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DOES BIOLOGICAL KNOWLEDGE MAKE ANY DIFFERENCE IN WILD SHEEP MANAGEMENT?

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Abstract: The unique success of wildlife restoration and management in the United States is tightly linked to the Roosevelt Doctrine, which states that the best management is based on the best science. This concept provides the underlying rationale for wild sheep and goat research. After 16 years of observing fragmented management thinking, I [WEH] articulated the concept of the working management hypothesis in 1988. I presumed that articulation and integration of current natural history/species biology into a management "prescription" would facilitate successful management by those without a specialty in wild sheep or goats. Prior to this effort, Alaskan Dall sheep (*Ovis dalli dalli*) management had proceeded on an *ad hoc* basis as politics and structural agency priorities trumped relevant sheep adaptations to environment on an ongoing basis. These problems persist. A typical case study is briefly reviewed in this paper. The putative goal for this symposium section is to refine the working management hypotheses for wild mountain sheep. Since the articulated working hypotheses have been largely ignored, three questions come to mind. "Is it possible to construct a working management hypothesis?" "If not, what is the point of biological research on sheep and goats?" and "Should we put any effort into a working management hypothesis for mountain goats?" These questions are offered for discussion.

Almost two decades ago I began to argue that increased management success should attend managing according to what I called a "working management hypothesis" (Heimer 1988). I proposed that this hypothesis consist of anticipated sheep population responses to management challenges based on what we known about wild sheep adaptations to environment. Subsequently, I learned from Toweill and Geist (1999) this is a hoary notion, perhaps first articulated as the Roosevelt Doctrine in the late 19th century. The Roosevelt Doctrine held that the best management would be based on the best scientific information. This assumption has been the basis for modern North American wildlife conservation for so long that it is considered intuitively obvious. By the last quarter of the 20th Century (my period involvement in agency management) it had been virtually forgotten as an articulated concept until resurrected by Geist under a slightly different rubric (Geist 1978). Geist's approach was couched in the modern concept of evolutionary inclusive fitness, and argued that management success must be based on management within the suite of adaptations naturally selected for by environment within any managed species.

Those few of us who embraced this antique but neo-radical notion were charged with developing a "retrograde" approach to contemporary wildlife research. In contrast with our more 'with it' fellows, we saw research less as an attempt to quantify observations and catalog the statistical probabilities of their recurrence than as a quest to define species adaptations to environment and relate them to management challenges and opportunities. In an effort to reintroduce wildlife management at this level in Alaska, I proposed and have argued for the working management hypothesis concept within this context (Heimer 1988, 2000*a*, 2000*b*).

A definition of "management' is basic to this discussion. During the "Roosevelt Doctrine era" (which I define as "modern"), "management" meant intervening in natural ecosystems to maintain or augment pre-defined human benefits while "conserving" the system. Of course, this sort of management could not leave the ecosystem in the unmanaged or "natural" condition. The trick was to produce the desired human benefits without wrecking the system. In what I call the "postmodern" era, I argue the definition of "management" has become intuitively subjective; and now popularly carries the connotation of simply observing and quantifying wildlife interactions while making rules to keep humans from significantly interfering with "the natural."

Within the framework of preserving and enhancing human benefits, I suggested an articulated working hypothesis defined by the compiled scientific, anecdotal, and adaptation-rationalized biology of the managed species should facilitate success for managers who were not species specialists. I reasoned having the best and most comprehensive information summarized in "digest format" and related to potential management scenarios seemed was necessary to revivify the Roosevelt Doctrine.

The notion that management, which I argue had evolved adaptively in the postmodern era, could (or should) be returned to this level of simplicity has not been generally embraced by the neo-traditionalist leadership of postmodern management agencies. Nevertheless, primarily through persistence and skullduggery on my part, and the open-mindedness of our colleagues in the sheep management community, working hypotheses for thinhorn (*Ovis dalli dalli*, and *stonei*), Rocky Mountain Bighorn (*Ovis canadensis*), California Bighorn (*Ovis canadensis caleforneinsis*), and Desert Bighorn (*Ovis canadensis nelsoni*) sheep have been articulated and published (see Heimer, Wishart, Toweill, and Lee, 2000). One goal for this present, goat-centered symposium is to produce a working management hypothesis for Rocky Mountain Goats (see Toweill et al., this proceedings).

In spite of having an articulated working hypothesis for Dall sheep in Alaska for almost two decades, the impact on Dall sheep management success has been slight. It is the purpose of this paper to cite a case study where the choice to manage apart from the published working hypothesis resulted in a notable departure from the Roosevelt Doctrine. The consequences of this choice sacrificed the managed populations and compromised human benefits. Dall sheep populations declined, and required

a series of necessary corrective regulatory steps. The secondary purpose of this paper is to invite the symposium to share ideas on the efficacy of the working hypothesis concept.

THE CASE STUDY: [Draft contributed by KMG]

Overview: The study area is what Alaskans call Game Management Unit 11. It lies primarily on the western end of the Wrangell Mountains as they extend westward into Alaska from Kluane National Park in Canada for about 175 miles. Sheep habitat lies primarily on the south side of the Wrangell Mountains north of the Chitina River, but there are significant habitats on the northwestern slope of the Wrangell Mountains in Game Management Unit 11. The maximum population estimate for this area was approximately 4,000 Dall sheep in the early 1990s (Strickland *et al*. 1993). Sheep densities in this area are on the low side of the Alaskan average of roughly 1.1 sheep per square mile. Calculated sheep densities at maximum population sizes were in the neighborhood of 0.7 sheep per square mile (Heimer and Smith 1975) until population declines began in the early 1990s. By some accounts, populations may have declined to less than half of the observed maximums.

Harvest management until 1978 was under the traditional ¾-curl regulation inherited from territorial days in Alaska (Heimer and Watson 1990). The initial increase in legal horn size was driven partially by biology, but primarily by politics (Heimer 1982). Subsequently, harvest regulations have varied primarily as a result of political influences (Heimer 2000*c*). These latter-day harvest management choices generally set aside the biological protections which had been previously established. In the seemingly noble cause of providing customary and traditional subsistence harvest opportunities, harvest strategies typically designed to lower sheep population densities across wild sheep distributions were implemented. These included the harvest of "any sheep," and encouraged the harvest of ewes from declining populations beginning in 1989. In the early 1990s general population declines began throughout Alaska. Sheep populations in Unit 11 declined, as did hunter harvests. Eventually, corrective steps subsequently limiting the harvest to rams only, then to ¾-curl rams for residents (full curl for nonresidents has remained standard) have been incrementally implemented over the last several years at the insistence of the sheep harvesting public.

It seems likely the declines in hunter-harvested sheep were caused by decreases in overall sheep population numbers compounded by liberal harvest regimes (Heimer *et al*. 1994). The declines, presumably associated with weather, were complicated by unchecked growth in predator populations associated with changes in land classifications and politicization of predator management. While there is little that can be done about the weather, and perhaps only slightly more can be done about predation, the consequences of political management choices (e.g. necessarily "reinventing" ram-only seasons and ¾-curl bag limits for residents) could have been considerably mitigated if guided by the biology of Dall sheep in intact ecosystems.

Structural components: The working management hypothesis for thinhorn sheep has five structural components. These are: distribution, abundance, and population strategy; predation and harvest management; disease; parasites; and disturbance. The longer term management approach in the study area failed significantly with respect to the first two. The first has to do with distribution and abundance.

The sheep populations in GMU 11 should be understood to be particularly sensitive to weather events because of the geography of the area. Typically, precipitation moves inland (northward) from the Gulf of Alaska. Habitats on the windward (snow accumulating) southern slopes of Alaska's generally east-west oriented mountain ranges generally do not support Dall sheep because of excessive snow accumulation. Snow accumulations 'deeper than a Dall sheep's legs are long' seem to preclude occupation by sheep. Exceptions to the general distribution include the south-facing slopes of the Wrangell Mountains, which are on the leeward side of the coastal Chugach Mountains. Thus, these Wrangell Mountains of the study area, which are in a sort of "snow shadow." The Southern Wrangell Mountains (which contain most of the sheep discussed here), are among the lower density habitats in Alaska. Geography-influenced weather is most likely the cause.

The most hunter-vulnerable sheep populations on the south side of the study area are those closest to human habitations. These populations are exquisitely susceptible to coastal weather influences because they lie at the northern end of the Copper River "trench" as the river bends from "east-west" to "north-south." The Copper River valley constitutes a "weather channel" which runs directly (north and south) through the weather-protective Chugach Mountains (which make sheep habitation in the Southern Wrangells even possible). The humans who hunt these weather-labile sheep are located there primarily because of the salmon-rich Copper River (valley) which formerly supported a rail link transporting copper ore from the upper Chitina River to the port at Cordova. Consequently, the Southern Wrangell Mountains were perhaps the worst place in Alaska to offer extremely liberalized sheep harvest seasons.

The second place where the working hypothesis of thinhorn management could have helped the managers relates to predator and harvest management.

Given that the sheep in the study area are exquisitely weather labile, providing liberal and perhaps unsustainable "any sheep," "any ram," and "young ram" harvests for residents on both state and federal lands has to be perceived, at least in retrospect, as a major management misstep. Sheep populations were being decimated by weather as it was, yet harvest regulations typically designed to lower sheep population numbers were implemented. The, predator and harvest management, component of the thinhorn working hypothesis contains emphatic data-grounded recommendations against this sort of liberal harvest scheme (Heimer 2000b).

DISCUSSION:

The obvious question here is, "Why did this happen?" I have discussed the perils of the federal takeover of fish and wildlife management in Alaska previously (Heimer 2000*c*). In this case, the ultimate driver of hyper-permissive harvest management was federal usurpation of Alaska's inherent state's right to allocate the state's common-property wildlife resources. When the feds decided to allocate harvest privileges to "rural residents" (primarily Alaska Natives with the allocation justified by "federal trust responsibility" for "Indians"), they moved to exclude non-Natives and non-local residents. This, of course, didn't go down with the State, and a bizarre competition to provide the most lenient harvest regime developed. Nothing could have been farther from the precepts of the Roosevelt Doctrine.

As detailed above, first harvests (for "residents") were liberalized to the extreme with the new "any sheep" federal bag limit in 1990. At first, the federal regulations defined "residents" as local to specific villages and locations. Subsequently, the state defined "residents" as "all Alaskans" due to a court decision which said the State could not discriminate among its residents. This meant that the number of hunters for which the "any sheep" bag limit applied increased beyond anyone's imagination. Nevertheless, the liberal bag limit (with a 42-day season and voluntary reporting) persisted until 2001 when local residents, concerned that the beleaguered sheep population would be extirpated, petitioned the Alaska Board of Game for more restrictive seasons. At that point, the season was restricted to "any ram" to protect ewes for population restoration purposes. This change lasted two years, and in 2003 the resident bag limit was increased to ¾-curl. Unfortunately, even this bag limit restriction (for general Alaskan residents only—federal regulations still allow the harvest of "any sheep" for federally recognized subsistence users, and nonresidents were restricted to harvest of full curl rams only) is unlikely to maximally facilitate population recovery. Heimer and Watson (1986) showed it highly likely that maximal harvests of ¾-curl rams will compromise reproduction and survival. Their subsequent work (Heimer and Watson 1990) showed increases in harvests associated with limiting harvest to Class IV (full curl) rams. These findings are factored into the harvest and predator management section of the thinhorn working hypothesis.

I realize this discussion has a certain, "coulda-woulda-shoulda" tone. Nevertheless, I argue that the information necessary to the earlier decision makers who set sheep management in the Southwestern Wrangells on this tragic course was available at that time. It has certainly been available for the last six years, being published in 1999. Still, it has had no notable effect on management. Again, the question is "Why?"

I suggest we address this question by first asking, "Is it possible to articulate a functional working hypothesis?" I suggest the answer is "yes," and I argue that if we don't, there is no point in doing wildlife research. In the context of "modern" management as defined here, if research does not produce

knowledge relevant to providing and sustaining human benefits while not wrecking the ecosystem, there is no justification for it. Alternately, if one ascribes to what I define as "postmodern management," there is no need for this effort either. The working management model is only relevant if "modern management" in accordance with the Roosevelt Doctrine is the goal.

Addendum: Discussion at the end of this presentation indicated it was the consensus of the symposium that a working hypothesis, while it may not be a prefect model, is definitely a worthwhile effort. To that end, this symposium produced a working hypothesis for mountain goats. NWSGC is indebted to Dale Toweill, Steve Gordon, Emily Jenkins, Terry Kreeger, and Doug McWhirter (as well as all the researchers and managers who contributed to their compendium) for this effort. However, unless the sheep and goat community continues to refine and reference this significant effort, it will have failed to live up to our collective vision. If I could tell you how to make this happen, I would. Sadly, I can't. The best I can offer is to keep plugging away at the project, and arguing for this approach to the Roosevelt Doctrine. It has always worked when applied in the past, and I see no reason it should not work now.

LITERATURE CITED

Geist, V. 1978. Life strategies, human evolution, environmental design toward a biological theory of health. Springer-Verlag. New York, Heidelberg, Berlin. 495pp.

Heimer, W. E. 1982. Dall sheep management in Alaska following congressional settlement of the Alaska lands issue. Proc. Bienn Symp. North. Wild Sheep and Goat Counc. 3:1-8.

_____. 1988. Toward a working hypothesis for mountain sheep management. Proc. Bienn. Symp. North. Wild Sheep and Goat Counc. 6:39-46.

_____. 2000*a*. Introduction to the 2nd North American wild sheep conference. pp 21-24 in Thomas, A. E., and H. L. Thomas (eds.) 2000. Transactions of the 2nd North American Wild Sheep Conference. April 6-9, 1999, Reno NV. 470pp.

_____. 2000*b*. A working hypothesis for thinhorn management. pp. 25-46 in Thomas, A.E., and H. L. Thomas (eds.) 2000. Transactions of the 2nd North American Wild Sheep Conference. April 6-9, 1999, Reno NV. 470pp.

_____. 2000c. Federal assumption of fish and wildlife management in Alaska. Pp 169-186. in Thomas, A. E., and H. L. Thomas (eds.) 2000. Transactions of the 2nd North American Wild Sheep Conference. April 6-9, 1999, Reno NV. 470pp.

_____. and A. C. Smith III. 1975. Dall ram horn growth and population quality and their significance to Dall sheep management in Alaska. Alaska Dept. Fish and Game, Tech. Bull. 5. 41pp.

_____. and S. M. Watson. 1986. Comparative dynamics of dissimilar Dall sheep populations. Fed. Aid in Wildl. Rest. Final Rep. Proj. W-22-1 through W-22-4. Job 6.9R. Alaska Dept. Fish and Game, Juneau, AK. 101pp.

_____. and _____. 1990. The effects of progressively more restrictive regulations on ram harvests in the eastern Alaska Range. Proc. Bienn. Symp. North. Wild Sheep and Goat Counc. 7:45-55.

_____., _____. and F. J. Mauer. 1994. The effects of physical geography on Dall sheep habitat quality and home range size. Proc. Bienn. Symp. North. Wild Sheep and Goat Counc. 9:144-148.

Lee, Raymond M. 2000. A working hypothesis for desert bighorn management. pp 67-76 in Thomas, A. E., and H. L. Thomas (eds.) 2000. Transactions of the 2nd North American Wild Sheep Conference. April 6-9, 1999, Reno NV. 470pp.

Strickland, D., L. L. McDonald, J. Kern, and K. Jenkins. 1993. Estimations of Dall sheep numbers in the Wrangell-St. Elias National Park. National Park Service. Alaska Region, Anchorage, AK. 30pp.

Toweill, D. A. 2000. A working hypothesis for California bighorn management. pp 55-66 in Thomas, A. E., and H. L. Thomas (eds.) 2000. Transactions of the 2nd North American Wild Sheep Conference. April 6-9, 1999, Reno NV. 470pp.

_____. and V. Geist. 1999. Return of Royalty. Boone and Crockett Club and Foundation for North American Wild Sheep. Missoula MT and Cody WY. 214pp.

Wishart, W. D. 2000. A working hypothesis for Rocky Mountain bighorn sheep management. pp 47-54 in Thomas, A. E., and H. L. Thomas (eds.) 2000. Transactions of the 2nd North American Wild Sheep Conference. April 6-9, 1999, Reno NV. 470pp.