

To: Kirsten Bertuglia, Town of Vail Sustainability Manager

From: Rick Kahn- Wildlife Biologist

Re: Wildlife Mitigation Plan Comments, with an emphasis on bighorn sheep, on East Vail Workforce Housing Subdivision, Vail Colorado

7/3/2019

Rick Kahn- Qualifications- I have been a professional wildlife biologist for over 40 years. I have a B.S. degree in Wildlife Biology and a Masters in Wildlife Science. I spent 32 years with the Colorado Division of Wildlife (CDW) in many capacities including: District Wildlife Manager 10 years, Statewide Big Game manager 4 years, Wildlife Management Supervisor 15 years and Terrestrial Section Manager for 3 years. During my tenure with CDW I worked on many bighorn sheep projects including trap and transplant, disease monitoring and testing, development on statewide policies and presenting regulations and policies to the Wildlife Commission, Executive leadership and the Colorado legislature. I was a co-author on the Colorado Bighorn Sheep Management Plan 2009-2019 and represented CDW on the Western Association of Wildlife Agencies Bighorn Sheep Working Group. After retirement from CDW I spent 7 years with the National Park Service as a system wide wildlife biologist and worked on bighorn and Dall sheep issues across the western United States and Alaska and represented NPS on the Bighorn Sheep Working Group. As both a CDW and NPS employee I was involved in numerous land use issues and either directly wrote comments or had employees under my direction write comments on impacts to wildlife from many entities including private developers. I am familiar with the various aspects of wildlife mitigation and have been involved in both management and research efforts to determine the effectiveness of various mitigation techniques. My Masters of Science work looked at the impacts of pinyon/juniper chaining on mule deer and small mammals. At the present time I am the owner and principal wildlife biologist for RHK Consulting LLC and working with the Rocky Mountain Bighorn Society by providing technical assistance.

Executive Summary

The Wildlife Mitigation plan and in particular the 2017-2018 East Vail Winter Sheep bighorn study is not adequate in both design and results to be able to make decisions on either short or long term impacts on bighorn sheep. The study is too limited in time to account for year- to- year changes and the data collected were not analyzed with any analytical tools with which to base decisions on. In short, it is a short term observational snap shot with many inherent biases. The plan does not take into account the already compromised nature of this bighorn herd (population reduction of ~40% in the past 12 years) and the already very limited and compromised winter range.

The plan does not acknowledge the value of this herd in the recent past or today for both the recreational and watchable wildlife perspective. This is one of the most viewed bighorn herds in the state. The proposed mitigation based on offsite habitat treatments may not be adequate to compensate for both forage loss and impacts of disturbance. Given these parameters, this author does not believe that the proposed mitigation will enhance this wintering herd and in fact could result in further loss and potential extirpation.

Comments on the Wildlife Mitigation Plan by Western Ecosystems Inc.

3.1.1- Bighorn Sheep. The Plan does not mention the status of bighorns in Colorado or range wide which I believe is a significant omission. Of all the native ungulates in Colorado, bighorns are the only ungulate species (except for bison for which recovery is a political and social issue not a biological one) which has not recovered from the late 1800's to the present day. This lack of recovery is not due to lack of effort as both state and federal land management agencies have been involved in bighorn sheep restoration work for over 70 years in Colorado. While there is no specific evidence on how many bighorns were present in Colorado at settlement, there are anecdotal accounts which state they were common and widely distributed in suitable habitat across the state (George et al 2009). Some have estimated the pre-settlement population in the west at 2 million sheep. If that is correct, then the Colorado estimated population could have been in the 200,000 range. At the present time bighorn sheep numbers are approximately 6800 animals, about 3-5% of the pre-settlement estimate and the trend has been slightly downward for the past decade. These trends are shared by many western states and provinces.

The sheep wintering in east Vail are known to the Colorado Parks and Wildlife as the Gore –Eagles Nest herd or S-2. The present estimate of this herd is approximately 50-60 animals down from around 100 in mid-2000. This herd is a native high altitude herd which was only supplemented by transplanted bighorns once in the late 1940's with <10 sheep from the Tarryall herd. The S-2 herd for many years was one the largest herds in the Northwest part of Colorado and provided not only a small number of rams for hunting but given the propensity for wintering along I-70 was one of the most visible and watched herds in the state during the winter time. Thus, it is important to consider the larger context of bighorn sheep in Colorado and also in the area west of the Continental Divide and north of I-70 when considering impacts and mitigation for this herd of bighorns. The Gore-Eagles Nest herd and in particular the sub herd that winters along I-70 (a small % of the herd may winter at higher altitudes during some winters) is of high importance both statewide and regionally.

It is also important to note that this herd has already experienced significant reductions over the past 20 years. At the present time this herd had declined by about 40% from the average during the period from around 1990-2005. The specific causes of the decline are unknown but it is suspected that during

the winter of 2007 there was significant loss due to deep snow and limited winter forage due to constrained winter range. There is also the likelihood that disease may have played some role in keeping lamb recruitment at a low level in subsequent years but this had not been documented, but mountain goat populations also declined during this same period which could have also been due to a disease event. Pneumonia related disease impacts many bighorn herds in Colorado and is responsible for not only all age mortality, but reduction in lamb survival for long periods of time. The loss of wintering habitat over the past 30 years to development along the I-70 corridor is also a likely contributing factor to declines as this herd has been restricted to a smaller area of winter range over the years.

The Wildlife Mitigation Study 2019 references a 2017-2018 winter sheep study and the results of said study are noted often in the document. The study uses observation and trail cameras as the means for detecting sheep presence, absence and movements. The siting of the trail cameras was also not random and the coverage is only on a partial section of the winter range and thus could result in a biased sample. One must be very careful about using such short term studies (7 months total) to make accurate judgments about any wildlife species. In general, the wildlife profession tends to use longer term (minimum 2 years and longer) studies to make determinations about habitat use and preferences. How sheep use the area during one winter may not be indicative of how they use it in another winter and in particular given the relatively small area how they use specific sites and the relative importance of those sites to long term fidelity and ultimately sustainability of the sheep herd. The conclusions stated on page 6 and 7 are in my opinion too definitive and need to be qualified as indicative of only one year's observations and are not long term trends, nor should significant land use and mitigation recommendations be based on such limited temporal data. Making statements such as "foraging (on the proposed development area) was stressful due to traffic" is highly speculative. In addition there are numerous statements as to why the bighorns are using some areas and not others; again this is very speculative and based on one seasons observations it can be very difficult to determine why the bighorns are in specific areas and what is keeping them from using other habitats, including the area that is proposed for development. Typically wildlife researchers use more sophisticated tools such as 24 hour spatial collars to determine how individuals and groups of animals are using specific areas. These types of studies give decision makers and wildlife managers site specific information in the amount needed to use statistical analyses to actually determine use.

It should be noted that bighorn sheep ewes and lambs tend to exhibit very high site fidelity based on a variety of factors including historic use. In general groups of ewes and lambs are poor at pioneering to new habitats even if they are nearby. Thus making statements about bighorn sheep behavior due to disturbance forage quality and availability, as the study does, is not based on any statistical analysis of spatial nor forage data.

In summary, the 2017-2018 study is extremely limited in its ability to show specific habitat use over time, has no statistical analysis or power to let decision makers understand the quality of the information and thus of the inferences and due to only one year of data its recommendations should be considered speculative.

7.3 Rockfall Berm

This section notes that screening may not be necessary if bighorns return to the area during the night time. While bighorns can be active at night that is not their preferred time period for foraging or movement, bighorns rely primarily on sight as the key sense to detect predators and thus night time activity periods are generally avoided (Valdez et al 1999). In a number of instances this document speculates that if sheep become active at night and use that time period to move into or through developed areas that could mitigate the disturbance. In my opinion, if sheep are forced to move at night they are already being put in a compromised position and thus are more at risk to predation and other factors.

7.5 Aspen Screen

The statement that “such inanimate objects are generally ignored by most wildlife” lacks any citations and is entirely dependent on context. An inanimate oil well has been shown to be problematic to sage grouse in some situations and there are many other examples where manmade objects are avoided by wildlife. This section acknowledges that smooth brome cut slope foraging area may be lost due to development. However, it continues to state that this could be mitigated by night time use. As stated above this is not a desired situation for bighorns and put them at greater risk. In addition, the document states that this forage loss could be mitigated or offset by habitat development on surrounding lands. As stated earlier, bighorn sheep ewe and lamb groups are very difficult to move to new habitat, it is not at all certain that the types of habitat manipulation proposed, hand tool manipulation, will get the desired habitat type necessary for bighorns or that they will find and utilize such habitat.

7.8 Unit Numbers

The study states “The paramount issue associated with this project is not habitat loss to development, or temporary construction disturbances, but keeping the residents away from the important surrounding habitats, particularly in winter.

If this bighorn herd had robust population performance and lots of undisturbed winter range this may be a valid statement. However, given the past population issues, the already hugely constricted amount of winter range available and utilized, this is an unsupported hypothesis. This sheep herd is already in a very difficult winter range situation. Losing additional acreage and the increased disturbance from both construction and increased proximate human activity puts this herd in a much worse situation.

Managing people is important, but so are maintaining existing habitat and managing short term disturbance from development. The literature is full of studies that have documented that bighorn sheep are very susceptible to disturbance by humans (Popouchis 2001, Keller 2007, Schoeneker 2005, George 2009). Human impacts are difficult to quantify as some sheep can develop some levels of tolerance to some human activities. In general, bighorns are more tolerant of vehicles moving at steady speeds than they are of humans walking, bicycles or vehicles stopping and starting (which occurs routinely during construction) (Popouchis 2001). Some studies (Miller et al 1991) have found raised

cortisol levels in bighorns adjacent to human disturbance and this has been linked to lower recruitment and survival rates. Distance from disturbance also appears to matter; Holl and Bleich (1983) found that at distances >645 meters sheep appeared not concerned about human presence but at 440 meters (about 1/4 mile) sheep moved away from humans.

7.11 Maintaining Sheep Movements above the frontage road

I agree with the study that it is critical to maintain the limited movement corridors already in place. Additional trails, bus stations and roads put an already compromised bighorn sheep herd at significant additional risk.

8.0 Project-related wildlife effects

Based on my experience with bighorn sheep I can find absolutely no beneficial effects of this project on bighorn sheep. There will be a net loss of habitat, significant human-related disturbance and the potential impacts of habitat improvement may never be fully realized due to bighorn sheep behavior, elk impacts on aspen regeneration and the highly variable responses of bighorn sheep to vegetation manipulation. This project increases the likelihood that an already compromised bighorn sheep herd will have an increased risk of extirpation. Part of this concern is based on the number of herds in Colorado and throughout the west with less than 100 sheep and the long term viability of these smaller bighorn herds. Montana Fish Wildlife and Parks have stated that 125 bighorns are the minimum needed to maintain a population for > 50 years. Other scientists have stated that 175-200 animals are needed to maintain a population for 100 years. Whatever the specific number it is significantly greater than the number of bighorns in the S-2 herd for the past decade.

9.1 Winter Range Enhancement

The project acknowledges a loss of bighorn winter range and also elk range. The proposal is to enhance almost 15 acres to create better habitat and encourage bighorn sheep use of new habitat. The proposed area to treat for improved winter range may not have access to the escape cover (steep slopes) that bighorns need. Bill Andree (personal communication) has noted mountain lion predation on a bighorn ram in this area in the recent past and attempting to move ewe and lamb groups to this area could result in increased lion predation. The proposal is to use hand cutting of aspen and shrubs and then burning slash piles. The study also acknowledges that controlled burns would offer the best and most effective tool to enhance habitat. I agree with that assessment. There has been a burn proposed in this area since the late 1990's (B. Andree personal communication). This has not been done due to local citizen concerns and existing federal land management requirements for burns in areas of population interface. The literature (Nelson 1976, Peek et al 1985, Beecham et al 2007) on bighorns is clear that fire offers the best opportunity to treat enough land, obtain the visual landscape needed by bighorns and add vital nutrients to the system in the form of new palatable vegetation. The impacts of fire are much longer term than those from habitat manipulation via hand tools. The impacts from using hand tools to manipulate aspen stands are unclear when the goal is bighorn sheep habitat improvement (Dibb

and Quinn 2008). However, when mature aspen stands are managed the observations of data suggest that elk will take advantage of the new growth. The proposed manipulations will certainly be positive for elk and mule deer but the impacts on bighorn sheep would most likely be limited. This is due to the lack of pioneering by ewes and lambs, the aggressive nature of elk in recently disturbed aspen stands, the difficulty in actually opening up enough sight lines to truly make it bighorn habitat and quick regeneration of aspen and shrubs so that in a relatively short time (<10 years) the impacts that are positive to bighorns are minimal. Fire is longer lasting, adds nutrients, done correctly has significant more impact on canopy and is more cost effective.

9.2.1 Wintering Sheep

The general goal here is to screen visually the bighorn wintering areas from the construction areas. The mitigation offered may not be adequate to protect bighorns particularly in winters of deep and persistent snow. Again, the concept proposed is to limit construction to daylight hours, but as mentioned earlier, bighorns are largely diurnal and if there was a desire to protect sheep during the construction phase, then construction should only occur at night when bighorns are more sedentary. The best solution to protect the bighorns is to not allow construction during the winter time period when bighorns are in the immediate area. Sound control is needed in addition to sight line control. If blasting is needed it should absolutely be prohibited during time periods when sheep are in the area and should be restricted to later in the summer after peregrines have fledged and before bighorns arrive.

9.3.1 Requirements for the Developer of the East Vail Workforce Housing Parcel

Will the developer put money into an account so that future (100 years?) vegetation manipulation will be done? To benefit bighorns, and the benefit is questionable, these activities should be done at least every 10 years so that open sight lines are maintained.

9.3.2.1 Recreation

The concept of allowing some residents to own dogs and others not to have them seems a bit ridiculous. As the document mentions dogs are a big problem for all wintering wildlife and during heavy snow years can be a significant issue resulting in stress and mortality. All dogs should be banned from the property. Allowing some residents to have dogs raises the potential that accidents will happen and that bighorns will be compromised. The rationale to allow some people, the careful ones (?), to have dogs and others not to should be better explained.

Many of the human- caused impacts on bighorns are difficult to enforce and the plan states that the local residents will be involved in reporting and maintaining control. Given the transitory nature of the

local workforce this may not be a good option. The constant changeover in some residents also makes education and enforcement more difficult.

Literature Cited

Beecham, J.J., C.P. Collins, and T.D. Reynolds. 2007. Rocky Mountain Bighorn Sheep (*Ovis Canadensis*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region.

Dibb, A.D. and M.S. Quinn. 2008. Response of bighorn sheep to restoration of winter range revisited. Proceedings of the Northern Wild Sheep and Goat Council. 16(221-247).

George, J. L., R. Kahn, M.W. Miller and B. Watkins. 2009. Colorado Bighorn sheep Management Plan. Special Report No 81. Colorado Division of Wildlife.

Holl, S.A. and V.C. Bleich. 1983. San Gabriel bighorn sheep. USFS, San Bernadino NF Administrative report.

Keller, B.J., L.C. Bender. 2007. Bighorn sheep response to road-related disturbance in Rocky Mountain National Park Colorado. *Journal of Wildlife Management* 71(2).

Miller, M.W., N.T. Hobbs and M.C. Sousa. 1991. Detecting stress responses in Rocky Mountain bighorn sheep: reliability of cortisol concentrations in urine and feces. *Canadian Journal of Ecology*. 69(1). pp 15-29.

Nelson, J.R. 1976. Forest fire and big game in the Pacific Northwest. *Proc. Tall Timbers Fire Ecology Conf* 15.

Peek, J. M., D.A. Demarchi, R.A. Demarchi, and D.E. Stucker. 1985. Bighorn sheep and fire: seven case histories. USDA Forest Service General Technical Report INT-186. 96pp.

Popouchis, C.M., F. J. Singer, W. B. Sloan. 2001. Responses of bighorn sheep to increased human recreation. *Journal of Wildlife Management*. 65(3). P573-580.

K.A. Schoeneker, P. R. Krausman. 2005. Human Disturbance on Bighorn Sheep, Pusch Ridge Wilderness. *Arizona-Nevada Academy of Science*. Vol 34 (1). P 63-68.

Valdez, R, P.R. Kruasman. 1999. Description, distribution and abundance of mountain sheep in North America. University of Arizona Press. P 3-22.

