

off the PNF. The Forest Service's "[g]eneral statements about possible effects and some risk do not constitute a hard look" at the cumulative impacts. *See Ocean Advocates v. U.S. Army Corps of Eng'rs*, 402 F.3d 846, 868 (9th Cir. 2005); *Kern*, 284 F.3d at 1075; *Muckleshoot Indian Tribe*, 177 F.3d at 810. If the Forest Service had properly considered the cumulative impacts of continued grazing on the variety of lands within and adjacent to the PNF, and within bighorn sheep habitat, as it was required to do, it may have altered the proposed action. Additionally, the agency's own conclusions in its limited cumulative effects analysis are ultimately ignored by the Forest Service in the ROD, leading to an arbitrary and capricious decision. Thus, the ROD and FSEIS must be remanded to the Forest Supervisor for proper consideration of cumulative impacts.

2. The Cumulative Impacts Analysis Fails to Consider the Effects of the Elimination of Grazing on Wildlife

NEPA requires the agency to describe in the EIS all of the environmental consequences of its proposed action. 40 C.F.R. § 1502.16. This is to ensure that the agency takes a "hard look" at the effects of the proposed project. *Westland Water Dist. v. United States Dept. of Interior*, 376 F.3d 853, 872 (9th Cir. 2004).

The FSEIS acknowledges that suitable rangeland for domestic sheep will be lost on the PNF and provides that "reducing infrastructure could affect the economies associated with domestic sheep grazing." FSEIS at 3-83; *id.* at 3-157 ("quality of life associated with sheep grazing on the Payette National Forest could decrease . . . the quality of life of individual operators could be impacted to a greater degree"); *id.* ("Since allotments on the Payette National Forest are a valuable source of production for area operators, private land may not be able to compensate for this lost NFS rangeland"); *id.* at 3-159 ("Sheep grazing management on other lands (e.g., private, Bureau of Land Management) will cause additional bighorn sheep

cumulative economic effects.”). This is an understatement of the impacts on domestic sheep production. Because most sheep producers rely heavily on Forest Service rangeland, the PNF is likely to force many sheep producers out of business. *See, for example*, FSEIS at 3-102 (“Private land may not be able to compensate for this lost NFS rangeland, and quality feed and bucking conditions may be reduced, potentially affecting overall sheep production.”).

Considering this impact on sheep producers, the FSEIS should have considered the possibility of private land sell-offs by the sheep producers whose operations heavily rely on the availability of Forest Service allotments. Is it possible that if sheep producers find it uneconomical to maintain their land without access to public grazing land, they may choose to sell their land, potentially giving way to real estate development in the form of low density residential or commercial development (which has been shown to be an important factor for wildlife habitat suitability)?

These are reasonably foreseeable future actions that the Forest Service must consider. In fact, the loss of ranch land was such a concern and happening at such a rapid rate that the Forest Service developed an entire Open Space Conservation Strategy to combat loss of rural private lands. *See* USDA Forest Service, *Forest Service Open Space Conservation Strategy*, Nov. 2007, available at http://www.fs.fed.us/openspace/national_strategy.html (last visited August 26, 2010).

The Forest Service recognized in the Open Space Conservation Strategy that development of ranches and other such open space affects the Forest Service’s ability to manage national forests and grasslands and increases the risk of wildfire; raises the cost of fighting fires; contributes to the spread of invasive species; increases conflicts among recreational users; reduces access to recreation lands; and fragments fish and wildlife habitat. *Open Space*

Conservation Strategy at 3. With loss of open space, at stake is the ability of private and public forests and rangelands to provide clean water, scenic beauty, biodiversity, outdoor recreation, natural-resource-based jobs, forest products, and carbon sequestration. *Id.*

Here, the very real result of the Forest Supervisor's selected alternative will be to force sheep producers out of business. The following summarizes the concern:

There is also concern that failing ranches will turn into development projects, causing much greater effect on the environmentally sensitive region. '(The same rancher) also has over two miles of Salmon River frontage and has said before that if they won't let him raise sheep, he'll have to raise condos instead. I guess that's what the Forest Service wants.'

Jason Campbell, WLJ Correspondent, "Idaho forest sharply curtails sheep grazing," *Western Livestock Journal*, (Aug. 16, 2010). Nowhere in the FSEIS does the Forest Service discuss the real possible outcome of the Forest Supervisor's decision that sheep grazers will be forced out of business and sell their lands and the causal effect on wildlife and other environmental characteristics of the PNF.

C. The FSEIS's Purpose and Needs Statement is Inadequate and Skews the Forest Service's NEPA Analysis

An EIS must contain a discussion of the "underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." 40 C.F.R. § 1502.13. An adequate purpose and need statement is necessary to provide the agency and the public with the basis for comparison and choice. For example, in the context of an EIS, alternatives must relate to the concerned purpose and need to be judged reasonable. *Northwest Coalition for Alternatives to Pesticides v. Lyng*, 844 F.2d 588, 593 (9th Cir. 1988). The agency must guard against "skew[ing] the focus of the 'reasonable alternatives' analysis by defining . . . project purposes, rather than facilitating an informed evaluation of the competing environmental and developmental concerns implicated by the proposed project." *Sierra Club v. Marsh*, 714 F.

Supp. 539, 577 (D. Me. 1989). The agency therefore may not pre-ordain the outcome of its NEPA analysis by manipulating the purposes and needs addressed. *Id.* at 574; *Residents in Protest - I-35E v. Dole*, 583 F. Supp. 653, 660 (D. Minn. 1984).

The purpose and need in the FSEIS is unreasonably narrow and therefore effectively eliminates the analysis of reasonable alternatives. See FSEIS at 1-1 through 1-6; see, e.g., *Muckleshoot Indian Tribe v. U.S. Forest Service*, 177 F.3d 800, 812 (9th Cir. 1999). Because the stated goal of a project necessarily dictates the range of alternatives, an agency cannot define the goal so narrowly that only one alternative would accomplish the agency's objective. See *Friends of the Southeast's Future v. Morrison*, 153 F.3d 1059, 1066 (9th Cir. 1998). The courts agree that the purpose and need of the project cannot be so narrowly defined as to make the EIS a "foreordained formality." *City of Bridgeton v. FAA*, 212 F.3d 448, 458 (8th Cir. 2000).

It appears that the underlying objective of the PNF is to implement management strategies to provide for the viability of bighorn sheep on the PNF. FSEIS at 1-5. Although the FSEIS recognizes that the exact mechanisms of disease transmission are not fully understood and that there exists considerable debate surrounding the disease transmission issue, the FSEIS forecloses consideration of any alternative dealing with the mitigation of disease transmission or implementation of measures to boost bighorn sheep immunity to disease. The PNF's consideration of alternatives is so limited that only those alternatives that involve removal of domestic sheep from bighorn sheep habitat are considered. However, feasible alternatives involving the implementation of best management practices and mitigation measures to promote separation of domestic sheep and bighorns are available. Further, alternatives to enhance bighorn sheep resistance to disease to alleviate the need to separate domestic sheep and bighorns,

assuming for argument's sake that separation is necessary and effective, are also available. The reasonable range of alternatives must be expanded to include the alternatives just mentioned.

The FSEIS states that modeling “suggests that for some bighorn sheep populations, even a minimal level of contact can have severe persistence implications for bighorn sheep populations.” FSEIS at 3-53. The FSEIS also provides that “disease could still be a factor for bighorn sheep populations on the Payette National Forest, regardless of how much domestic sheep grazing remains within the Payette National Forest.” *Id.* at 3-83; *see also id.* at 3-84 (“the effects of the potential risk of contact from the Payette National Forest can extend beyond the boundaries of the known metapopulations”); *id.* at 3-85 (“other ownerships that graze domestic sheep can be a potential source of disease to populations of bighorn sheep on the Payette National Forest, regardless of the alternative implemented by the Payette National Forest Service”). These statements represent the futility of the PNF’s selected alternative. *See also supra* § III. Under the analysis in the FSEIS, the PNF would have to eliminate all, or nearly all, contact with domestic sheep and goats, and any other species harboring disease. This would be an impossible task considering the PNF’s inability to regulate lands outside of its jurisdiction, on which bighorns and domestic sheep and goats and other species may interact.

Based on the analysis in the FSEIS, the most prudent and most logical management action would be to work on developing the immunity of bighorn sheep to disease. Without this, bighorns will appear to remain at risk, regardless of actions taken by the PNF. Thus, the PNF should have analyzed a solution to the problems of disease transmission that would protect bighorn sheep in the long-term, not just in the short-term. The PNF’s selected action is short-sighted and does not provide any assurance that bighorn populations will avoid contact with disease.

A more appropriate alternative would be for the PNF to develop a comprehensive bighorn health policy which has population immunity and agreed upon nutritional standards at its center. A bighorn health plan should include agreed upon nutritional standards (which are applied to habitat choices for translocation or population growth goals), disease surveillance, appropriate quarantine with diagnostics before translocation and vaccination. Should there be needs in terms of diagnostics, nutritional unknowns and vaccinations, clearly defined research should be developed.

D. The FSEIS and ROD Failed to Consider an Adequate Range of Alternatives as Required by NEPA

NEPA requires that as part of its preparation of an EIS, an agency must “study, develop, and describe appropriate alternatives to recommended courses of action,” 42 U.S.C. § 4332 (2)(E), and discuss alternatives that it has considered, 40 C.F.R. § 1508.9. The agency’s discussion of reasonable alternatives forms the “heart” of the EA. 30 C.F.R. § 1502.14. NEPA mandates that federal agencies “provide legitimate consideration to alternatives that fall between the obvious extremes.” *Colorado Env’tl. Coalition v. Dombeck*, 185 F.3d 1162, 1175 (10th Cir. 1998). More specifically, NEPA is violated when an agency dismisses the consideration of an alternative “in a conclusory and perfunctory manner that [does] not support a conclusion that it was unreasonable to consider them as viable alternatives.” *Davis v. Mineta*, 302 F.3d 1104, 1122 (10th Cir. 2002). “The existence of reasonable but unexamined alternatives renders an EIS inadequate.” *Ilio ’ulaokalani Coalition v. Rumsfeld*, 464 F.3d 1083, 1095, 1101 (9th Cir. 2006) (Army’s failure to consider alternative of transforming 2d Brigade outside of Hawaii rendered EIS inadequate).

The FSEIS fails to adequately study, develop and describe appropriate alternatives to the proposed course of action. The alternatives analyzed do not meet the stated purpose and need for

the action. Furthermore, the alternatives analyzed by the FSEIS represent only the extremes of the spectrum of the potential actions and create all or nothing scenarios. Finally, the Forest Service never addressed an intermediate solution proposed by IWGA that would have met the stated purpose and need.

1. The Final SEIS Must Consider Implementation of Best Management Practices and Mitigation Measures for a Reasonable Range of Alternatives

For a reasonable range of alternatives, the FSEIS must consider implementation of best management practices (“BMPs”) and mitigation measures, rather than simply concluding that domestic sheep grazing allotments must be closed. An EIS must describe and analyze a proper range of alternatives. 40 C.F.R. § 1502.14. This includes the requirement to rigorously explore and objectively evaluate all reasonable alternatives. *Id.* There is also a requirement to include appropriate mitigation measures. *Id.* Without an alternative that describes and analyzes the implementation of mitigation measures to prevent contact between domestic sheep and bighorn sheep, instead of simply eliminating domestic sheep allotments, the FSEIS contains an inadequate range of alternatives. Alternatives considering best management practices and mitigation measures are both reasonable and feasible under the circumstances, and must be analyzed in the FSEIS.

Specifically, with regard to mitigation measures, CEQ regulations require the PNF to discuss possible mitigation measures when defining the scope of the EIS, in identifying the consequences of the proposed action, and in explaining the PNF’s ultimate decision. 40 C.F.R. §§ 1502.16(h), 1505.2(c) and 1508.25(b). The regulations define “mitigation” to include the following:

- (a) Avoiding the impact altogether by not taking a certain action or parts of an action;

- (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;
- (e) Compensating for the impact of replacing or providing substitute resources or environments.

40 C.F.R. § 1508.20. An EIS must include a reasonably thorough discussion of mitigation measures. Here, the FSEIS fails to discuss mitigation measures.

Rather, the FSEIS summarily dismisses implementation of monitoring and BMPs and other mitigation measures by providing “[a]lthough monitoring and BMPs may play a role in short term management decisions, the cost and efficacy of long-term applications is unrealistic.” FSEIS, Appendix A at A-115; *see also id.* at 3-92 (similar); *id.* at 3-103. There is no basis for this statement. The PNF has not provided any discussion of recommended best management practices in the FSEIS, nor has it included any alternatives that would implement such practices. As a result, the range of alternatives considered in the FSEIS is deficient. The PNF should consider best management practices and other mitigation measures in the FSEIS, rather than jumping to the conclusion that domestic sheep grazing allotments on the PNF must be closed. The FSEIS must include a proper range of alternatives and must discuss appropriate mitigation measures.

Moreover, on other National Forest System lands, the Forest Service controls contact between domestic sheep and bighorns with annual operating instructions (“AOI”) that include

minimizing measures, terms and conditions, and reporting requirements. Such AOIs should be considered in the FSEIS. For example, AOI developed for the Sawtooth National Forest (“Sawtooth AOI”) provide reliable management guides and commitments to maintain separation between domestic sheep and bighorn sheep.¹³ The “2010 Bighorn Sheep Management Guides” from these AOI provide:

1. The permittee will notify the Ranger District prior to trucking onto the National Forest.
2. The permittee will notify the Ranger District of all bighorn sheep sightings as soon as possible, preferably within 24 hours.
3. The permittee will notify the Ranger District of all stray domestic sheep within 24 hours of discovery. When strays are found, they will be removed from the allotment or returned to the band. The District will be notified of location where strays are found and action taken by the permittee.
4. Herders will count marker sheep daily to assure that no small groups of sheep have separated from the main band.
5. If herders observe bighorn sheep in close proximity (less than 1 mile) they will haze the bighorn out of the area and if necessary adjust the trailing or

¹³ See Annual Operating Instructions, Sawtooth National Forest, Minidoka Ranger District, 2010, available at

http://www.fs.usda.gov/wps/portal/fsinternet!/ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gjAwhwtDDw9_AI8zPyhQoY6BdkOyoCAGixyPg!/?navtype=BROWSEBYSUBJECT&cid=stelprdb5166591&navid=1301200000000000&pnavid=1300000000000000&ss=110414&position=Project.Html&ttype=detail&pname=Sawtooth%2520National%2520Forest-%2520Resource%2520Management (last visited Sept. 9, 2010).

grazing route to minimize the possibility of direct contact with domestic sheep.

6. The permittee will provide binoculars to the herders to improve their ability to spot bighorn sheep.

Sawtooth AOI at 2. The AOI also encourages use of guard dogs. *Id.* at 4. Additional commitments by the permittee in the Sawtooth AOI include instruction of herders on bighorn identification and separation procedures, extensive marking and counting of sheep and use of man-made and natural barriers to ensure separation of domestic sheep from bighorn sheep. *Id.* at 6-8. Strategies for managing separation between domestic sheep and bighorn sheep can also be adopted by permittees, such as the “Strategy for Managing Separation between Bighorn Sheep and Domestic Sheep and Goats in the South Hills” that is mentioned in the Sawtooth AOI, developed by the Idaho Department of Fish and Game, the U.S. Forest Service, the Bureau of Land Management, the Idaho Department of Agriculture and permittees. *See id.* at 6.

The FSEIS should analyze possible minimizing measures and develop alternatives that allow for domestic sheep grazing on the PNF, instead of simply eliminating grazing allotments. Further, the PNF should set forth a plan for working with grazing permittees to provide for grazing on the PNF while minimizing impacts to bighorns.

2. Alternatives Must Consider Strengthening Bighorn Sheep Immunity to Disease

Established epidemiology shows that disease occurs in bighorn sheep populations in the absence of contact with domestic sheep and other animals. These data indicate that infectious agents and other contributing factors involved in the disease process are present within bighorn sheep populations. It appears that most bighorn sheep are getting pneumonia from other bighorns because most of the herds have outbreaks of pneumonia yet are not in contact with

domestic sheep. This indicates that the major problem is the lack of a good immune system in the bighorns. As discussed below there are inherent risks in deciding to focus on attempting to isolate populations from all perceived transmission risks (when complete isolation is not possible), instead the focus should be on managing population immunity.

The critical component of managing infectious diseases in populations is immunity. A decision to attempt to immunologically isolate a given population from contact with potential sources of infection assumes the capacity to maintain total isolation. The United States practices this form of management with diseases such as foot and mouth disease, a highly contagious viral infection of cattle, sheep and swine. Critical to this policy is the ability to identify countries which have endemic infection and restrict the entry into the United States of sources of virus from these countries. The primary component of this management scheme is assuring that no sources of infection exist within the United States. The risks associated with this management scheme are that the entire United States cattle, sheep and swine populations are immunologically naïve and susceptible to infection and the enormous economic losses associated with entrance of the virus to United States animal populations. The wisdom of this management scheme (maintaining immunological naivety) in animal populations within the United States, when sources of infection are present in nature, is highly questionable. Two methods which provide population immunity are vaccination and/or exposure of populations through natural exposure (transmission). This latter situation is also referred to as premonition (resistance to a disease due to the existence of its causative agent in a state of physiological equilibrium in the host and/or by immunity to a particular infection due to previous presence of the causative agent).

The primary risk associated with incomplete immunologic isolation of an animal population is cycles of disease when isolation is broken as opposed to a continuum of managed

population immunity through vaccines and/or natural exposure and premonition. When multiple sources of a given pathogen or group of pathogens exist, the prudent long-term health management dictates that population immunity be the primary tool. As an example of population immunity being the most effective management tool, the Lostine River herd of bighorns experienced a die-off in the 1980s, but is now considered the most viable herd in the Hell's Canyon area due to successful population immunity. Since bighorn sheep are infecting each other, building up their immune systems could have a beneficial effect on survival from many forms of disease.

Here, the Forest Service failed to adequately consider a range of alternatives because the alternatives examined represent only the extremes of those reasonable alternatives available. *Colorado Env'tl. Coalition*, 185 F.3d at 1175. None of the alternatives considered building up bighorn sheep immunity to disease. The range of alternatives is unreasonable because a reasonable intermediate alternative was summarily rejected. *Davis v. Mineta*, 302 F.3d at 1122. Alternatives that implement best management practices, utilize annual operating instructions, and which consider bighorn immunity and other long-term health concerns, must be considered in the FSEIS.

E. The Forest Service Failed to Meet Its NEPA Obligation to Ensure the Scientific Integrity of the FSEIS

In evaluating the environmental impacts of a proposed action, NEPA requires federal agencies to ensure the scientific integrity of an EIS by considering appropriate studies and data. 40 C.F.R. § 1502.24. An agency may not rely on conclusory statements unsupported by data, authorities, or explanatory information. *Seattle Audubon Soc'y v. Moseley*, 798 F. Supp. 1473, 1480-83 (W.D. Wash. 1992), *aff'd*, 998 F.2d 699 (9th Cir. 1993). NEPA requires that an agency candidly disclose in its EIS the risks and effects of its proposed actions, and that it respond to

adverse opinions held by respected scientists. *Seattle Audubon*, 798 F. Supp. at 1482 (citing *Friends of the Earth v. Hall*, 693 F. Supp. 904, 937 (W.D. Wash. 1988)).

The environmental effects that must be evaluated in an EIS include cultural, economic, and social effects, whether these effects are direct, indirect, or cumulative effects of the proposed action. 40 C.F.R. § 1508.8; *id.* § 1502.16. The required evaluation of environmental effects in an EIS “forms the scientific and analytic basis for the comparison[]” of alternatives that is the heart of the environmental impact statement. 40 C.F.R. § 1502.16. The CEQ regulations specify the procedures that must be followed when, as here, an agency is evaluating reasonably foreseeable significant adverse effects in an EIS and there is incomplete or unavailable information. *See* 40 C.F.R. § 1502.22.

In addition to its general obligation to respond to public comments under 40 C.F.R. § 1503.4(a), the PNF must specifically “discuss at appropriate points in the final [EIS] any responsible opposing view which was not adequately discussed in the draft [EIS] and . . . indicate the agency’s response to the issues raised.” *Ctr. for Biological Diversity v. U.S. Forest Serv.*, 349 F.3d 1157, 1167 (9th Cir. 2003) (quoting 40 C.F.R. § 1502.9(b)). A failure to do so is itself a NEPA violation. *Id.* at 1168. The PNF must also “insure the professional integrity, including scientific integrity, of the discussions and analyses” included in its EIS. 40 C.F.R. § 1502.24.

1. The Forest Service Did Not Properly Address the Relevance of Unavailable or Incomplete Scientific Information

The Forest Service readily acknowledges in several places that it lacks complete information to assess the potential effects of disease transmission between domestic sheep and bighorns. For example, the ROD states that “the mechanisms of disease transmission are not fully understood.” ROD at 6; *see also id.* at 7 (“the interaction of disease outbreaks with other

stressors (both disease and otherwise) in bighorn sheep populations is poorly understood”). Similarly, the FSEIS provides “[i]t continues to be recognized that the exact mechanisms of the transfer [of disease] are not fully understood.” FSEIS at 1-2; *see also id* at 2-17 (“The severity of the outcomes from the disease models depends largely on assumptions made relative to probability of a disease outbreak given contact.”); *id.* at 3-13 (“We do not understand all of the mechanisms involved in potential disease transmission between the species.”); *id.* at 3-41 (similar); *id.* at 3-56 (“The complexity of the model and number of variables whose estimation was necessary to run it . . . imply a high degree of uncertainty of its results.”). The FSEIS also provides that “the potential risk of contact from lands other than the Payette National Forest is not completely known.” *Id.* at 83; *see also id.* at 3-46, 3-51, 3-52 (discussing lack of information for modeling effort). Further, the FSEIS reports that “[d]eveloping immunity to pasteurellosis in bighorn sheep is complex and poorly understood” *Id.* at 3-8.

In situations such as this, where the relevant information for assessing impacts is incomplete or unavailable, the agency preparing the EIS must take the following steps: first, if the incomplete information relevant to reasonably foreseeable adverse effects is essential to a reasoned choice among alternatives and the overall costs of obtaining the information is not exorbitant, the agency must include that information in the EIS. Next, if the relevant information cannot be obtained because the overall costs are exorbitant or the means of obtaining the information are not known, then an agency must include in an EIS:

- (1) a statement that such information is incomplete or unavailable;
- (2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant impacts on the human environment; (3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and (4) the agency’s evaluation of such impacts

based upon theoretical approaches or research methods generally accepted in the scientific community.

40 C.F.R. § 1502.22(b).

Here, the Payette National Forest failed to take these required steps to address the incomplete or unavailable information relevant to ascertaining the possibility and consequences of disease transmission between domestic sheep and bighorns. The FSEIS failed to contain a clear and direct statement that the required information is incomplete or unavailable. The FSEIS also fails to discuss the relevance of the incomplete or unavailable information in light of evaluation of a reasonably foreseeable environmental impact. Lastly, the FSEIS fails to contain the Forest Service's own evaluation of such impacts "based upon theoretical approaches or research methods generally accepted in the scientific community." *Id.*

Instead of honestly evaluating the range of potential scientific opinion applicable to disease transmission between domestic sheep and bighorns, the Forest Service impermissibly substituted its own assumptions on disease transmission. *See, for example*, FSEIS at 2-13 ("we infer that overlap between bighorn sheep core herd home ranges and domestic sheep allotments will result in repeated contacts that will result in disease outbreak"); *id.* at 3-19 (similar). Where these assumptions have no grounding in the scientific literature concerning disease transmission, the agency has failed to ensure professional integrity, including the scientific integrity, of the FSEIS, and has also failed to comply with the requirements of the CEQ regulations to address incomplete or unavailable scientific information. Not only do the Forest Service's assumptions lack grounding, they are contradictory to the published, peer reviewed scientific literature from Lawrence et al. Based on this fundamental flaw in the evaluation or environmental consequences in the FEIS, the ROD and FSEIS should be remanded to the PNF for further analysis and decision-making.

2. The FSEIS Must Explain What is Being Done to Prove the Assumption that Disease Transmission from Domestic Sheep to Bighorns is Occurring the Wild

The FSEIS assumes that “disease transmission from domestic sheep to bighorn sheep is a threat to the wild sheep species.” FSEIS at 2-3; *id.* at 2-13 (“we infer that overlap between bighorn sheep core herd home ranges and domestic sheep allotments will result in repeated contacts that will result in disease outbreak”). The PNF provides that some published science supports this assumption because it has “proven” transmission from domestic sheep to bighorn sheep in laboratory settings. *Id.* However, the PNF provides no discussion of whether disease transmission from domestic sheep to bighorn sheep actually occurs in the wild and is proven to be a threat to the wild sheep species. *Id.*; *id.* at 3-11 (“No one form of evidence can or does conclusively demonstrate that contact with domestic sheep frequently leads to die-offs of[] bighorn sheep populations.”).

Reports from wildlife officials across the West indicate that there is no evidence linking recent pneumonia outbreaks in bighorn sheep populations to disease transmission from domestics sheep. *See* Martin Griffith, Associate Press Writer, *Outbreak kills hundreds of bighorn sheep in West* (Feb. 26, 2010), available at <http://www.katu.com/outdoors/featured/85602037.html> (last visited August 26, 2010). As Krysten Schuler with the U.S. Geological Survey’s National Wildlife Health Center indicated “[i]t can be difficult to determine what causes a pneumonia outbreak . . . , [t]hey can include factors that are bacterial, parasitic or viral” *Id.* According to wildlife officials, recent pneumonia outbreaks have not been linked to domestic sheep: “[w]hile domestic sheep carry pathogens that can infect bighorns, there’s no evidence linking them to any of the pneumonia outbreaks, wildlife officials said.” *Id.*

The PNF failed to discuss the fact that there is no evidence of a link between domestic sheep and recent pneumonia outbreaks within bighorn sheep populations in the wild. This fact calls into question the PNF's assumptions about disease transmission from domestic sheep to bighorn sheep. The PNF was required to disclose and analyze the possibility that domestic sheep are not the link causing bighorn sheep die-offs. Otherwise, the FSEIS would be rendered defective. *See Center for Biological Diversity v. U.S. Forest Service*, 349 F.3d 1157, 1169 (9th Cir. 2003); *Seattle Audubon Society v. Espy*, 998 F.2d 699, 704 (9th Cir. 1993); *League of Wilderness Defenders v. Zielinski*, 187 F. Supp.2d 1263 (D. Or. 2002).

The Ninth Circuit, in its review of a Forest Service EIS that approved various timber sales, has highlighted this point. In *Center for Biological Diversity*, the Forest Service had determined that proposed logging would not have a significant adverse impact on the northern goshawk because it had concluded that the northern goshawk was a habitat generalist. Various parties, including the FWS and state wildlife agencies, had submitted comments and concerns to the Forest Service as a part of the scoping process and in response to the DEIS that disputed whether the northern goshawk was a habitat generalist and identified published research and scientific studies that suggested it may be a habitat specialist. *Id.* at 1162-63. However, the final EIS did not respond to these comments or otherwise discuss these scientific studies and opinions. *Id.* Therefore, the court held that the EIS failed to disclose and discuss responsible opposing scientific viewpoints in violation of NEPA and the CEQ Regulations. *Id.* at 1169; *see also Sierra Club v. Bosworth*, 199 F. Supp.2d 971, 981 (N.D. Cal. 2002) (holding that an EIS must include a reasoned discussion of major scientific objections).

Similarly, here, the FSEIS fails to discuss the mechanism through which domestic sheep transfer disease to bighorn sheep, despite comments demanding such discussion in the FSEIS.

Scientists have opposing viewpoints on the mechanism of disease transmission and the probability of disease transmission in the wild. These viewpoints were required to be addressed in the FSEIS, particularly those viewpoints on disease transmission provided by Lawrence et al.

3. The PNF Should Not Rely on Assumptions Concerning Disease Transmission and Must Rely on Best Available Science

The FSEIS states that “[o]ne key assumption carried over from the 2003 FEIS is that disease transmission from domestic sheep to bighorn sheep is a threat to the wild sheep species.” FSEIS at 2-3; *see also id.* at 2-16 (“Assumptions regarding the probability of a disease outbreak given contact have substantial implications for [] estimating the persistence of these bighorn sheep populations on, and adjacent to, the Payette National Forest.”); *id.* at 2-17 (“The severity of the outcomes from the disease model depends largely on assumptions”); *see supra* § IV.E.1. These statements reveal that the PNF has relied largely on assumptions. The scientific research needs to document that disease transmission occurs between bighorns and domestic sheep.

Forest Service regulations require that “best available science” be taken into account in planning. 36 C.F.R. § 219.11(a). In taking “best available science” into account, the Forest Service must “(1) [d]ocument how the best available science was taken into account in the planning process within the context of the issues being considered and (2) [d]ocument that the science was appropriately interpreted and applied.” *Id.* “Under the final planning rule there is no firm, established definition of what is best available science.” *National Forest System Land Management Planning; Final Rule*, 73 Fed. Reg. 21468, 21498 (Apr. 21, 2008). “It is important to realize there can be more than one source for science or more than one interpretation of the science.” *Id.* “What constitutes the best available science might vary over time and across scientific disciplines. The best available science is a suite of information and the suite of information does not dictate that something can only be done one way.” *Id.*

In the FSEIS, the PNF makes the one-sided assumption that disease transmission from domestic sheep to bighorn sheep is a threat to the wild sheep species. This assumption does not rely on best available science, because, among other things, it fails to account for other interpretations of the science; it fails to account for the fact that bighorns already carry disease; it fails to account for the fact that other wildlife may transmit disease to bighorns; and it fails to account for the fact that the bighorns may have a reduced immunity to disease that can be improved. The FSEIS fails to present baseline data on bighorn health. Further, the Forest Service's assumption is contradicted by the study by Lawrence et al. Thus far, the PNF has dictated that interpretation of the science must lead to separation of domestic sheep and bighorns on the PNF. Here, the best available science does not dictate such an outcome.

4. Epidemiological Modeling is Needed to Understand How a Range of Factors Affect the Dynamics of Disease Spread Under Various Management Alternatives

The disease review in the FSEIS is based on geographic characteristics of the disease in the context of interaction between domestic and wild sheep. While this is a useful and necessary component of much needed research, it in itself is not enough to make well-informed recommendations on policy alternatives. For example, the disease review mentions, at FSEIS 3-6, that only "limited knowledge of transmission dynamics exists (Garde et al. 2005)." Clinical studies have shown bighorn sheep susceptibility to disease from contact with domestic sheep. However, epidemiologic modeling is needed to understand how contacts with domestic sheep, bighorn sheep, and other disease carriers (llamas, wild goats, birds, etc.), forage and climatic conditions, and other factors affect the dynamics of the disease spread under various management alternatives. The current disease model "is largely dependent on assumptions." FSEIS at 2-17. These assumptions need to be studied and proven to be relied upon.

NEPA's procedures require the presentation of "complete and accurate information to decision makers and to the public to allow an informed comparison of the alternatives considered in the EIS." *NRDC v. U.S. Forest Service*, 421 F.3d at 813. Further, modeling and additional study is needed to determine the added probability of disease transmission among bighorns. The probability that healthy "carrier" bighorns are infecting "non-carrier" bighorns is likely high, since a large number of the bighorns on the PNF may be disease-carriers. More information and study should be undertaken to determine the exact mechanism for developing pneumonia in bighorn sheep following association with domestic sheep. The PNF must study the development of immunity to disease in bighorn sheep

F. The Forest Service Failed to Properly Respond to Comments on the DSEIS

In preparing a final EIS, the CEQ regulations require that an agency properly respond to relevant, substantive comments made on the draft EIS. *See* 40 C.F.R. § 1503.4. Further, in addition to its general obligation to respond to public comments under 40 C.F.R. § 1503.4(a), the PNF must specifically "discuss at appropriate points in the final [EIS] any responsible opposing view which was not adequately discussed in the draft [EIS] and ... indicate the agency's response to the issues raised." *Ctr. for Biological Diversity v. U.S. Forest Serv.*, 349 F.3d 1157, 1167 (9th Cir. 2003) (quoting 40 C.F.R. § 1502.9(b)). A failure to do so is itself a NEPA violation. *Id.* at 1168. The PNF must also "insure the professional integrity, including scientific integrity, of the discussions and analyses" included in its EIS. 40 C.F.R. § 1502.24.

1. The PNF Must Include the Findings of the CAST Report in the FSEIS

The FSEIS fails to discuss and analyze scientific findings indicating that pasteurellosis epidemics in bighorn sheep are not caused solely by disease transmission from domestic sheep to bighorns. *See* Council for Agricultural Science and Technology (CAST), *Pasteurellosis Transmission Risks between Domestic and Wild Sheep* ("CAST Report"), CAST Commentary

QT2008-1 (2008). Not all pasteurellosis epidemics in bighorn sheep can be attributed to contact with domestic sheep. CAST at 5. The CAST Report found that “[p]asteurellaceae have been isolated from both healthy and pneumonic wild sheep” and that “both endemic and introduced pathogens are believed to contribute to contemporary pasteurellosis epidemics in bighorn sheep.” CAST Report at 3 (citations omitted).

As the CAST Report states, “[b]ecause 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 out-breeding and genetic diversity must be weighed against the increased risk of disease transmission.” CAST Report at 5. The FSEIS should have examined the implications of interactions between different herds of wild sheep. This examination should weigh the benefits of out-breeding and genetic diversity against the increased risk of disease transmission. Instead, the findings and conclusions of the CAST Report were ignored by the Forest Service in violation of NEPA. See FSEIS, Appendix A at A-181.

The CAST Report concludes that “[f]urther 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.” CAST Report at 4. The FSEIS does not analyze 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. Until risks from these interactions are studied and analyzed, there is no guarantee or proven basis that the proposed alternative, or any alternative in the FSEIS, will be effective to maintain the viability of bighorns on the PNF. The FSEIS must examine these risks and the

potential influences on these risks. These concerns were ignored by the FSEIS, Appendix A at A-181.

Rather than eliminating grazing of domestic sheep entirely, which may not solve the problems of disease transmission or enhance the viability of bighorns on the PNF, the CAST Report argues that “[d]eveloping 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.” CAST Report at 7. The FSEIS should have evaluated the implementation of such methods to help decrease risks posed by interspecies interactions, or to decrease wild sheep susceptibility to pathogens. Instead, the FSEIS rejected consideration of alternative methods to help decrease risks posed by interspecies interactions because of its claim that “it is not clear whether their administration to wild populations of bighorn sheep living in country as inaccessible as the Payette National Forest would be either feasible or desirable.” FSEIS, Appendix A at A-181. Then, the FSEIS declined responsibility for management of bighorn sheep populations. *Id.*

These are not proper responses to public comments. The PNF must specifically “discuss at appropriate points in the final [EIS] any responsible opposing view which was not adequately discussed in the draft [EIS] and ... indicate the agency’s response to the issues raised.” *Ctr. for Biological Diversity v. U.S. Forest Serv.*, 349 F.3d 1157, 1167 (9th Cir. 2003) (quoting 40 C.F.R. § 1502.9(b)). The PNF’s claim that bighorn are so inaccessible is refuted by the premise in the FSEIS that bighorn sheep are so accessible that domestic sheep herders and their sheep are transmitting disease to bighorn sheep. Further, the entire ROD and FSEIS is premised on the Forest Service’s belief that it has to manage bighorn sheep populations. If the PNF “is not the

agency responsible for management of bighorn sheep populations,” then the entire ROD and FSEIS must be invalidated.

2. The PNF Overestimates the Likelihood that Bighorn Sheep Will Contact Domestic Sheep on an Allotment

The risk of contact model used by the PNF holds that a bighorn sheep transecting a domestic sheep allotment is contact. FSEIS at 3-55. Further, the PNF states, “we infer that overlap between bighorn sheep CHHRs and domestic sheep allotments will result in repeated contacts that will result in disease outbreak.” FSEIS at 3-73; *but see* ROD at 12 (“Determining the probability that a bighorn will reach an occupied allotment and that contact between the species will result in disease transmission is problematic.”). This methodology overestimates the likelihood that bighorn sheep will contact domestic sheep because contact with an allotment does not constitute contact with a domestic sheep on that allotment. Furthermore, mere contact with domestic sheep does not equate to disease transmission from domestic sheep to bighorn sheep. This point was proven in the recent Lawrence et al. study. Moreover, this methodology does not account for bighorn sheep that have developed an immunity to disease or bighorn sheep that are already infected with disease. The PNF’s risk of contact model grossly overestimates the risk of contact because of the underlying assumptions in the model and great uncertainty inherent in the model.

The CEQ regulations provide that an EIS must identify methodologies used and scientific and other sources relied on for conclusions in an EIS. 40 C.F.R. §1502.24. NEPA requires “up-front disclosures of relevant shortcomings in the data or models” used in an EIS. *Lands Council*, 395 F.3d at 1032. Withholding such information violates NEPA. *Id.* Further, methodologies that are “based on various assumptions and subjective values” fail to provide a rational basis for

a decision, and thereby render an EIS inadequate. *See National Parks and Conservation Ass'n v. FAA*, 998 F.2d 1523, 1533 (10th Cir. 1993).

Relief Requested

In adopting Alternative 7O with implementation modifications (7O modified) and eliminating a large portion of lands suitable for domestic sheep grazing on the PNF, the Forest Service has exceeded or violated its obligations and authority under the MUSYA, NFMA, HCNRA Act, and FLPMA, and has failed to follow the procedures prescribed by NEPA and NFMA planning regulations. IWGA requests the following immediate relief to remedy this situation:

A. Withdraw the decision to select Alternative 7O modified and remand the decision to the Forest Supervisor for reconsideration consistent with the Forest Service's obligations under NEPA and NFMA and consistent with the limited scope of the agency's MUSYA, NFMA, HCNRA Act, and FLPMA obligations.

B. On remand, require consideration consistent with the Forest Service's obligations under the Forest Service directive from Mark Rey, the Forest Service Open Space Conservation Strategy, the 2007 MOU with the State of Idaho, and the Letter of Agreement between the Forest Service and the Idaho Wool Growers Association.

C. On remand, require full adherence to the procedures governing forest plan amendments under NEPA, NFMA and Forest Service regulations, including the Optional Appeal Procedures. This requirement should also include full compliance with Judge Winmill's decision in *Idaho Wool Growers Assoc. v. Schafer*, 637 F. Supp. 2d 868 (D. Idaho 2009).

D. On remand, require a full evaluation of the justification for any elimination of grazing acreage on the PNF and require appropriate consideration of the scientific uncertainty surrounding disease transmission between domestic sheep and bighorn sheep, including the

mechanisms through which such transmission occurs, as required by NEPA. Such consideration should address the findings by Lawrence et al. concerning disease transmission.

E. On remand, require an appropriate consideration of the effects of contact between domestic sheep and bighorn sheep on adjacent National Forest, BLM and private lands. This evaluation should address the ineffectiveness of eliminating grazing on the PNF at reducing contact between domestic sheep and bighorn sheep, and discuss the potential for disease transference between populations of bighorn sheep and between other species and bighorn sheep.

F. On remand, require a full consideration of alternatives to the elimination of grazing on the PNF, including use of best management practices and annual operating instructions. This evaluation should also address the development of a comprehensive bighorn sheep health policy and use of vaccines, nutritional supplements and other mechanisms for ensuring the long-term health of bighorn sheep populations.

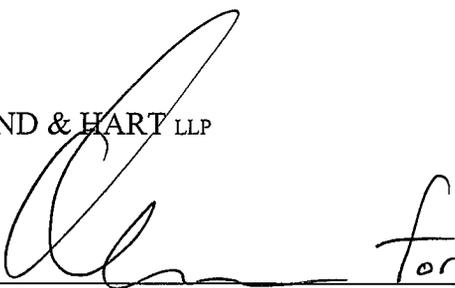
G. On remand, require proper consideration of the cumulative impacts of alternatives on sheep ranchers, including but not limited to the complete loss of business for sheep ranchers utilizing the PNF and resulting effects on the PNF.

H. Pending resolution of this appeal on remand with a new FSEIS and ROD, allow continued grazing of domestic sheep on the PNF under the No Action Alternative until the Forest Service has complied with relevant authority and applicable procedures.

Respectfully submitted this 10th day of September, 2010.

HOLLAND & HART LLP

By



for

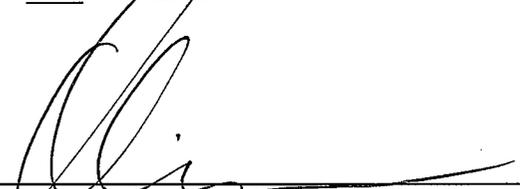
William G. Myers III
Attorneys for Appellants

Certificate Of Service

I hereby certify that on this 10th day of September, 2010, I caused to be served a true and correct copy of the foregoing by the method indicated below, and addressed to the following:

Intermountain Regional Forester	<u> x </u>	U.S. Certified Mail, Return
Attn: Harv Forsgren, Appeal Deciding Officer		Receipt Requested
USDA-Forest Service	<u> </u>	Hand Delivered
324 25th Street	<u> </u>	Overnight Mail
Ogden, UT 84401	<u> </u>	Telecopy (Fax)
Fax: (801) 625-5277	<u> x </u>	E-mail
E-mail: appeals-intermtn-regional-office@fs.fed.us		

Forest Supervisor, Payette National Forest	<u> x </u>	U.S. Certified Mail, Return
USDA-Forest Service		Receipt Requested
800 W. Lakeside Ave.	<u> </u>	Hand Delivered
McCall, ID 83638	<u> </u>	Overnight Mail
Fax: (208) 634-0744	<u> </u>	Telecopy (Fax)
E-mail: payettebighorn@fs.fed.us	<u> x </u>	E-mail



for HOLLAND & HART LLP

Appendix 1, Names, Mailing Addresses and Telephone Numbers of Appellants

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Sacramento, CA 95814-1910
(916) 444-8122

Colorado Wool Growers Association
8833 Ralston Rd Ste 200
Arvada, CO 80002
(303) 431-8310

F.I.M. Corporation
25 Saroni Rd
Smith, NV 89430-9401
(775) 465-2381

Idaho Wool Growers Association
P.O. Box 2596
Boise, ID 83701
(208) 344-2271

Idaho Farm Bureau Federation
275 Tierra Vista Drive
P.O. Box 4848
Pocatello, ID 83205-4848
(208) 232-7914

Krebs Livestock LLC
69956 Hwy 74 – Cecil
Ione, OR 97843
(541) 422-7548

Montana Wool Growers Association
P.O. Box 1693
Helena, MT 59624
(406) 442-1330

National Lamb Feeders Association
1270 Chemeketa St. NE
Salem, OR 97301-4145
(503) 370-7024

Nevada Wool Growers Association
HC 30 Box 320
Spring Creek, NV 89815
(775) 744-4388

New Mexico Federal Lands Council
Box 149
Alamogordo, NM 88310
(575) 963-2505

New Mexico Wool Growers Association
P.O. Box 7517
Albuquerque, NM 87194
(505) 247-0584

Oregon Sheep Growers Association
1270 Chemeketa St NE
Salem, OR 97301-4145
(503) 364-5462

Public Lands Council
1301 Pennsylvania Ave. NW – Suite 300
Washington, D.C. 20004
(202) 347-0228

Shirts Brothers Sheep
1839 Weiser River Road
Weiser, ID 83672
(208) 549-0391

Soulen Livestock Company
1760 Fairmont Drive
Weiser, ID 83672-1215
(208) 549-1878

Texas Sheep & Goat Raisers Association
P.O. Box 2290
San Angelo, TX 76902
(325) 655-7388

Utah Wool Growers Association
431 W. 3700 N
Provo, UT 84604
(801) 765-1080

Washington State Sheep Producers
P.O. Box 2145
Leavenworth, WA 98826
(509) 888-3003
Wyoming Wool Growers Association
P.O. Box 115
Casper, WY 82602
(307) 265-5250

Appendix 2, Study by Lawrence et al.

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^R). 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^R, 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^R). 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^R. 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 herpesvirus 1 (BHV-1), and bovine viral diarrhea 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% CO₂. 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 CGC 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 CCG GGG 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^R

Plasmid pAM2425 was constructed by cloning the *gfp* gene from plasmid pAG408 into an *M. haemolytica* shuttle vector, pAM2355 (Marciel, 2001). Briefly, the *Cla*I/*Eco*RI fragment of pAG408 was cloned into a pBluescript KS II+ plasmid carrying the leukotoxin C promoter, then the P_{lktC}::*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', *Hind*III site italicized) primers, and then cloned as a *Hind*III/*Xba*I 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

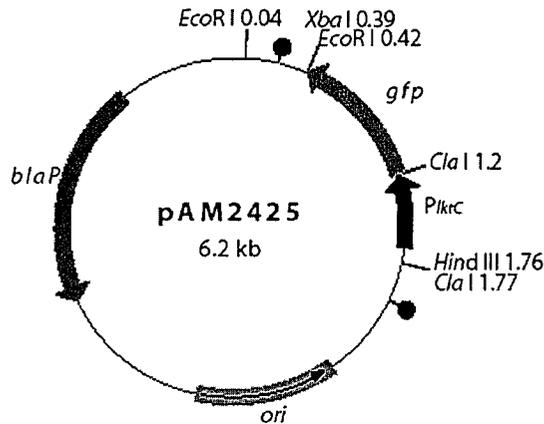


FIGURE 1. Schematic representation of the plasmid pAM2425 carrying *gfp* and *bla* genes. Plasmid pAM2425 was constructed by cloning the *gfp* gene from plasmid pAG408 into a *Mannheimia haemolytica* shuttle vector pAM2355, as described in materials and methods.

nanograms of plasmid DNA were added to each cuvette, which contained 100 μ l electrocompetent cells. An electrical pulse of 15–20 kilovolt, 400 ohm, 25 μ farad was applied and, immediately, 1 ml BHI/SOC medium (BHI broth; 2.5 mM KCl; 10 mM MgSO₄; 10 mM MgCl₂; 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 μ 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- μ 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^R

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 μ 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 10⁹ 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 ^a	Bacteria recovered, sample 1/sample 2 ^b			
		Mh ^c	Bt ^d	Past ^e	Movi ^f
1	P	+/+ ^g	+/-	-/-	+/+
	N	-/-	-/-	-/-	+/-
2	P	-/+	-/-	+/-	+/+
	N	+/+	-/-	-/-	-/-
3	P	-/+	-/-	+/-	+/-
	N	-/+	-/-	-/-	-/-
5	P	+/-	+/-	-/-	+/-
	N	-/-	-/-	-/-	+/-

^a Site of sample collection: P = pharynx; N = nasal cavity.

^b Sample 1/sample 2 = Swabs collected at two different dates.

^c Mh = *Mannheimia haemolytica*.

^d Bt = *Bibersteinia trehalosi*.

^e Past = *Pasteurella* species.

^f Movi = *Mycoplasma ovipneumoniae*.

^g (-) = 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 ^a	Bacteria recovered before commingling (sample 1/sample 2) ^b			Sample site	Bacteria recovered after commingling (postmortem)			
		Mh ^c	Bt ^d	Movi ^e		Mh	Bt	Movi (culture)	Movi (PCR)
Y13	P	-/- ^f	+/+	-/-	P	+	-	-	-
	N	-/-	-/-	-/-	N	+	+	-	-
	L				L	+	+	-	-
Y15	P	-/+	+/-	-/-	P	-	+	+	+
	N	+/+	-/-	-/-	N	+	-	-	-
	L				L	+	-	-	-
Y16	P	+/-	+/+	-/-	P	-	+	-	-
	N	-/-	-/-	-/-	N	+	+	-	-
	L				L	+	+	-	-
Y47	P	-/-	+/+	-/-	P	nd ^g	nd	nd	-
	N	-/+	-/-	-/-	N	nd	nd	nd	-
	L				L	+	-	-	+

^a Site of sample collection: P = pharynx; N = nasal cavity; L = lung.

^b Sample 1/sample 2 = Swabs collected on two different dates.

^c Mh = *Mannheimia haemolytica*.

^d Bt = *Bibersteinia trehalosi*.

^e Movi = *Mycoplasma ovipneumoniae*.

^f (-) = Absent or not detected; (+) = present.

^g nd = not done.

the bacteria were successfully tagged with GFP and Ap^R. 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 5×10^9 CFU of the *M. haemolytica* isolates tagged with GFP/Ap^R plasmid developed pneumonia and died within 2 days postinoculation, indicating that organisms tagged with the GFP/Ap^R plasmid were pathogenic.

GFP- and Ap^R-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^R-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

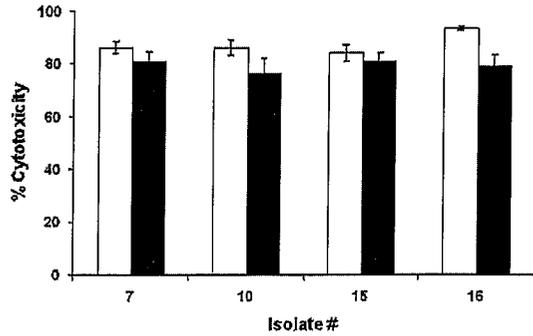


FIGURE 2. Leukotoxin production by *Mannheimia haemolytica* isolates before and after tagging with the plasmid carrying *gfp* and *bla*. Culture supernatant fluids from the *M. haemolytica* isolates numbers 7, 10, 15, and 16, before and after tagging with the plasmid carrying *gfp* and *bla*, were subjected 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).

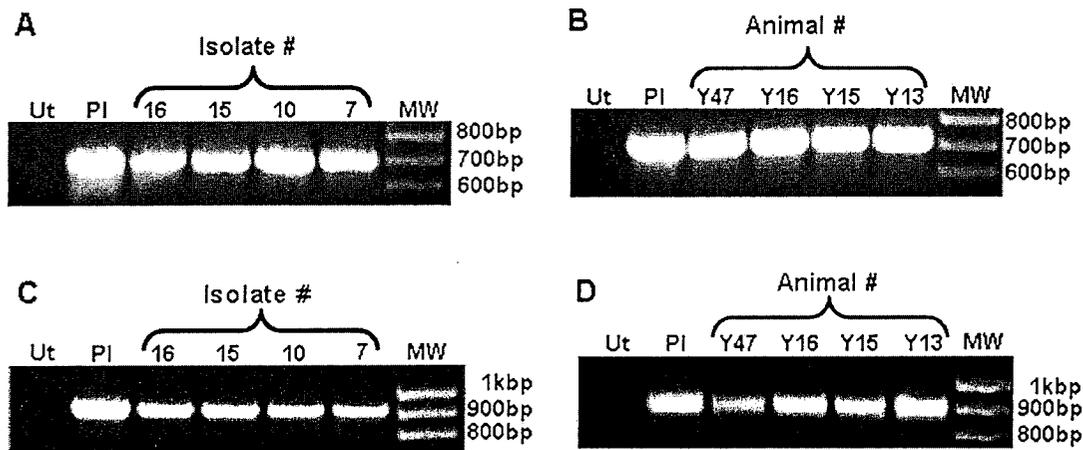


FIGURE 3. Detection of *gfp* and *bla* in *Mannheimia haemolytica* isolates by polymerase chain reaction (PCR) amplification. The *M. haemolytica* isolates tagged with the plasmid carrying *gfp* and *bla*, and the *M. haemolytica* isolates recovered from the lungs of the four dead bighorn sheep, were 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.

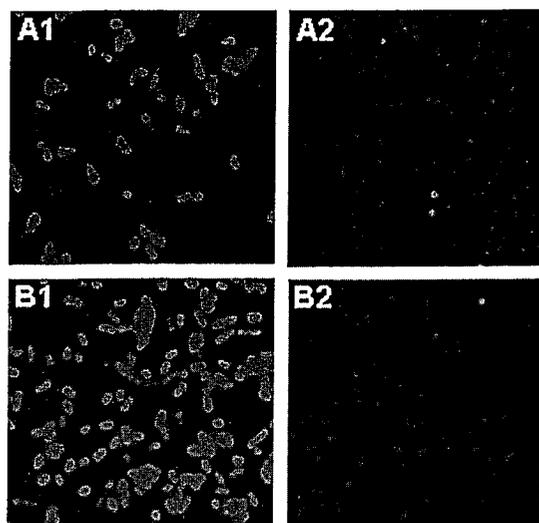


FIGURE 4. Detection of expression of GFP by immunofluorescence staining. The *Mannheimia haemolytica* isolates tagged with the plasmid carrying *gfp* and *bla*, and the *M. haemolytica* isolates recovered from the lungs of the four dead bighorn sheep, were tested for the expression of GFP by immunofluorescence 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 $\mu\text{g/ml}$ 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-

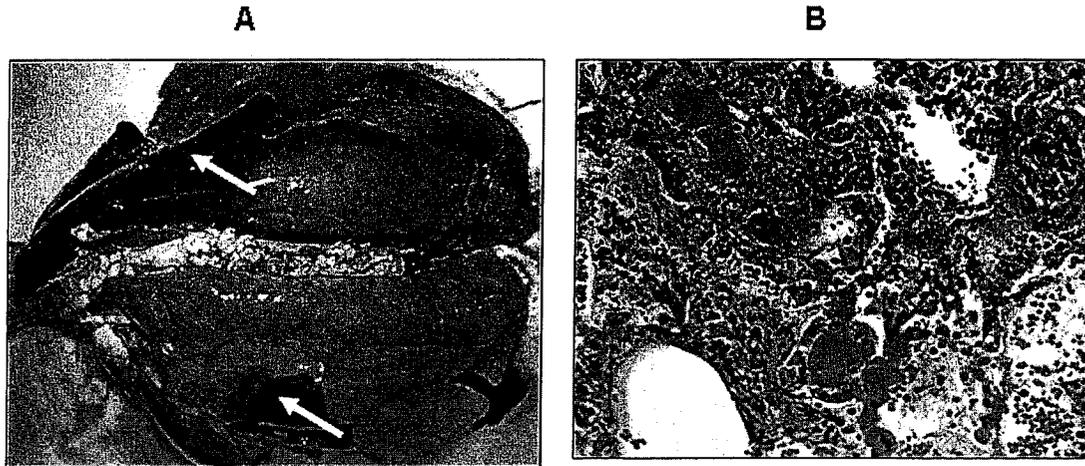


FIGURE 5. Representative gross lesions and histopathology of the lungs of the dead bighorn sheep. (A) Typical gross appearance of the lungs of the dead bighorn sheep. The lungs were removed from the carcass for examination, and the total area of gross lung consolidation was discerned by visual inspection 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^R, 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^R). 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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Forest Service. We thank Thomas E. Besser for helpful suggestions and discussion.

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Appendix 3, Letter from Donald Knowles



United States Department of Agriculture

Research, Education and Economics
Agricultural Research Service

22 August, 2010

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USDA – Forest Service
324 25th Street
Ogden, UT 84401

To whom it may concern:

This communication is to provide additional scientific peer reviewed information in response to the Payette National Forest, Record of Decision, Land and Resource Management Plan issued July 2010. Specifically, Record of Decision for the: Final Supplemental Environmental Impact Statement and Forest Plan Amendment Identifying Suitable Rangeland for Domestic Sheep and Goat Grazing to Maintain Habitat for Viable Bighorn Sheep Populations.

I'm a supervisory veterinary medical officer with the Agricultural Research Service with twenty-two years of infectious disease research experience. Two very relevant factors in controlling infectious diseases is detailed understanding of transmission dynamics and population immunity. A recent peer reviewed publication authored by Lawrence, P. K., et al., *Journal of Wildlife Disease*, 2010 Jul;46(3):706-17 (I'm also an author) provided data listed below. To my knowledge, it is the first quantified time and distance study concerning the transmission of *Mannheimia haemolytica* between domestic and bighorn sheep and shows that contact, as related to transmission and disease development are complex concepts. Details of contact need to be incorporated into management plans and risk models. Data specifics are:

1. Transmission of *M. haemolytica* didn't occur between domestic and bighorn sheep maintained at a distance of 10 meters (33 feet) for 1 month. The *M. haemolytica* was tagged with a green marker which aided in tracking and detecting transmission.
2. Transmission but not clinical disease occurred when these same groups of domestic and bighorn sheep were maintained with fence line contact for 2 months. During this period three of the bighorn sheep acquired infection of the tagged *M. haemolytica*.
3. These domestic and bighorn sheep were allowed to commingle and all 4 bighorn sheep developed clinical disease and died within 2 to 9 days of commingling.

These data show that even extended fence line contact of 2 months didn't lead to disease and death. Disease required co-mingling for a minimum of 48 hours and this was after transmission had already occurred in three of the bighorn sheep. These data leave open the possibility that if left at fence-line contact the bighorn sheep would have developed immunity instead of disease. This is a question for future research. These data show the contact time requirement for transmission and disease is complex and requires extended time periods followed by at least 48 hours of co-mingling.



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These data provide rationale for management of the domestic – bighorn sheep interface under range conditions. It is important to note that transmission of an organism doesn't necessarily lead to disease. Many factors are involved in determining the outcome of organism transmission, but a key factor is organism dose (amount) transmitted. Transmission may lead to immunity, depending on dose and other factors. For instance other factors would include general health status and biochemical changes associated with stress, especially the stress associated with confined comingling, during which animals must quickly establish a population hierarchy. A key need is a method to provide or boost bighorn immunity to *M. haemolytica* to avoid disease from transmission events from endemic sources such as domestic or bighorn sheep and to protect lambs beyond passive transfer of maternal immunity.

Sincerely:

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