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February 14, 2011

Damien Miller
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Sheldon – Hart Mountain National Wildlife Refuge Complex
Post Office Box 111
Lakeview, Oregon 97630

Re: Sheldon Comprehensive Conservation Plan

Dear Mr. Miller;

Thank you for providing an opportunity for the Nevada Department of Wildlife (NDOW) to review and comment on the Sheldon Wildlife Refuge Comprehensive Conservation Plan (CCP). As a partnering agency, NDOW supports your land use planning efforts and offers the following recommendations for consideration and incorporation into the CCP/EIS. To preface our concerns and comments, NDOW is generally in support of the Alternative 2 (i.e. the preferred alternative); however, we recommend modifying the preferred alternative to incorporate the following changes.

State Plans section 1.7.1

NDOW commends your efforts of describing the CCP's relationship with state wildlife managements plans; however, in reading through the CCP it is not comprehensive and difficult to track compatibility with Nevada's Wildlife Action Plan (WAP). For example, the WAP Species of Conservation Priority are not mentioned in the goals, objectives, or habitat management strategies. In addition, the section calling for monitoring of "sensitive species" appears non-committal. We recommend you include the WAP species of conservation priority in the goals, objectives, and management strategies in addition to strengthening the sensitive species monitoring by establishing commitment actions. Furthermore, we encourage the Sheldon CCP to include an appendix of all Species of Conservation Priority, along with Partners In Flight priority species from both the Continental Plan (2004) and the newly revised Nevada Bird Conservation Plan (2010), shorebird plans (U.S. and Intermountain West) and water bird plans (North American and Intermountain West). The Desert Complex CCP (2008) can provide an example of such an appendix. To ensure this appendix will be included in the Sheldon Refuge CCP, NDOW will provide this appendix in the near future.

NDOW also encourages the Sheldon Refuge to incorporate goals and objectives from state wildlife conservation and management plans into the CCP document as the CCP's relationship with such plans is currently unclear. Additionally, further explaining the CCP's relationship to the following state conservation and management plans will help clarify such relationships: Greater Sage-grouse Conservation Plan, Mule Deer Conservation Plan, Bat Conservation Plan, Antelope Conservation Plan, Big Horn Sheep Conservation Plan, Elk Conservation Plan, and Predator Conservation Plan. Furthermore, NDOW would like the CCP to state the protocol or amendment process that will be used for incorporating new or updated wildlife conservation plans and updated WAP's.

Management of the Feral Horse and Burro Population

NDOW supports removing all wild horse and burros from within the refuge as described under Alternative 2 so that habitat conditions throughout Sheldon Refuge will improve. This improvement in habitat conditions would likely result in significant long-term benefits to fish and wildlife such as population increases, stability, and robustness. Furthermore, this objective is consistent with the Sheldon Sage-grouse Population Management Unit Conservation Plan which identifies wild horse and burro populations as the greatest threat to greater sage-grouse populations on the refuge. Subsequently, the quality and quantity of wildlife-dependent recreation uses will also likely improve.

Fisheries

Sport fisheries in Nevada are extremely limited and highly valued by the public. Humboldt and Washoe counties are especially limited in their availability of sport fisheries. NDOW recommends that water developments such as reservoirs and ponds continue to be maintained for wildlife habitat and recreation opportunities as identified in Alternative 1 and 2. Therefore, we cannot support Alternative 3 due to the loss of the sport fishing opportunity that would result. Further, implementation of Alternative 3 would seem to be in conflict with the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, which identifies sport fishing as one of the six priority wildlife dependent recreational uses for the Sheldon Refuge.

NDOW supports the proposed repair/maintenance of the Catnip Dam and dredging of the reservoir to increase the depth and improve the fishery as identified in all alternatives (Objective 3d: Artificial Emergent Marshes and Reservoirs). We look forward to working with the Sheldon staff in moving this proposal forward and may be able to assist financially with habitat restoration. Furthermore, NDOW would like to partner with the Sheldon Refuge on the rehabilitation/restoration of Catnip Creek following the removal of all horses and burros. Habitat improvement on Catnip Creek will likely improve spawning success and reduce the need to frequently stock the reservoir with hatchery fish. Additionally, the NDOW has two concrete fish traps on Catnip Creek that are necessary for fisheries management; thus, these structures should remain in place.

In Objective 8b (Cold-water Recreational Fisheries), the EIS calls for the use of Lahontan cutthroat trout (LCT) or Alvord cutthroat trout in Catnip and Big Spring reservoirs. Since 1947, Catnip Reservoir has been managed by NDOW as a LCT fishery, albeit outside of its historic range. Catnip Reservoir is located within a closed basin which does not have a native or indigenous species of trout associated with it, although it is adjacent to the Columbia River drainage which contains native redband trout (*Oncorhynchus mykiss gairdneri*) and the Lahontan basin which contains native LCT. NDOW has no plans to change the management of Catnip Reservoir to anything other than for LCT. The genetic strain of LCT best suited for use in the maintenance of the recreational fishery as well as to facilitate recovery efforts for LCT in the Lahontan basin will be based on professional judgment as well as available genetic research.

Big Spring Reservoir is located within the Alvord Basin which, at one time, was inhabited by Alvord cutthroat trout. The pure form of this subspecies of cutthroat trout has been extirpated from the basin due to hybridization with rainbow trout which were stocked in the 1930s; as such, this subspecies is not available for management purposes. While the Alvord Basin is adjacent to the Lahontan Basin, it is also adjacent to the Columbia River Basin which contains redband trout which are, geographically speaking, just as close to being a native species on the Sheldon Refuge as LCT. They are adapted to warm water temperatures and can thrive in a desert environment. Redband trout should also be considered a potential species for sport fisheries management on the Sheldon Refuge. Either of these species could be used to reestablish the recreational fishery at Big Spring should water conditions allow in the future. Again, neither of these species would be native or indigenous to the basin and would thus be considered out-of-basin populations.

The EIS states that the current put-and-take management is inconsistent with several United States Fish and Wildlife Service (USFWS) policies. Both Catnip and Big Spring reservoirs are man-made impoundments with limited to no spawning and rearing habitat which would facilitate self-sustaining trout populations large enough to support a recreational fishery. Hatchery stocking is necessary to maintain recreational fishing opportunity and provide a quality fishing experience to the public. NDOW's current management direction has resulted in quality fisheries which are highly regarded by the anglers who frequent these waters. We would respectfully request that any changes to the management of these waters be coordinated with the NDOW biologist responsible for their management.

Additionally, page 1-16 contains inaccurate information that should be corrected. Information in the Sport Fishing section reads, "Both Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*; native to nearby areas) and rainbow trout (not native to nearby areas) are periodically stocked to Catnip Reservoir". This is incorrect. Rainbow trout have never been stocked by NDOW into Catnip Reservoir, we have never received a report of an illegal introduction, nor have we ever documented rainbow trout in Catnip

Reservoir. It is strictly managed as a LCT water and we have no reason to believe rainbow trout have ever been introduced, legally or illegally.

On page 2-26 the CCP states, "In-channel habitat: Restore (where necessary), protect, and maintain more than 60% (125 miles) of in-channel habitat within cold-water streams for the benefit of a diverse assemblage of native species including desert fish (e.g., Sheldon tui chub [*Gila bicolor eurystoma*]), amphibians, and endemic invertebrates on Sheldon Refuge". NDOW wishes to expand this list to include LCT and/or Redband trout. Additionally, one of the stream characteristics is listed as "soft bottom sediments", which is not consistent with the stream habitat necessary to support trout populations, especially for spawning. Therefore, NDOW suggests that future management actions on streams such as Catnip Creek should strive to reduce "soft bottom sediments" and increase cobble and gravel to support salmonid spawning and rearing.

On page 2-50 the CCP states, "Within five years of the final decision for the CCP, develop a coldwater fisheries plan." NDOW would like to be intimately involved in this process and ensure that such a plan is consistent with State Fisheries plans.

Wilderness

NDOW questions if wilderness designation on the Refuge is necessary to manage this land consistent with your mission. NDOW's experience with wilderness is that it is a passive form of management and severely restrictive in its ability to utilize the wide range of management tools. We are concerned that this action would severely limit habitat protection, conservation, and restoration management actions (i.e. Goals 2-5 & 7) that benefit wildlife, a goal of the USFWS mission. For example, a wilderness designation will restrain fire management techniques, which we believe, other than horses, is one of the major threats facing vegetative communities on the refuge. Our concerns are reflected in your discussion under Goal 7a on pages 2-47-48:

Natural fire now has the potential to burn more intensely, more rapidly, and over larger areas than if overgrazing and continued fire suppression had not occurred—making fire management more difficult. Under some circumstances, these sorts of natural fires can completely eliminate an existing native plant community. Fires can foster the spread and density of unwanted, nonnative invasive species, primarily cheatgrass, which further alters the natural fire regime. Having adequate fire suppression resources available to contain and extinguish natural fires before they become large and burn under undesirable conditions is critical to the long-term reservation of the natural, cultural, and native biological resources of Sheldon Refuge.

The CCP states that only primitive tools and equipment not prohibited by the Wilderness Act would be used within proposed wilderness areas. The limitation of only using primitive tools restricts your fire suppression capabilities and vegetation management measures (e.g. fuel reduction). This could lead to a reduction in habitat quality and

increased stress levels for wildlife. In addition, your ability to restore lost habitat following wildland fire will be severely restricted. We are especially concerned that these restrictive measures, as discussed under the proposed alternative, will occur across 73 percent of the Sheldon Refuge until Congress can take action. In our opinion, choosing to limit the management tools that can be used on the Sheldon Refuge, is inefficient and contradictory to the mission and goals of the USFWS, the National Wildlife Refuge System as well as the Sheldon Refuge purpose, goals, and justification for refuge establishment. Furthermore, we are concerned that any wilderness on the refuge will inhibit NDOW's ability to manage wildlife populations (e.g. guzzler maintenance and development, fence maintenance and development, surveys, augmentations, introductions, etc.). NDOW has purchased material for fencing springs. Will we be permitted to construct pipe rail fence within these wilderness areas? What equipment will be permitted within wilderness areas to complete the fencing task among other managerial tasks? As a result of restricted management activities, NDOW suggests that areas be managed for "wilderness character" through other methods (e.g. public access, roads, and transportation management plan) which will not inhibit wildlife population management and habitat protection, and restoration management actions. Therefore, NDOW suggest the Sheldon Refuge recommend to Congress that no areas within the refuge be designated as wilderness for the reasons stated above.

Habitat Management

Based on NDOW's experience and knowledge, we recommend keeping all restoration tools, techniques, and options available for use and encourage site specific prescription restoration plans rather than limiting it to only those actions anticipated for implementation. However, we wish to express our concerns with the use of prescribed fire and not providing immediate suppression actions in low or Wyoming sagebrush communities. Vegetation recovery time and the very real possibility of noxious/invasive weed invasion in these communities have shown that wildfire should be suppressed and prescribed burning should be very limited. Please see the attached white paper on the subject. Mowing of sagebrush can also have detrimental effects to sage grouse and other ground-nesting bird species under certain situations. For example, mowing can be detrimental in Wyoming sagebrush communities that may have cheatgrass in the understory. In certain situations (south aspects and at low elevations), these areas can become strips of cheatgrass and can act as fine fuel ignition points rather than fuel breaks. We request you provide more specific details regarding where and how these tools will be used.

NDOW encourages the Sheldon Refuge to better incorporate a vegetation inventory discussion of the current vegetation conditions into the CCP. In the CCP it states that, "currently precise conditions of habitats throughout the Sheldon Refuge have not been quantified, but based on the results from vegetation surveys and site visits, the primary factors currently influencing habitat conditions within Sheldon Refuge are feral horses and burros and long-term suppression of natural fire". Specifically, what are the results from vegetation surveys and site visits? NDOW also feels that an undesirable vegetation response following past fires has significantly altered habitat for Mule deer,

sage grouse, and other wildlife species associated with mountain mahogany, mountain big sagebrush, and sagebrush/bitterbrush mixed shrub communities. As such, NDOW discourages thinning in mountain mahogany communities (as it is stated in under alternative 2 in the CCP on page 2-6) as this seems counter-productive based on declining mountain mahogany communities on the Refuge. Additionally, NDOW requests the CCP discuss the status, management actions, and vegetation response of past prescribed fires and wildfires. Specifically, NDOW would like the CCP to discuss the vegetation response of fires in relation to the management objectives and whether these old burns are providing the necessary cover and forage for sage grouse, Mule deer, antelope, and other sagebrush obligate species. The discussion should include the fires on Catnip Mountain, Badger Mountain, Alkali Peak, and Devaney Mountain. NDOW requests a partnership with the Sheldon Refuge to work on restoring mountain mahogany stands, mountain big sagebrush, and sagebrush/bitterbrush mixed shrub communities on the refuge.

Within the Habitat Management portion of Table 2.1 (Page 2-12 Summary of Alternatives), one of the bullet points under Alternative 2 is to maintain at least 60% of big and low sagebrush communities and at least 80% of montane sagebrush communities. What was the rationale for these numbers? NDOW recommends increasing these figures and contributing a greater amount of management effort towards maintaining low sagebrush and Wyoming big sagebrush communities as they are less resilient to impacts. How will the refuge measure if these objectives are achieved or not (i.e. what monitoring plan will be implemented)? (Note - Please incorporate this same discussion above into Goal 2 on pages 2-18 and 2-19.) Furthermore, please cite where the vegetation characterization statistics under Goals 2-5 originated.

Wildland Fire Protection and Restoration

NDOW recommends the consideration of all restoration tools, techniques and options available as opposed limiting the tools that are proposed for the three alternatives. We also recommend that native seed be used in reclamation efforts, where those species can achieve the desired goals of reclamation. However, if the use of native plant materials cannot achieve the desired restoration objectives (i.e. an ecological constraint exists such as limited precipitation, undesirable soil conditions, etc.) then, using non-native seed maybe substituted. For example, NDOW has used Siberian wheatgrass and forage kochia in fire prone areas to break the fire cycle and deter the establishment of more deleterious and fire loving invasive species such as cheatgrass. These non-native species were used (as opposed to native species) because their characteristics (e.g. vigor, ease of establishment, drought tolerant, fire tolerant, fire resistant etc) ensured a greater likelihood of success at achieving restoration objectives based on the site conditions. We encourage the Sheldon Refuge to consider using non-native seed as a restoration option under the preferred alternative as non-native species can increase restoration success in certain situations. Additionally, we support natural recovery post fire; however, if it is determined that an undesirable response would occur, the use of active restoration techniques should be applied.

The loss of mountain mahogany, mountain big sagebrush, and sagebrush/bitterbrush mixed brush communities have impacted Mule deer, sage grouse, and other associated wildlife. NDOW encourages the Sheldon Refuge to make it a priority to protect and maintain current mountain mahogany, mountain big sagebrush, and sagebrush/bitterbrush mixed brush communities. We would also request the restoration of these communities to be a priority. In maintaining and restoring mahogany and mixed brush communities, NDOW will take an active role and facilitate such endeavors where necessary.

On page 49 the CCP states, "Use appropriate management response for natural fire suppression, including allowing natural fire when appropriate". Please provide more detail as to when natural fire is appropriate. Please also provide the decision-making process that will be used in making the "allowing natural fire when appropriate" determination.

Guzzlers, Playa Dugouts, and Water Developments

NDOW supports continuing to manage artificial water developments (i.e. guzzlers) as described under Alternative 2 as these water developments enable wildlife to use habitat that would otherwise be unavailable. NDOW recommends that each playa dugout and water development receive site specific analysis to warrant a determination of leaving in place, modifying, or removing altogether. NDOW supports water development removal to restore natural hydrology if taking such an action does not impact wildlife (i.e. reduce the amount of suitable habitat). Guzzlers, water developments, and playa dugouts provide water to wildlife that would otherwise be unavailable, and allows wildlife to occupy areas of the refuge that would otherwise be unusable. On the Sheldon Refuge many of these playa dugouts provide critical water sources for pronghorn and sage grouse. NDOW has over 30 years of intensive aerial survey data on pronghorn antelope that can be used to demonstrate the critical importance of certain playa water sources. Some sage grouse populations are dependent upon such water sources for late summer brood rearing. A site specific analysis should be used to determine which areas would benefit from removing a water development as well as the development of water sources.

On page 2-32 of the CCP it states that no new guzzlers will be developed "unless compelling scientific evidence is provided which demonstrates guzzlers are biologically necessary for healthy populations of native wildlife within the expected range of natural population variability". With many unknowns (i.e. horse management, climate change, etc.) restricting future guzzler development may hinder our ability to manage wildlife populations by restricting our ability to meet water needs where no water is present. As such, NDOW recommends allowing guzzler development within this planning document. Guzzler development will be based on sound science, the biological needs of the species, and our need to achieve management objectives.

NDOW does not agree with many of the points made in the CCP's discussion of water developments. For example, when making the point that artificial water developments are of little value, the CCP quotes that, "A recent study demonstrated that desert bighorn sheep showed no response to removal of water catchments including no changes in diet, foraging area selection, home-range size, movement rates, mortality, productivity, or recruitment (Cain et al. 2008)". However, the CCP failed to state:

The increase in precipitation that coincided with removal of water sources during post-treatment may have obviated the need for female desert bighorn sheep to respond to removal of water catchments by changing their diet, foraging areas, movement rates, or home-range areas. During post-treatment, increases in forage moisture content and availability of naturally occurring sources of free water in the treatment range likely minimized any impact of removing water catchments (Cain et al. 2008).

NDOW encourages the Sheldon Refuge to appropriately discuss the role artificial water developments play in wildlife management as they have illustrated benefits to wildlife (Arizona Desert Bighorn Sheep 2004; Bleich et al. 2010; Brussard et al. 2006; Resenstock et al. 2004).

Weed Management

NDOW supports the Sheldon Refuge's increased efforts to detect and control newly introduced non-natives plants. However, on page 2-40 under Goal 5, it states that alternative 2 will not implement the following strategies:

- Accomplish treatments through partnerships, grants, and co-op agreements.
- Reduce noxious weeds and other invasive through an emphasis on early detection and eradication of new and/or small infestations.
- Continue to document populations of noxious weeds and other invasive plants on an opportunistic basis and in response to project proposals and activities.
- Focus on early detection and rapid response using a variety of methods to aggressively control and/or remove newly introduced non-native plants and small infestations where eradication is most likely.
- Avoid projects or activities that would increase the rate of spread or area infested.

Please provide further discussion as to why the above strategies would not be implemented, as these measures have proven to be effective.

Hunting

The Nevada Board of Wildlife Commissioners will continue to set harvest levels for game species commensurate with available resources. This is stated in the Nevada Revised Statutes (NRS) 501.181 (4a) declaring that the commission shall establish:

Seasons for hunting game mammals and game birds, for hunting or trapping fur-bearing mammals and for fishing, the daily and possession limits, the manner and means of taking wildlife, including, but not limited to, the sex, size or other physical differentiation for each species, and, when necessary for management purposes, the emergency closing or extending of a season, reducing or increasing of the bag or possession limits on a species, or the closing of any area to hunting, fishing or trapping. The regulations must be established after first considering the recommendations of the Department, the county advisory boards to manage wildlife and others who wish to present their views at an open meeting. Any regulations relating to the closure of a season must be based upon scientific data concerning the management of wildlife. The data upon which the regulations are based must be collected or developed by the Department.

NDOW will continue collaborating and information sharing with the Sheldon Refuge in regards to the wildlife management on the refuge. However, hunting limits and seasons are regulated by the Nevada Board of Wildlife Commissioners. As such, NDOW recommends clarifying and amending incorrect information in the CCP in regards to managing game species. For example, the CCP states on page C-19:

As a priority species for Sheldon Refuge and as a candidate species under the Endangered Species Act, Greater sage-grouse would be managed within Sheldon Refuge to ensure long-term population health and viability and to maintain or restore declining or extirpated populations (Sheldon Refuge CCP Objective 6d). Sport hunting of these birds would be allowed to continue to the extent the activity does not interfere with the implementation of these primary objectives. Upon review, if Greater sage-grouse harvest data are determined insufficient to accurately and precisely measure identified population parameters, the activity would be found incompatible and subsequent harvest seasons would be suspended indefinitely.

NDOW assures the Sheldon Refuge that if long-term population health and viability are at risk, appropriate measures (suspended harvest, limited harvest, etc) will be taken to ensure population success on the refuge. NDOW looks forward to continuing coordination efforts with the Sheldon Refuge in regards to wildlife management.

Transportation Management

The CCP states under Objective 8a on page 2-58 that, “Within three to five years of the final decision for the CCP, (they will) develop and adopt a transportation management plan (see also Figures 2.1, 2.2, and 2.3 depicting maps of the three transportation management alternatives)”. However, there are a number of roads, routes, and trails that have been suggested for closure and opening. For example, under Alternative 2 regarding public access in Table 2.1, there is a bullet point that says “97 miles of routes”

will be opened for vehicle use. NDOW recommends further analysis of these actions in a transportation management plan prior to opening or closing road access. We would like the analysis to include the effects to sage grouse and other wildlife populations. For example, are these roads in proximity to nesting or brood rearing habitat? What necessitates that these roads be opened? (Page 2-15. Table 2.1. Public Use Management). NDOW anticipates that this would be a publicly-reviewed document and that we would be given an opportunity to comment on planning documents, such as a Travel Management Plan.

The CCP states on page 2-7 under Alternative 2 that “visitors would be required to register all OHVs for use on refuge roads and routes designated open to vehicle use”. This action creates additional administrative work and may discourage recreation use. It may be more effective (e.g. cost and time savings) to improve signage, education, and law enforcement to deter misuse of off-highway vehicles as opposed to mandatory registration requirements. NDOW encourages further analysis and analysis into determining appropriate measures to deter vehicle misuse. If it is determined that OHV registration is the most effective method of deterring vehicle violations, please provide a discussion as to how this program would be implemented.

Camping

NDOW supports moving campgrounds out of and away from riparian and other important wildlife habitat areas. We also encourage the restoration of these areas. Furthermore, NDOW recommends the development of additional camp sites to keep pace with public demand as we have received complaints about campground congestion.

Some additional questions and comments NDOW would like addressed in the CCP/EIS include:

Depending on surface water availability and temperatures during the summer, it may be necessary to carry out mosquito abatement activities on the Sheldon Refuge to curtail the effects of West Nile virus (WNV) on greater sage-grouse. The Sheldon Refuge is somewhat unique in the Great Basin with respect to the number of water bodies and the potential for WNV to affect sage grouse, which could be significant under the right conditions. NDOW would like the Sheldon Refuge to consider including this as a conservation measure in one of their alternatives (e.g. Section 2.1.2 Integrated Pest Management Strategies).

The CCP discusses the potential to assist in the recovery of locally extirpated species (Page 2-43 Rationale). NDOW requests the Sheldon Refuge to investigate the feasibility of Columbian sharp-tailed grouse re-introductions in the future and would like to work with the Sheldon Refuge regarding this endeavor.

NDOW suggests the establishment of a protocol, whereby NDOW will notify and coordinate with the Sheldon Refuge on future introductions, augmentation, removals, and other population management techniques. Additionally, we recommend adding

augmentations to the list of “standard management techniques used to increase/decrease population numbers”.

In conclusion, NDOW appreciates the opportunity to review and comment on the Sheldon Refuge CCP/EIS. We support the preferred alternative with incorporation of the above recommendations. Furthermore, we look forward to working with the Sheldon Refuge on developing and implementing habitat restoration projects for the benefit of wildlife. Please let us know if you have any questions, concerns, or need additional information.

Sincerely,



Mark Freese
Supervisory Habitat Biologist

Literature

Sage and Columbian Sharp-tailed Grouse Technical Committee for the Western Association of Fish and Wildlife Agencies. June 2009. Prescribed Fire as a Management Tool in Xeric Sagebrush Ecosystems: is it Worth the Risk to Sage-Grouse? A White Paper

Rosenstock, S.S., C.S. O'brien, R.B. Waddell, M.J. Rabe. Technical Guidance Bulletin No. 8 – December 2004: Studies of Wildlife Water Developments in Southwestern Arizona: Wildlife Use, Water Quality, Wildlife Diseases, Wildlife Mortalities, and Influences on Native Pollinators.

Arizona Desert Bighorn Sheep Society. 2004. Wildlife Water Developments and Desert Bighorn Sheep in the Southwestern United States.

Brussard, P.F. Merideth, S.J. “The Impact of Artificial Water Developments (Guzzlers) on Vertebrate Species in the Gabbs Valley Region of Northwestern Nevada.” University of Nevada Reno Report submitted to the BLM Carson City District 2006.

Bleich, V.C. Marshal, J.P. Andrew, N.G. June 2010. Habitat use by a desert ungulate: Predicting effects of water availability on mountain sheep. Journal of Arid Environments 74 (6) pp 638-645.