Rocky Mountain
BIGHORN
SOCIETY

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April 4, 2016

Matt Janowiak
District Ranger
Columbine Ranger District
San Juan National Forest
P.O. Box 439
367 South Pearl Street
Bayfield, CO 81122

Re: Weminuche Landscape Grazing Analysis Draft EIS

Dear Mr. Janowiak:

Please accept these comments on behalf of the Rocky Mountain Bighorn Society (RMBS) regarding the proposed Weminuche Landscape Grazing Analysis decision to leave vacant seven (7) domestic sheep grazing allotments and reauthorize domestic sheep grazing on six (6) allotments on the Columbine Ranger District of the San Juan National Forest (hereafter, "Forest"). The mission of the RMBS is to promote the science-based management of bighorn sheep, educate the public about their life and habitat, and assure the sportsman's rights in proper opportunities.

The RMBS has reviewed the Weminuche Landscape Grazing Analysis Draft Environmental Impact Statement (DEIS) (USDA Forest Service 2016a) and the accompanying Weminuche Grazing Risk Assessment (RA) (USDA Forest Service 2016b) that analyzes the risk of contact between bighorn sheep and domestic sheep in the Weminuche grazing analysis landscape. The RMBS appreciates that the Forest chose to use the Risk of Contact (RoC) Tool developed by the USDA Forest Service Bighorn Sheep Working Group (USDA Forest Service 2013a). The RoC Tool represents the best available science for analyzing the risk associated with grazing of domestic sheep in proximity to bighorn sheep. We commend the Forest on conducting such a thorough RA, and we appreciate that the Forest recognizes that domestic sheep and goats can transmit lethal pathogens to bighorn sheep which can lead to disease-induced all age die-offs and threaten the viability of bighorn sheep populations (Lawrence et al. 2010, Besser et al. 2012a, and Cassirer et al. 2013). Herds affected by these epizootics often remain suppressed for decades following a die-off due to low recruitment rates (Besser et al. 2012b). Therefore, reducing the risk of interaction between domestic sheep and bighorn sheep is of primary importance for maintaining stable populations of bighorn sheep.

We are disappointed to see few substantive changes from the 2014 draft Environmental Assessment to the DEIS that will create the effective separation necessary to reduce the risk of

disease transmission to wild sheep and maintain viable populations of bighorn sheep on the Forest. In fact, the RA notes on pg. 151:

> "Therefore, under Alternative 4, the action alternative most likely to maintain bighorn herd persistence in the long term, concern remains for the potential for a disease transmission event in the Weminuche Landscape due to a number of allotment/bighorn herd combinations **having predicted total herd contact rates more frequent than the levels thought necessary to maintain herd persistence for the long term.** These concerns are greatest for the Vallecito Creek Herd S-28 (39% of allotment/disease transmission probability combinations; see Table 41, above), which is believed to be connected biologically with the Cimarrona Peak Herd S-16 and Sheep Mountain Herd S-15 as members of the interconnected Weminuche Population. For this reason, **a disease event involving the Vallecito Creek Herd S-28 is predicted in 39% of allotment/disease transmission probability combinations and could also involve bighorn herds S-16 and S-15 through biological connections among these three herds**" (USDA Forest Service 2016b)**.**

And on pg. 142 of the RA:

> "Because the Weminuche Population represents nearly three quarters (73%) of the bighorn population and geographic distribution across the planning area, viability across the planning area is closely related to the status and function of the Weminuche Population. **A disease event involving the population that represents 73% of the bighorn population on the planning area and roughly half of the geographic distribution across the planning area has potential for being a significant event for viability of bighorn sheep Forest-wide.** Of the two herds remaining across the San Juan NF administrative unit, one (the Blanco River Herd S31) recently tested positive for two pathogens known to cause disease in bighorn sheep and indicates the population may be predisposed to the outbreak of disease with potential for a future mortality event. The second herd (the West Needles Herd S-71) was created within the past 15 years by animals released into historic and apparently suitable habitat. Recent CPW population estimates show this population to be stable but having declined slightly from previously higher numbers (see figure 3, below). **Given the status of these two remaining herds, the importance of the Weminuche Population to viability of bighorn sheep across the planning area is high**" (USDA Forest Service 2016b).

The findings from the RA noted above make it clear that the proposed alternative to continue grazing high risk allotments with the use of unproven design criteria puts the Weminuche bighorn herd at risk of a catastrophic disease event and threatens the viability of the bighorn sheep at the Forest level. The Forest RMP notes 36 CFR 219.19 specifically requires that:

> "[f]ish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area," and "[f]or planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure [sic] its continued existence is well distributed in the planning area." Regulation 36 CFR 219.26 requires that "[f]orest

> planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple use objectives of the planning area. Such diversity shall be considered throughout the planning process." In addition, the FLPMA specifies that special uses granted by the Secretary of Agriculture or the Secretary of the Interior are subject to terms and conditions that "minimize damage to fish and wildlife habitat and otherwise protect the environment." Agency actions should avoid or minimize impacts to species whose viability has been identified as a concern. **USFS actions must not result in loss of population viability or create significant trends toward federal listing** (FSM 2670.32) (USDA Forest Service 2013b)

As noted on pg. 11 of the DEIS, the San Juan National Forest Land and Resource Management Plan (RMP) desired conditions include:

> "**Prevent physical contact between bighorn sheep and domestic sheep. Manage domestic sheep to achieve effective separation from bighorn sheep**" (USDA Forest Service 2013b).

The DEIS further notes RMP Standards on pg. 25:

> "**During project level planning on domestic sheep allotments, management options must be developed to prevent physical contact between domestic sheep and bighorn sheep. Actions may include but are not limited to boundary modifications, livestock type conversion, or allotment closures 2.3.39,**" and, "**Management of domestic sheep must utilize measures to prevent physical contact with bighorn sheep. 2.7.12**" (USDA Forest Service 2013b).

The RMBS believes that the proposed design criteria for Alternative 4 are not proven to "prevent physical contact between domestic sheep and bighorn sheep." Therefore, we believe the Forest is left to choose an alternative management action, such as conversion of livestock type or allotment closures.

In a July 31, 2014 letter to Regional Foresters, National Forest System Deputy Chief Leslie A. C. Weldon provided guidance regarding bighorn sheep analysis for NEPA documents. That letter states in part:

> "Best management practices to maintain separation need to be applied to the extent they are effective in supporting both uses. When a line officer determines that the potential risk for contact, as identified through the four-step process, is at an unacceptable level, **those officers need to identify and analyze potential replacement allotments when developing management alternatives. The analysis for alternatives for replacement allotments should be part of a single decision-making process as part of ongoing collaborative efforts to identify and develop site-specific solutions**" (USDA Forest Service 2014).

Again, the RA makes it clear that continuing to graze high risk allotments in the Weminuche Wilderness jeopardizes bighorn sheep viability across the planning unit. Page 33 of the DEIS 2.1 Alternatives Considered But Eliminated From Detailed Analysis states:

> "We considered the possibility of moving domestic sheep bands from currently active allotments where the risk of contact with bighorn sheep is high to other currently vacant allotments where the risk of contact with bighorns is low. However, the only vacant allotments on the Columbine Ranger District at this time are more suitable for cattle grazing than sheep grazing. The sheep permittee was offered the choice of converting to cattle and/or moving to some vacant allotments on the district. These options were unacceptable to the permittee due to additional trailing distance, different trailing routes, and increased costs. Additionally, the permittee's winter range and base property would not support change of livestock class to cattle" (USDA Forest Service 2016a)

Regardless of the willingness of the current permittee to consider solutions such as conversion of livestock type or moving to replacement allotments, existing vacant cattle and sheep allotments should have been analyzed as part of this analysis.

As the Forest is certainly aware, the 9th Circuit Court of Appeals recently upheld the 2010 Payette National Forest decision to eliminate domestic sheep grazing in areas of high risk to bighorn sheep. In her Opinion, Circuit Judge Marsha Berzon affirmed the conclusion of the Payette National Forest:

> "…that the scientific consensus is that disease transmission from domestic sheep—by whatever mechanism and involving whatever confounding factors—poses a sufficient risk to bighorn sheep viability to merit separation of the bighorns from the domestic animals" (*Idaho Wool Growers Assn v. Vilsack, Case No. 14-35445, D.C. No. 1:12-cv-00469BLW*) (Attachment 1).

The Wildlife Society and the American Association of Wildlife Veterinarians recently released a Joint Issue Statement regarding domestic sheep and goat disease transmission risk to wild sheep (TWS and AAWV 2015) (Attachment 2). This issue statement notes that both organizations:

> "Recognize effective temporal and spatial separation of domestic sheep and goats from wild sheep as the only currently available management solution for preventing or minimizing disease transmission and advocate for proactive and cooperative management strategies for achieving such separation."

It is important to note that the Payette National Forest decision to eliminate domestic sheep grazing in areas of high risk was based on modeled contact rates several times lower than rates modeled in the Weminuche. In addition, the neighboring Rio Grande National Forest recently chose to vacate the Fisher-Ivy/Goose Lake allotments which, even when overlap with bighorn sheep CHHR was removed, had modeled contact rates similar to those on the Weminuche.

The Weminuche bighorn sheep herd is classified as a Tier 1, primary population by Colorado Parks and Wildlife (CPW), based on population size, population performance, and the lack of

transplanted bighorn sheep into the population (Weinmeister 2012). As such, the herd is given the highest priority for inventory, habitat protection and improvement, disease prevention, and research (George et al. 2009). The greatest threat to this bighorn sheep herd is respiratory disease outbreaks from contact with domestic sheep (Weinmeister 2012, USDA Forest Service 2013b and 2013c, USDA Forest Service 2016b). Rocky Mountain bighorn sheep are also listed by the USDA Forest Service Region 2 as a Sensitive Species (USDA Forest Service 2013d). The rationale for inclusion on the Sensitive Species list states, "…the susceptibility of herds to extirpation as a result of diseases transmitted by domestic sheep or goats appears to be the greatest threat."

The RMBS feels the that the Forest has not adequately considered the importance of the Weminuche bighorn sheep herd not only to the viability of the species on the Forest, but the importance of the herd to the viability, diversity, and persistence of bighorn sheep populations at the state and regional level. It is one of the most important herds remaining in the region. In summary, our concerns with the proposed decision to continue grazing high risk domestic sheep allotments are:

- The Weminuche bighorn sheep herd is classified by CPW as a Tier 1, primary population, one of the most important herds for conservation in the state.

- The Risk Assessment completed by the Forest acknowledges that modeled contact rates under Alternative 4 are more frequent than levels thought necessary to maintain herd persistence for the long term.

- The Risk Assessment acknowledges that disease event encompassing the Weminuche metapopulation would jeopardize viability of bighorn sheep on the Forest, in violation of the Forest RMP as well as FLPMA and NFMA species viability requirements.

- The Forest failed to complete a risk analysis on available alternate sheep and cattle allotments as directed by the Deputy Chief of the Forest Service, choosing instead to dismiss those alternatives from further consideration because the existing permittee had no interest in those options.

- The Preferred Alternative relies on Design Criteria, for which the efficacy has not been tested or proven, to achieve effective separation of bighorn sheep and domestic sheep.

- The overwhelming scientific opinion currently is that the only way to reduce the risk of disease transmission is to maintain effective spatial and temporal separation of bighorn sheep and domestic sheep, which is not accomplished by the preferred alternative.

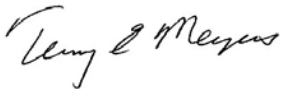
- The Courts have repeatedly upheld use of the RoC Tool as the best available science to model risk of contact, and have also upheld the decision to remove domestic sheep from the landscape in areas of high modeled risk, including in areas where the modeled risk is several times less than modeled risk on the Weminuche landscape.

- Recent Forest Service analyses in Region 2 have determined that modeled contact rates similar to and lower than those on the Weminuche landscape pose too great a risk to bighorn sheep, which has resulted in the decision to vacate high risk allotments.

Based on the concerns listed above, the RMBS finds the Forest's decision to continue grazing high risk domestic sheep allotments on the Weminuche landscape to be arbitrary and capricious. In the absence of an alternative that reauthorizes these allotments only for cattle use, the RMBS must request that the Forest adopt **Alternative 1 – No Term Livestock Grazing**. It is clear that Alternative 1 is the only option which lowers the risk to this important bighorn sheep herd to an acceptable level.

Thank you for giving RMBS the opportunity to comment on this grazing analysis. Please apprise us of future opportunities to comment on this analysis or on other bighorn sheep management issues on the San Juan National Forest.

Sincerely,



Terry E. Meyers
Conservation Director
Rocky Mountain Bighorn Society

Literature Cited

Besser, T. E., E. F. Cassirer, C. Yamada, K. A. Potter, C. Herndon, W. J. Foreyt, D. P. Knowles, and S. Srikumaran. 2012a. Survival of bighorn sheep (Ovis canadensis) commingled with domestic sheep (Ovis aries) in the absence of Mycoplasma ovipneumoniae. Journal of Wildlife Diseases 48:168-172.

Besser, T. E., M. A. Highland, K. Baker, E. F. Cassirer, N. J. Anderson, J. M. Ramsey, K. Mansfield, D. L. Bruning, P. Wolff, J. B. Smith, and J. A. Jenks. 2012b. Causes of pneumonia epizootics among bighorn sheep, Western United States, 2008-2010. Emerging Infectious Diseases 18:406-414.

Cassirer, E.F., R.K. Plowright, K.R. Manlove, P.C. Cross, A.P. Dobson, K.A. Potter, and P.J. Hudson. 2013. Spatio-temporal dynamics of pneumonia in bighorn sheep. Journal of Animal Ecology. 82: 518-528.

George, J.L, R. Kahn, M.W. Miller and B. Watkins. 2009. Colorado Bighorn Sheep Management Plan 2009-2019. Colorado Division of Wildlife Special Report. 88 pp.

Lawrence, P.K., S. Shanthalingam, R.P. Dassanayake, R. Subramaniam, C.N. Herndon, D.P. Knowles, F.R. Ruragirwa, W.J. Foreyt, G. Wayman, A.M. Marciel, S.K. Highlander, and S. Srikumaran. Transmission of Mannheimia haemolytica from domestic sheep (Ovis canadensis): Unequivocal demonstration with green fluorescent protein-tagged organisms. J. Wildl. Dis. 46:706-717.

TWS and AAWV. 2015. The Wildlife Society & American Association of Wildlife Veterinarians Joint Issue Statement, Domestic Sheep and Goats Disease Transmission Risk to Wild Sheep. AAWV approved March 5, 2015. TWS approved March 8, 2015. Available on the internet at: http://wildlife.org/wp-content/uploads/2015/03/WS-DS_DiseaseTransmission_TWS-AAWV_JointStatement_APPROVED.pdf

USDA Forest Service. 2010. 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. Supplemented July 2010. Payette National Forest, 800 West Lakeside Ave, McCall, ID 83638. 38 pp. Available on the internet at: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5238683.pdf

USDA Forest Service. 2013a. Bighorn Sheep Risk of Contact Tool. USDA Forest Service, Intermountain Region. Prepared by USDA FS Bighorn Sheep Working Group and Critigen.

USDA Forest Service. 2014. Assessment of risk of physical contact between Rocky Mountain bighorn sheep and domestic sheep in the Weminuche grazing analysis landscape. San Juan National Forest, 15 Burnett Court, Durango, CO 81301. Unpublished report. 115 pp.

USDA Forest Service. 2013b. Final San Juan National Forest and proposed Tres Rios Field Office Land and Resource Management Plan. USDA Forest Service, San Juan National Forest, 15 Burnett Court, Durango, CO 81301. 328 pp. Available online at http://www.fs.usda.gov/goto/sanjuan/planning.

USDA Forest Service. 2013c. Risk Assessment and Viability Analysis for Rock Mountain Bighorn Sheep on the San Juan National Forest, August 21, 2013. 65 pp. Unpublished report, on file at San Juan National Forest Supervisor's Office, 15 Burnett Court, Durango, CO 81301.

USDA Forest Service. 2013c. Region 2 Regional Forester's Sensitive Species List, FSM R2 Supplement 2600-2013-1, August 24, 2013.

USDA Forest Service. 2013d. Region 2 Regional Forester's Sensitive Species List, FSM R2 Supplement 2600-2013-1, August 24, 2013.

USDA Forest Service. 2014. Bighorn Sheep Analysis for NEPA Documents, Washington Office unpublished letter to Regional Foresters. July 31, 2014. Leslie A. C. Weldon. Deputy Chief, National Forest System

Weinmeister, B. 2012. Bighorn sheep management plan, Data Analysis unit RBS-20, Weminuche Herd. Game management units S15 (Sheep Mountain), S16 (Cimarrona Peak), S28 (Vallecito). Colorado Parks and Wildlife. 67 pp. Available on the internet at: http://cpw.state.co.us/Documents/Hunting/BigGame/DAU/BighornSheep/RBS20DAUPlan.pdf

Attachment 1

FOR PUBLICATION

UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

IDAHO WOOL GROWERS ASSOCIATION; AMERICAN SHEEP INDUSTRY ASSOCIATION; PUBLIC LANDS COUNCIL; WYOMING WOOL GROWERS ASSOCIATION; CARLSON COMPANY, INC.; SHIRTS BROTHERS SHEEP; COLORADO WOOL GROWERS ASSOCIATION,

Plaintiffs-Appellants,

v.

TOM VILSACK, in his official capacity as the Secretary of the U.S. Department of Agriculture; TOM TIDWELL, in his official capacity as the Chief of the U.S. Forest Service; KEITH LANNOM, in his official capacity as the Forest Supervisor of the Payette National Forest; UNITED STATES FOREST SERVICE,

Defendants-Appellees,

THE WILDERNESS SOCIETY; WESTERN WATERSHEDS PROJECT; HELLS CANYON PRESERVATION COUNCIL,

Intervenor-Defendants–Appellees.

No. 14-35445

D.C. No. 1:12-cv-00469-BLW

OPINION

Appeal from the United States District Court
for the District of Idaho
A. Wallace Tashima, District Judge, Presiding*

Argued and Submitted
November 2, 2015—Portland, Oregon

Filed March 2, 2016

Before: Raymond C. Fisher, Marsha S. Berzon, and
Paul J. Watford, Circuit Judges.

Opinion by Judge Berzon

SUMMARY**

Environmental Law

The panel affirmed the district court's summary judgment in favor of the United States Forest Service in an action challenging the Forest Service's decision, made in response to concerns regarding disease transmission to immunologically vulnerable bighorn sheep, to close to domestic sheep grazing approximately 70% of allotments on

* A. Wallace Tashima, Circuit Judge, for the Ninth Circuit Court of Appeals, sitting in the United States District Court, for the District of Idaho, by designation.

** This summary constitutes no part of the opinion of the court. It has been prepared by court staff for the convenience of the reader.

which grazing had been permitted in the Payette National Forest in Idaho.

The panel held that, pursuant to the National Environmental Policy Act environmental review process, any error by the Forest Service in failing to consult the Agricultural Research Service, a federal agency within the U.S. Department of Agriculture, before preparing the final supplemental impact statement and Record of Decision, was harmless. The panel held that because the lack of consultation did not prevent the Forest Service or the public from considering information about the uncertainties in transmission of disease from domestic to bighorn sheep, such as the Agricultural Research Service would have offered, and because information about the precise mechanisms of such transmission was not a basis of the Forest Service's decision, no prejudice resulted from the lack of consultation.

The panel also held that the Forest Service did not otherwise act arbitrarily or capriciously or abuse its discretion. Specifically, the panel held that the Forest Service did not act arbitrarily or capriciously or abuse its discretion by declining to supplement the final supplemental impact statement. The panel also held that the Forest Service did not act arbitrarily or capriciously or abuse its discretion in its modeling used to analyze bighorn sheep home ranges and movement, and the potential impacts of various management alternatives.

COUNSEL

William G. Myers III (argued) and Murray D. Feldman, Holland & Hart LLP, Boise, Idaho, for Plaintiffs-Appellants.

Robert J. Lundman (argued) and David B. Glazer, Environment & Natural Resources Division, U.S. Department of Justice, Washington, D.C.; Sam Hirsch, Acting Assistant Attorney General, U.S. Department of Justice, Washington, D.C.; Heather Hinton-Taylor, Office of the General Counsel, U.S. Department of Agriculture, Washington, D.C., for Defendants-Appellees.

Lauren M. Rule (argued), Advocates for the West, Portland Oregon; Jennifer R. Schemm, La Grande, Oregon, for Intervenor-Defendants–Appellees.

OPINION

BERZON, Circuit Judge:

Between the late 1800s and the early 1900s, the number of bighorn sheep in North America declined dramatically, falling from a high of 1.5 to 2 million individuals to approximately 10% of that number. Scientists have generally attributed the decline to over-harvesting, habitat loss, competition for food, and disease transmission from domestic sheep.

In response to concerns regarding disease transmission to immunologically vulnerable bighorn sheep, the Chief of the U.S. Forest Service ordered further analysis of the effects of grazing domestic sheep in the Payette National Forest of

west-central Idaho ("Payette"). In response, the Forest Service prepared a draft supplemental environmental impact statement ("DSEIS"), an update to the DSEIS, and, eventually, a final supplemental environmental impact statement ("FSEIS") and Record of Decision ("ROD"). Concluding that there is a significant risk of fatal disease to the small and insular populations of bighorn sheep in the Payette, the Forest Service decided in the ROD to close to domestic sheep grazing approximately 70% of the allotments on which grazing had been permitted.

The Idaho Wool Growers Association, other state and national trade associations, and two sheep ranchers (collectively, "Wool Growers") challenged the Forest Service's decision, objecting to the Forest Service's (1) failure to consult the Agricultural Research Service ("ARS"), a federal agency within the U.S. Department of Agriculture, before preparing the FSEIS and ROD; (2) failure to supplement the FSEIS and ROD in light of the publication in 2010 of a certain study of the transmission of disease from domestic to bighorn sheep, the "Lawrence study"; and (3) choice and use of particular models to evaluate the risk of contact between domestic and bighorn sheep and the effects of disease transmission from domestic to bighorn sheep. The district court entered summary judgment in favor of the Forest Service. Wool Growers appealed.

We conclude that any error in failing to consult ARS was harmless. As the Forest Service did not otherwise act arbitrarily or capriciously or abuse its discretion, we affirm.

I.

A. Background

Bighorn sheep are currently found in two populations in the Payette—one in Hells Canyon and the other in the Salmon River Mountains. In approximately 1870, major die-offs of bighorn sheep began to occur in the Salmon River Mountains. The die-offs roughly coincided with the onset of wide-spread grazing of domestic sheep in the Payette.

Over the years, the Payette's bighorn populations have continued to experience periodic "large-scale, rapid, all-age die-offs." FSEIS xx; *see also* ROD 6–7. Since 1981, despite efforts at transplanting sheep from elsewhere, the total population in the Payette has decreased by 47%. Although at one time more than 10,000 bighorn sheep lived in Hells Canyon and the surrounding mountains, "they were extirpated by the mid-1940s." ROD 6. Between 1971 and 2004, 474 bighorn sheep were transplanted into Hells Canyon. Seven die-offs in the Hells Canyon population have been reported since 1971. At the time the FSEIS was written, that population numbered 850 sheep.

The Salmon River population was never extirpated. According to surveys in 2001, 2003, and 2004, that population numbers roughly 700 sheep.

B. The NEPA Environmental Review Process

The administrative process underlying this appeal began in 2003, when the Forest Service, pursuant to the National Environmental Policy Act ("NEPA"), issued the Southwest Idaho Ecogroup Land and Resource Management Plans Final

Environmental Impact Statement and Record of Decision ("EIS"), which revised the 1988 Payette National Forest Land and Resource Management Plan. The EIS was appealed, appellants urging that the EIS "violated the [National Forest Management Act] and Hells Canyon National Recreation Area (HCNRA) Act on the Payette National Forest by providing for grazing of domestic sheep within or near the range of bighorn sheep, thus threatening the viability of bighorn sheep though [sic] disease transmission." ROD 1. In March 2005, the Chief of the Forest Service agreed that the EIS "did not adequately address viability [of bighorn sheep populations in the Payette] or the potential for disease transmission." *Id.* The Chief therefore rejected the EIS's analysis.

The Chief then "instructed the Regional Forester to reanalyze the potential impacts of domestic sheep grazing on bighorn sheep viability on the Payette National Forest to ensure habitat is available to support a viable population of bighorn sheep." ROD 1. The Chief's decision reflected general concerns regarding disease transmission—in particular, the spread of various strains of pneumonia-causing or -contributing bacteria—from domestic to bighorn sheep, as confirmed by anecdotal evidence and a multitude of studies.

There is uncertainty regarding the particular mechanics of disease transmission, and the evidence of transmission is largely circumstantial. Pneumonia-causing bacteria are commonly found in domestic sheep, with the worst outbreaks killing 2.5% of domestic sheep in a herd. The impact of pneumonia on bighorn sheep is considerably more catastrophic. Episodic pneumonia outbreaks appear to be the current limiting factor in bighorn sheep abundance and distribution, both because large-scale die-offs caused by

pneumonia kill most or all of a given population, and because female bighorns who survive die-offs experience low reproduction and high lamb mortality rates for years following an outbreak. Consequently, a number of state and federal agencies with jurisdiction over bighorn sheep have expressed concern and modified their management plans to address disease transmission from domestic to wild sheep. ROD 6; *see, e.g.*, John Beecham et al., *Rocky Mountain Bighorn Sheep (Ovis Canadensis): A Technical Conservation Assessment*, Feb. 12, 2007; Timothy Schommer & Melanie Woolever, *A Review of Disease Related Conflicts Between Domestic Sheep and Goats and Bighorn Sheep*, 2008; Montana Department of Fish, Wildlife and Parks, *Montana Bighorn Sheep Conservation Strategy, Draft*, August 2009; Idaho Department of Fish & Game, *Draft Bighorn Sheep Management Plan*, May 2010. As the FSEIS explained, "[s]cientists from both sides of the issue . . . recommend that the species be kept separate until the disease transmission science is better understood." ROD 11.

In September 2008, the Forest Service released the DSEIS, which "proposed to modify, delete, and add to the current Forest Plan direction in response to the Chief's instructions." ROD 1. The DSEIS precipitated over 14,000 public comments.

In 2009, because of declining bighorn sheep numbers, the Forest Service designated bighorn sheep a sensitive species in the Intermountain Region, which includes the Payette. Under that designation, the objectives of bighorn management "are to prevent listing under the Endangered Species Act (ESA), avoid or minimize impact to [the] species[,] whose viability has been identified as a concern, maintain viable populations of [the] species, and to develop

and implement management objectives for [the species'] populations and habitat." ROD 8.

The Forest Service released an update to the DSEIS in January 2010, which "provided interested stakeholders and the public an opportunity to review and comment on improved analyses and alternatives." ROD 1. In the update, the Forest Service responded to criticisms of the DSEIS's qualitative analysis by providing a quantitative analysis. *See* FSEIS xvii; *e.g.*, A-85. That analysis used modeling to study the potential risks and effects of contact and disease transmission. More than 11,000 comments on the update to the DSEIS were submitted.

In July 2010, the Forest Service completed and released the FSEIS and ROD. To analyze the effects of various alternative plans on the Payette's bighorn sheep, the Forest Service used three models developed in conjunction with researchers at the University of California, Davis Center for Animal Disease Modeling and Surveillance. The models—called the source habitat, risk of contact, and disease models—incorporated telemetric location data, including more than 54,000 data points collected in the Payette over the course of twelve years from over 400 radio-collared bighorn sheep. Even with the use of these models, the Forest Service recognized, "[d]etermining the probability that a bighorn sheep will reach an occupied [domestic sheep grazing] allotment [in the Payette] and that contact between the species will result in disease transmission is problematic," and "there is . . . essentially no research that would allow [] estimation" of the likelihood of contact causing disease transmission. ROD 12. To account for that difficulty, the Forest Service ran the disease model using a range of probabilities of contact resulting in disease transmission—

5%, 10%, 25%, 50%, 75%, and 100%. This approach allowed the Forest Service to assess the effects of various management alternatives on bighorn sheep subpopulations despite its inability to estimate accurately the degree of risk of disease-conveying contact.

After applying the models, the Forest Service selected one of the alternatives analyzed in the FSEIS, Alternative 7O. Alternative 7O would result in the termination of domestic sheep grazing on approximately 69,000 acres in the Payette, with implementation to occur over three years. The models showed that this alternative reduced the risk of extirpation of all but one of the bighorn subpopulations to low-to-moderate at the 5% transmission level; the models predicted a 100% likelihood of extirpation of the Sheep Mountain subpopulation at all transmission levels, due to that subpopulation's demographics and proximity to domestic sheep grazing allotments. At the higher transmission levels, the probabilities of extirpation under Alternative 7O ranged from 4% to 76%. Ultimately, the Forest Service found that large distances between domestic and bighorn sheep are necessary to assure protection of bighorns from disease, as bighorn sheep travel long distances across rugged terrain; domestic sheep are known to stray from their herds, remaining on allotments at unpermitted times; and bighorn and domestic sheep are attracted to each other and seek out each other's company.

The FSEIS incorporated findings from the then-unpublished Lawrence study, the first experiment to demonstrate directly that transmission of bacteria from domestic to bighorn sheep is implicated in causing pneumonia in bighorn sheep. The study's authors extracted bacteria from domestic sheep, genetically modified the

bacteria to be antibiotic resistant and to radioactively fluoresce (that is, give off light). The domestic sheep were then inoculated with the modified bacteria. The domestic sheep were initially placed in pens separated by ten meters from pens of bighorn sheep. Later, they were moved so that they were separated only by a fence. Still later, all the sheep were commingled in a single pen.

By the end of the study, three of the four bighorn sheep had contracted pneumonia and died, and the fourth was euthanized after displaying telltale and severe signs of pneumonia. Post-mortem examinations of the bighorn sheep showed that they carried the radioactively-labeled, antibiotic-resistant bacteria with which only the domestic sheep had been inoculated.

C. This Litigation

Wool Growers appealed the ROD and FSEIS to the Intermountain Regional Forester. During the appeal process, Dr. Donald Patrick Knowles, a co-author of the Lawrence study and a research scientist within ARS, submitted a letter discussing his interpretation of the study's results ("Letter"). Dr. Knowles maintained that (1) the study did not prove that fence-line contact between domestic and bighorn sheep resulted in transmission of pneumonia-causing bacteria between the species; (2) transmission of a disease-causing organism, as well as the mechanisms of disease, are complex processes; and (3) "transmission of an organism doesn't necessarily lead to disease." Letter 1–2. The Regional Forester, having considered Dr. Knowles' input, denied Wool Growers' appeal.

Wool Growers then filed a complaint for declaratory and injunctive relief in the district court, challenging the Forest Service's decision. The court granted Intervenors, a group of environmental organizations, leave to enter the action as defendants. Wool Growers moved to expand the record pursuant to *Asarco, Inc. v. U.S. EPA*, 616 F.2d 1153 (9th Cir. 1980).[1] The district court granted the motion, permitting the parties to submit expert declarations in support of their cross-motions for summary judgment. After a hearing, the district court entered summary judgment in favor of the Forest Service and Intervenors and dismissed the action.

Wool Growers timely appealed the district court's decision. On appeal, Wool Growers challenges three aspects of the Forest Service's decision under NEPA: its (1) failure to consult ARS prior to completing the FSEIS; (2) failure to supplement the FSEIS; and (3) choice and use of models.

II.

NEPA is a purely procedural statute; it does not impose any substantive requirements on an agency undertaking environmental review. *Lands Council v. McNair*, 537 F.3d 981, 1000 (9th Cir. 2008) (en banc), *overruled on other grounds by Winter v. Nat. Res. Def. Council, Inc.*, 555 U.S. 7, 20 (2008). Rather, "NEPA aims to make certain that the agency will have available, and will carefully consider, detailed information concerning significant environmental impacts, and that the relevant information will be made available to the larger public audience." *Id.* (citation and

[1] Under *Asarco*, an administrative record can be expanded upon review by a federal court to explain what's already in the record but not to add substantive evidence. 616 F.2d at 1159–60.

alterations omitted). Accordingly, federal agencies must "take a 'hard look' at the environmental consequences of their actions by preparing an EIS for each 'major Federal action significantly affecting the quality of the human environment.'" *Id.* at 1000–01 (alteration omitted) (quoting 42 U.S.C. § 4332(2)(C)). An EIS "must 'provide [a] full and fair discussion of significant environmental impacts' so as to 'inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.'" *Id.* at 1001 (quoting 40 C.F.R. § 1502.1).

Under NEPA and the Administrative Procedure Act ("APA"), our review is limited to determining whether the Forest Service's analysis was "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." *Id.* at 987 (quoting 5 U.S.C. § 706(2)(A)). We conclude that although the Forest Service may have acted contrary to NEPA in one respect, any such error was harmless. The Forest Service did not otherwise act arbitrarily or capriciously, nor did it abuse its discretion.

A. Consultation

1. Duty to consult

NEPA imposes on federal agencies conducting environmental review a duty to consult with certain other agencies. "Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved [in the proposed action]." 42 U.S.C. § 4332(2)(C). Further, to promote NEPA's policies of public

participation and informed decisionmaking, copies of the EIS and comments thereon from other agencies "shall accompany the proposal through the existing agency review processes." *Id.*

The regulations implementing these provisions state that "[a]fter preparing a draft environmental impact statement and before preparing a final environmental impact statement the agency shall . . . [o]btain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved . . . ." 40 C.F.R. § 1503.1(a)(1); *see also id.* § 1500.1(b) ("Accurate scientific analysis, *expert agency comments*, and public scrutiny are essential to implementing NEPA." (emphasis added)). "Special expertise" is defined as "statutory responsibility, agency mission, or related program experience." *Id.* § 1508.26. Under the statute and its implementing regulations, the Forest Service may have had a duty to consult with ARS before issuing the FSEIS.

The pivotal question is whether ARS has "special expertise" concerning one significant aspect of the proposed decision, the mechanics of pathogen transmission in domestic sheep.[2] Wool Growers argues that it does. They note, for example, that 7 C.F.R. § 2.65 delegates to ARS, among other matters, the authority to "[c]onduct research concerning domestic animals and poultry, their protection and use, [and] the causes of contagious, infectious, and communicable diseases." Also, ARS's mission statement proclaims: "ARS

[2] Because we decide that any consultation error was harmless, *see* section II.A.2., *infra*, we do not address the Forest Service's argument that the "special expertise" question does not apply to Dr. Knowles as an individual.

conducts research to develop and transfer solutions to agricultural problems of high national priority and provide information access and dissemination to . . . enhance the natural resource base and the environment . . . ." U.S. Department of Agriculture, Agricultural Research Service, *ARS: About US*, http://www.ars.usda.gov/aboutus/aboutus.htm.

The Forest Service argues, in response, that it had no duty to consult with ARS because that agency has no expertise in wildlife management. Although ARS's expertise does center on domestic, not wild, animals, the development within and movement of pathogens in domestic sheep is of some relevance to concerns regarding disease transmission to bighorn sheep. The Forest Service's assessment of the pertinence of that expertise may be too narrow an interpretation of its consultation duty under NEPA. And the language establishing NEPA's consultation requirement is expansive. It mandates consultation with any federal agency that has "special expertise *with respect to any environmental impact involved*." 42 U.S.C. § 4332(2)(C) (emphasis added). *See also* 40 C.F.R. § 1503.1(a)(1) ("[T]he agency shall . . . [o]btain the comments of any Federal agency which has jurisdiction by law or special expertise *with respect to any environmental impact involved* . . . ." (emphasis added)).

Further, *Warm Springs Dam Task Force v. Gribble* suggests that for the consultation requirement to apply, the particular expertise of an agency does not have to encompass the proposed project as a whole or the issue the proposed project was designed to address. Rather, the expertise need relate only to one of the project's anticipated environmental effects. *See* 621 F.2d 1017, 1020–21 (9th Cir. 1980) (per curiam).

In the end, we need not resolve in this case the precise parameters of the consultation requirement, or whether it extended to ARS on the record before us. Any violation of the consultation duty that occurred here, we are persuaded, was harmless.

2. Prejudice

The APA directs us to take "due account . . . of the rule of prejudicial error." 5 U.S.C. § 706; *see Nevada v. Dep't of Energy*, 457 F.3d 78, 90 (D.C. Cir. 2006). Accordingly, we consider whether the Forest Service's failure to consult was harmless. *See Warm Springs*, 621 F.2d at 1022–23. The harmless-error analysis asks whether the failure to consult materially impeded NEPA's goals—that is, whether the error caused the agency not to be fully aware of the environmental consequences of the proposed action, thereby precluding informed decisionmaking and public participation, or otherwise materially affected the substance of the agency's decision. *See Tucson Herpetological Soc. v. Salazar*, 566 F.3d 870, 880 (9th Cir. 2009).

Here, Wool Growers contends that, had consultation occurred, ARS and Dr. Knowles would have conveyed to the Forest Service information regarding the uncertainties of disease transmission mechanisms from domestic sheep and other contributors to bighorn disease. It is fair to assume Dr. Knowles would have offered this information—he *did* offer it to the Forest Service, both in his letter on appeal to the Forest Supervisor, as well as in his declarations in the expanded record before the district court. But, as reflected in the FSEIS, such information had already been amply communicated, and the Forest Service and the public already had considered it.

For example, the FSEIS acknowledged:

> Some of these contentions [challenging the link between disease in domestic sheep and disease in bighorn sheep] are accurate. We do not understand all of the mechanisms involved in potential disease transmission between the species. . . . Arguably, much of the evidence is circumstantial; however, the compilation of cases throughout several decades does contribute to an increasing body of evidence that overwhelmingly demonstrates bighorn sheep near domestic sheep are at risk for disease transmission, even though "contact" may not have actually been observed.

FSEIS xxi. The FSEIS also specifically acknowledged comments by "scientists and others, primarily from agricultural disciplines," regarding the effect of stressors on bighorn sheep disease, as well as uncertainties regarding disease transmission. *Id.* at 3-12–3-14. And in the ROD, the Forest Supervisor took those views and comments into consideration, stating: "Some scientists and others, primarily from agricultural disciplines, contend that disease transmission between bighorn sheep and domestic sheep is not a relevant factor in bighorn sheep distribution and population declines in the wildland environment. I have taken these arguments into consideration while making my decision." ROD 11.

Nor did these concerns escape public comment. The public provided extensive comments showing awareness of these considerations, including the comments that: "The FSEIS should be particularly thorough when assessing the

literature on the causal relationship of disease transmission between domestic sheep and bighorn sheep," FSEIS A-81; "[e]vidence linking disease outbreaks to domestic sheep is inconclusive," "[s]tudies documenting disease transmission between the two species have been done in controlled environments," and "[s]tress could be a precursor to the onset of sickness", *id.* at A-87; and "[t]he Forest Service should disclose plans for reduction or elimination of stressors, such as bad weather or lack of nutrition, that can predispose bighorn sheep to disease or exacerbate risk of mortality," *id.* at A-186.

In *Warm Springs*, we found no prejudice arising from the Army Corps of Engineers' failure to consult the U.S. Geological Survey because the Corps subsequently considered the study that consultation would have revealed. *See* 621 F.2d at 1023. Similarly here, the Forest Service's failure to consult did not prejudice its review process. The Forest Service took into account essentially the same comments—arguments from "scientists and others, primarily from agricultural disciplines" contesting the inference that domestic sheep can and do transmit disease to wild bighorn sheep—that ARS, through Dr. Knowles, would have provided by formally consulting with the Forest Service during the environmental review process.

The Forest Service's failure to consult ARS is immaterial for another reason as well. The precise mechanisms of disease transmission did not affect the Forest Service's decision. As the FSEIS states: "The exact means by which the disease is transferred [from domestic to bighorn sheep] is beyond the scope of this analysis and should be conducted by qualified researchers." FSEIS A-187. The FSEIS's conclusion was that the scientific consensus is that disease

transmission from domestic sheep—by whatever mechanism and involving whatever confounding factors—poses a sufficient risk to bighorn sheep viability to merit separation of the bighorns from the domestic animals. Confirming that conclusion, numerous agencies with jurisdiction over bighorn sheep have found the risk significant enough to compel modification of their management plans. *See* section I.B., *supra*.

Because the lack of consultation did not prevent the Forest Service or the public from considering information about the uncertainties in transmission of disease from domestic to bighorn sheep such as ARS would have offered (and which Dr. Knowles later did offer), and because information about the precise mechanisms of such transmission was not a basis of the Forest Service's decision, no prejudice resulted from the lack of consultation.

Wool Growers maintains that its member wool companies *were* prejudiced—some of them went out of business due to the Forest Service's ultimate decision, they claim. But this is not the type of prejudice with which NEPA is concerned. Rather, the question is whether the failure to consult somehow materially altered the environmental review process, not whether a constituent body was harmed by the agency's ultimate decision. *See Cnty. of Del Norte v. United States*, 732 F.2d 1462, 1466–67 (9th Cir. 1984). Almost invariably, some individuals or entities are negatively affected by an agency decision. As long as "[t]he integrity of the decision making process within the government and the public's opportunity to comment in accordance with all legal

requirements were not compromised in any way," *id.*, there is no prejudice of the sort with which NEPA is concerned.[3]

Accordingly, we conclude that any error arising from the Forest Service's failure to consult was harmless.

B. Supplementation

Wool Growers next challenges the Forest Service's failure to supplement the FSEIS. "Agencies . . . [s]hall prepare supplements to either draft or final environmental impact statements if . . . [t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." 40 C.F.R. §1502.9(c). But "an agency need not supplement an EIS every time new information comes to light after the EIS is finalized." *Marsh v. Or. Nat. Res. Council*, 490 U.S. 360, 373 (1989). So requiring "would render agency decisionmaking intractable, always awaiting updated information only to find the new information outdated by the time a decision is made." *Id.* Thus, only "if the new information is sufficient to show that the remaining action will affect the quality of the human environment in a significant manner or to a significant extent not already considered, [must] a supplemental EIS . . . be prepared." *Id.* at 374 (alteration and citation omitted).

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[3] The Forest Service also argues that any prejudice was cured by the thorough vetting in the district court of disease transmission questions, as expressed in the parties' expert declarations. This extra-record evidence does not cure the prejudice—the question of harmlessness is as to the effect of an error on the NEPA process. The expert declarations were submitted well after the NEPA process was complete. They cannot, therefore, cure any prejudice, although they are informative as to whether prejudice occurred.

Here, Wool Growers contends that publication of the Lawrence study in 2010, after the FSEIS issued, triggered the Forest Service's duty to supplement. But: (1) the Forest Service cited and discussed the study, in unpublished form, numerous times in the FSEIS; (2) the study bolstered the Forest Service's decision by confirming that pneumonia-linked bacteria were transmitted from domestic to bighorn sheep, and that the transmitted bacteria likely caused the pneumonia that killed the bighorns in the study;[4] and (3) the study, while confirming bacterial transmission between the species in a manner not yet definitively proven, reaffirmed the scientific consensus regarding the risk domestic sheep present to bighorn sheep, as discussed in the FSEIS and ROD.

The FSEIS stated, for example, that "the vast majority of literature supports the potential for disease transmission between the species, documents bighorn die-offs near domestic sheep, and supports the management option of keeping these species separate to prevent disease transmission." FSEIS 3-14. The Lawrence study was fully in accord with the literature reported, and indeed was taken into account by the FSEIS in making that statement. *See id.* It was eminently reasonable for the Forest Service to determine that the *publication* of the Lawrence study in essentially the form relied upon in the FSEIS did not provide significant information not already considered.

Wool Growers also argues that the Forest Service should have supplemented the FSEIS in light of Dr. Knowles' critiques of the Lawrence study. But Dr. Knowles' critiques

[4] Wool Growers has not argued that the published version of the study differs materially from the unpublished form to which the FSEIS cited, and the Forest Service maintains there is no material difference.

either: (1) conflict with the express findings of the study, of which he was an author; or (2) state once more his views regarding the lack of certainty in disease transmission mechanisms. As to the former, it was reasonable for the Forest Service to decide that certain of Dr. Knowles' comments—which contradict the study's conclusion that its "results unequivocally demonstrate transmission of *M. haemolytica* from domestic to bighorn sheep, resulting in pneumonia and death of bighorn sheep"—did not represent "significant" new information. The responses from other authors of the Lawrence study disputed Dr. Knowles' characterization of the results of the study, indicating that the Forest Service reasonably concluded that Dr. Knowles' critiques did not undermine the relevance of the study's conclusion. And as to the latter, the Forest Service could reasonably have decided that Dr. Knowles' comments regarding the unproven and unknown mechanisms of disease transmission were already well addressed in the FSEIS, as discussed above, and therefore that his additional comments to the same effect did not trigger its duty to supplement the FSEIS. Supplementation is not required where the agency, having taken a "hard look" at reevaluation, "determines that the new impacts will not be . . . significantly different from those already considered." *N. Idaho Cmty. Action Network v. U.S. Dep't of Transp.*, 545 F.3d 1147, 1154–55 (9th Cir. 2008) (per curiam).

We conclude that the Forest Service did not act arbitrarily or capriciously or abuse its discretion by declining to supplement the FSEIS.

C. Models

Wool Growers' final challenge is to the modeling the Forest Service used to analyze bighorn sheep home ranges and movement, and the potential impacts of various management alternatives.

The framework for evaluating such challenges is well-established. "Agencies [must] insure the . . . scientific integrity[] of the discussions and analyses in environmental impact statements." 40 C.F.R. § 1502.24. Moreover, "NEPA requires that [EISs] contain high-quality information and accurate scientific analysis." *Lands Council v. Powell*, 395 F.3d 1019, 1031 (9th Cir. 2005) (citing 40 C.F.R. § 1500.1(b)). If relevant data is incomplete or unavailable, the EIS "must disclose this fact." *Id.* Thus, when an agency uses models in its NEPA analysis, it must provide "up-front disclosures of relevant shortcomings in the data or models." *Id.* at 1032. When an agency undertakes technical scientific analyses, as with the development of models to help analyze a problem, the court's deference to the agency's judgment is at its peak. *Lands Council*, 537 F.3d at 993.

1. Risk of contact model

The first model with which Wool Growers takes issue is the risk of contact model. Wool Growers argues that model failed adequately to take into account obstacles to bighorn sheep mobility, including rivers and mountains.

The Forest Service used one aspect of the risk of contact model—the core herd home range analysis—to map the home ranges for the fifteen herds in the Payette, as well as one "area of concern." The home range boundaries were

developed using telemetry data from radio-collared bighorn sheep. A second aspect of the model, the foray analysis, was used to map the distances bighorn sheep travel outside their home ranges. The Forest Service used the model, overall, to predict whether a given foray by a bighorn from its core home range would intersect a grazing allotment between May and October, the months during which domestic sheep were permitted to graze in the Payette. Contrary to Wool Growers' argument, the risk of contact model does take into account obstacles to mobility. The model incorporates telemetry data of actual bighorn sheep movements within the Payette. That data necessarily accounts for any topographical features that impede bighorn mobility, as it indicates the distances bighorn sheep *actually* move across the landscape.[5] Also, bighorns' *chosen* habitat is rugged, including steep, rocky terrain that permits them to escape from predators. Thus, much of the Payette's mountainous terrain does not serve as a barrier to bighorn sheep movement, although it might be a barrier to the movement of other species. And the Forest Service has pointed to evidence indicating that rivers are not obstacles to bighorn sheep, as they have been known to swim across the largest ones in the region. *See W. Watersheds Project v. BLM*, No. 09-0507-E-BLW, 2009 WL 3335365, at *4 (D. Idaho Oct. 14, 2009). Wool Growers' argument that the risk of contact model failed to account for barriers to movement therefore fails.

Wool Growers next contends that the risk of contact model should have been validated by comparing the model's

[5] The FSEIS also notes that, for various reasons, the telemetry data does not include some of the longest forays. It therefore underestimates the distances moved by bighorn sheep and thus the extent to which they are able to traverse challenging terrain. *See* FSEIS 3-35–36.

predicted values with actual values to assess the model's reliability. Neither the Forest Service nor Intervenors directly respond to this argument, although both generally note that the models: (1) were developed by leading experts in the field; (2) were derived from peer-reviewed and published models used to study bighorn sheep movements in the Sierra Nevada mountains of California; and (3) rely on a large data set reflecting actual bighorn sheep movements in the Payette.[6]

We reject Wool Growers' argument. The Forest Service is owed greater-than-average deference as it relates to its choice of technical methodologies. Also, as the methodologies used to construct the risk of contact model were peer-reviewed and used successfully elsewhere, it was not unreasonable for the Forest Service to rely on the model, adjusted to fit local circumstances in the Payette. The model was reliable as a predictor of actual movements because it was predicated on data depicting actual bighorn sheep movements. Given the model's Payette data-based origin, the Forest Service could reasonably assume that its predictions were sufficiently reliable to satisfy NEPA.

Ultimately, the Forest Service used top-rate model designers; relied on peer-reviewed methodologies applied by other bighorn researchers addressing similar issues; and incorporated on-the-ground data of bighorn sheep movements within the Payette. Given the foregoing, and in light of the

[6] Wool Growers also challenge the risk of contact model on the ground that two of the Forest Service's experts expressed conflicting views regarding whether the model takes into account barriers to bighorn sheep forays. Even assuming the experts' statements conflict—and it is not clear they do—those statements, which were presented only at the district court, did not in any way affect the analysis in the FSEIS, which we find reasonable.

deference owed to the agency when undertaking technical analysis within its purview, the Forest Service's reliance on the risk of contact model was not arbitrary, capricious, or an abuse of discretion. *Cf. Lands Council*, 537 F.3d at 990–94 (holding that the Forest Service did not act arbitrarily and capriciously by failing to verify its model with on-the-ground data).

2. Disease model

Wool Growers asserts two final points of error, related to the Forest Service's disease model. Wool Growers contends the model did not consider the effects of time on disease transmission, including both when and for how long bighorn and domestic sheep will be in contact with one another in the Payette, as well as the precise timing and period of contact necessary for transmission to occur.

Determining both the amount of time bighorn and domestic sheep spend cohabiting and the effects of timing on disease transmission involve uncertainties acknowledged by the Forest Service in the FSEIS. The degree to which both kinds of uncertainty affect the usefulness of the disease model can be resolved by the same three responses, as the Forest Service explained in the FSEIS:

(1) The disease model was not designed to predict actual disease outbreak probabilities. Instead, the Forest Service used the model to predict the likelihood that extirpation of bighorn sheep subpopulations would result from various alternative management plans, assuming probabilities of disease transmission risk ranging from 5% to 100%. The Forest Service did not use the disease model to predict a particular level of actual risk.

(2) Because the steps of disease transmission are uncertain—including the duration of contact between bighorn and domestic sheep and the precise timing and coincidence of events necessary for transmission to occur—the Forest Service ran the model at multiple different probability values. By using the model to test various proposed plans at different risk levels, the Forest Service accounted for the uncertainty of the variables involved.

(3) Most importantly, the Forest Service clearly explained the assumptions on which it built the model and the uncertainties inherent in it, thereby identifying the model's limitations. The FSEIS states, for example: "We do not understand all of the mechanisms involved in potential disease transmission between the species," FSEIS 3-13; "[There is] so much uncertainty surrounding [the probability of contact resulting in disease transmission] and essentially no research . . . that would allow its estimation," *id.* at 3-43; and "[t]he complexity of the [disease transmission] model and the number of variables whose estimation was necessary to run it . . . imply a high degree of uncertainty of its results," *id.* at 3-56. Those explanations and acknowledgments are all that NEPA requires. *Powell*, 395 F.3d at 1031–32 (citing 40 C.F.R. § 1500.1(b)). Were that not the case, government actions affecting the environment, positively or negatively, could be hamstrung by the need for unattainable scientific certainty.

Wool Growers points to additional available information regarding domestic sheep movement within allotments—grazing permits, operating instructions, and post-season actual-use reports—the Forest Service could have used to evaluate more accurately the likelihood that bighorn sheep would cohabit with domestic sheep. But as the FSEIS

explained, so much uncertainty surrounds contact probabilities that the Forest Service chose *not* to estimate the likelihood of actual contact. Specifically, the FSEIS observed that, while this information was relevant, it could not be incorporated into the modeling because domestic sheep: (1) graze differently on the allotments each year; and (2) could be anywhere in the Payette between May and October, and could stray during that time or be left behind after the grazing season. Given these uncertainties, the Forest Service did not act unreasonably by using a range of probabilities to model the risk of disease transmission.

Wool Growers' contention that the Forest Service should have modeled a disease transmission probability of 0% fares no better. If the disease transmission probability used was 0%, the models would necessarily show a 0% risk of extirpation due to disease transmission for any possible management plan. Because of the obviousness of this outcome, a 0% value would not inform the environmental review process. Perhaps the Forest Service could have used a 1% probability to flesh out more fully the effects of disease transmission, given various management alternatives. But in the face of competing reasonable methodologies, we do not substitute our judgment for that of the agency. That the Forest Service could have chosen a different methodology does not render the extensive analysis it undertook arbitrary or capricious.[7]

[7] The peer-reviewed Clifford study of bighorn sheep in the Sierra Nevada assumed that, given contact between domestic and bighorn sheep, the likelihood of disease transmission ranged from 50% to 100%. Here, the Forest Service chose much more conservative probabilities for use in its disease model.

In sum, the disease model was used for a limited purpose, and, for that purpose, was sufficiently grounded in scientifically acceptable methodology to shed some light on the choice of an appropriate management plan. As the ROD explained: "Determining the probability that a bighorn sheep will reach an occupied [domestic sheep grazing] allotment [in the Payette] and that contact between the species will result in disease transmission is problematic," partly because "there is . . . essentially no research that would allow . . . estimation" of the likelihood of disease transmission. ROD 12. Given the Forest Service's open acknowledgment of the model's limitations, the uncertainties inherent in estimating contact and disease transmission, and the actual use of the model—which was *not* to estimate actual probabilities of disease transmission—the Forest Service's development and use of the disease model was not arbitrary, capricious, an abuse of discretion, or otherwise contrary to law.

III.

In light of the foregoing, we conclude that the Forest Service committed no reversible error in preparing the FSEIS and ROD. Accordingly, we **AFFIRM**.

Attachment 2

The Wildlife Society &
American Association of Wildlife Veterinarians
Joint Issue Statement

Domestic Sheep and Goats Disease Transmission Risk to Wild Sheep

Bighorn sheep and thinhorn sheep (*Ovis canadensis* and *O. dalli)*, collectively referred to as wild sheep, are iconic species of western North America. Found in isolated, rugged, and extreme habitats of the continent, wild sheep are vital economic, social, and ecological components of these areas.

The historic distribution of wild sheep in North America extended from Alaska to Mexico and east to the Dakotas, western Nebraska and west Texas. Population estimates of wild sheep ranged from 1.5 to 2 million at the onset of the 19th century (Seton 1909). Unregulated hunting, disease, competition for forage and space with domestic livestock, as well as habitat destruction and fragmentation led to precipitous declines in distribution and abundance through the early 1900s, with extirpations occurring in many regions (Buechner 1960). Wildlife managers have used translocations, habitat enhancement, and habitat protection to restore wild sheep populations, but recovery in some populations has been hampered by periodic disease outbreaks.

Wild sheep are susceptible to a variety of diseases that affect herd viability. The most important diseases affecting wild sheep populations are respiratory infections that result in pneumonia. Bacteria of the family Pasteurellaceae (*Pasteurella multocida*, *Mannheimia haemolytica* and *Bibersteinia trehalosi*), and *Mycoplasma ovipneumoniae* are the most frequently isolated respiratory pathogens from wild sheep with pneumonia. Pneumonia caused by these organisms often results in the mortality of a large proportion of the population (Cox and Carlson 2012) across all age classes (referred to as an all age epizootic or die-off) and is typically followed by enzootic disease with multiple years of lamb mortality from pneumonia (WAFWA WHC 2014). This pattern of pneumonia in wild sheep has been documented in more than 70 peer-reviewed scientific publications.

Incidences of pneumonia-related die-offs are frequently associated with the presence of domestic sheep and goats (George *et al*. 2008, Wehausen *et al.* 2011). Controlled research studies have confirmed that both *Mannheimia hemolytica* and *Mycoplasma ovipneumoniae* are transmitted to wild sheep upon contact with, or proximity to, domestic sheep (Besser *et al.* 2014, Lawrence *et al.* 2010, Wehausen *et al.* 2011). Domestic sheep and goats commonly carry these disease-causing organisms which typically cause few deaths and little illness in domesticated adults and lambs (Martin 1996, Gilmour and Gilmour 1989). Contact between animals from range use overlap on public land and forays of wild sheep to nearby domestic herds on private in-holdings and visa-versa, is the crux of this wild-domestic animal controversy. While not all outbreaks of pneumonia in wild sheep have confirmed contact with domestic sheep or goats, the preponderance of scientific evidence shows that association with domestic sheep and goats poses a significant threat to the continued conservation and restoration of wild sheep populations.

Management alternatives to reduce the impacts of respiratory disease on wild sheep are limited. There is currently no effective vaccine or treatment for pneumonia in bighorn sheep (Wehausen *et al.* 2011). Maintaining appropriate and reasonable spatial and temporal separation between wild sheep and domestic sheep and goats is the most effective tool currently available for minimizing risk of disease transmission between species (WAFWA WSWG 2012).

Proactively protecting and managing the health of wild sheep populations is essential to the continued success of restoration, conservation and management efforts in North America. Managers must take appropriate steps to prevent epizootic events that reduce herd health and performance. This includes taking precautions to prevent transmission of pathogens between wild sheep during relocations. Appropriate, reasonable and effective solutions will be difficult, if not impossible to achieve, until the risk of disease transmission from domestic sheep and goats to wild sheep is widely acknowledged and substantially reduced. Stakeholder groups benefit when disease risk is managed to minimize the potential transmission of pathogens.

The policy of The Wildlife Society and the American Association of Wildlife Veterinarians regarding the risk of disease transmission from domestic sheep and goats to wild sheep is to:

1. Accept that peer-reviewed, published science has consistently demonstrated the occurrence of disease transmission from domestic sheep and goats to wild sheep upon contact or proximity.

2. Recognize that disease transmission from domestic sheep and goats to wild sheep is a significant risk factor for the conservation and restoration of wild sheep populations.

3. Emphasize the need for developing and implementing disease management strategies to address chronically infected wild sheep populations.

4. Acknowledge the importance of science-based assessments of disease risk between wild sheep and domestic sheep and goats, and promote strategies to reduce the disease transmission and mitigate disease outbreaks.

5. Recognize effective temporal and spatial separation of domestic sheep and goats from wild sheep as the only currently available management solution for preventing or minimizing disease transmission and advocate for proactive and cooperative management strategies for achieving such separation.

6. Recognize alternative management strategies are being developed, and until stakeholder agreements are negotiated, co-mingling of domestic sheep and goats with wild sheep may result in the continued loss of wild sheep from disease, and wildlife managers may have to cull infected wild sheep herds to reduce the risk of further disease transmission.

7. Recognize some wild sheep populations may harbor pathogenic organisms potentially detrimental to other wild sheep and translocation of animals can spread the pathogens they carry. Translocation of wild sheep should occur following determination that disease transmission risk is low and conservation benefits are high.

8. Emphasize the importance of monitoring herd health following relocations or disease events.

9. Promote increased cooperation and communication among all stakeholders and public education programs to articulate the risks and impacts of disease transmission between wild sheep and domestic sheep and goats.

The Wildlife Society's Position Statement on "Livestock Grazing on Rangelands in the Western U.S." supports livestock grazing management on rangelands that "guards against the potential for disease transmission between domestic livestock and wildlife" (TWS 2010).

The mission of the Wildlife Society's Wildlife Diseases Working Group is to promote better scientific understanding of the causes and consequences of disease in ecosystems and wildlife populations; to apply the principles of wildlife science, ecology, and epidemiology to the prevention and management of diseases in wildlife; to foster education and transfer of information on diseases to wildlife management professionals and the public; and to apply this knowledge to enhance the health and conservation of wildlife populations and their interactions with humans and domestic animals (TWS 2014).

The American Association of Wildlife Veterinarians includes as their mission "to stress the importance of the interrelationships of humans, domestic animals, and wildlife as reservoirs of disease" and "to educate…about the importance of wildlife preventive medicine and disease in relation to the wildlife resource and domestic species." (AAWV 2014)

It is under these baseline objectives and policies which these organizations issue this joint statement.

Literature Cited

American Association of Wildlife Veterinarians (AAWV). 2014. http://aawv.net. Last viewed December 28, 2014.

Besser, T.E., E. F. Cassirer, K.A. Potter, K. Lahmers, J. L. Oaks, S. Shanthalingam, S. Srikumaran, and W. J. Foreyt. 2014. Epizootic Pneumonia of Bighorn Sheep following Experimental Exposure to *Mycoplasma ovipneumoniae*. Browning GF, ed. *PLoS ONE.* 9(10):e110039. doi:10.1371/journal.pone.0110039.

Buechner, H.K., 1960. The Bighorn Sheep in the United States, Its Past, Present, and Future. Wildlife Monograph 4, The Wildlife Society, Washington, D.C. 174 pp.

Cox, M. and T. Carlson. Wild Sheep Disease Events & Management Actions among Western States and Provinces. Presentation at the 2012 Western Association of Fish and Wildlife Agencies,Wild Sheep Working Group, Wildlife Professional's Meeting, Reno, NV.

Foreyt, W. J., et al. 1994. Fatal pneumonia following inoculation of healthy bighorn sheep with *Pasteurella haemolytica* from healthy domestic sheep. Journal of Wildlife Diseases 30: 137-143.

George, J. L., D. J. Marin, P. M. Lukacs, and M. W. Miller. 2008. Epidemic pasteurellosis in a bighorn sheep population coinciding with the appearance of a domestic sheep. *J Wildl Dis. Apr; 44(2):388-403.*

Gilmour, N. J. L. and J. S. Gilmour. 1989. Pasteurellosis of sheep. *In Pasteurella and Pasteurellosis.* Adam C. and Ruter J. M. (eds). Academic Press, London UK. Pp. 223-262.

Lawrence, P. K., S. Shanthalingam, R. P. Dassanayake, R. Subramaniam, C. N. Herndon, D. P. Knowles, F. R. Rurangirwa, W. J. Foreyt, G. Wayman, A. M. Marciel, S. K. Highlander, and S. Srikumaran. 2010. Transmission of *Mannheimia haemolytica* from domestic sheep (*Ovis aries*) to bighorn sheep (*Ovis canadensis*): unequivocal demonstration with green fluorescent protein-tagged organisms. Journal of Wildlife Diseases 46:706-717, and erratum (46:1346-1347).

Martin, W. B. 1996. Respiratory infections of sheep. Comp. Immun. Microbiol. Infect. Dis. Vol. 19, No. 3, pp.171-179

Seton, E.T. 1909. Lives of Game Animals. Charles T. Branford, Co., Boston, Massachusetts. 780 pp.

The Wildlife Society (TWS). 2010. Final Position Statement, Livestock Grazing on Rangelands in the Western U.S. http://wildlife.org/wp-content/uploads/2014/11/Livestock-Grazing_March-2010_Renewed-Oct.15.pdf. Last viewed December 28, 2014.

Wehausen, J. D., R. R. Ramey II, and S. T. Kelley. 2011. Domestic sheep, bighorn sheep, and respiratory disease: a review of experimental evidence. California Fish and Game 97:7-24.

Western Association of Fish and Wildlife Agencies, Wildlife Health Committee. 2014. Bighorn Sheep Herd Health Monitoring Recommendations. 29 pp.

Western Association of Fish and Wildlife Agencies,Wild Sheep Working Group. 2012. Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat. 24 pp.