COMMENTS ON THE PROPOSED REVISION OF THE WOLF DELISTING RULE

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I have maintained over the past decade or so that the re-establishment of the gray wolf into the northwestern US would promote the ever-ongoing effort to use scientific approaches to big game management. There is a huge volume of research into the population dynamics and habitat relationships of the several big game species. We also have an extensive body of knowledge, as exemplified by the references in the various wolf management proposals, recovery plans, delisting plans, and other documents, on the predator-prey relationships involving big game species and wolves.

It seems to me that this knowledge will inevitably have to form a basis for managing gray wolf populations and their prey base. Much of the controversy over wolf conservation and management is not rooted in a scientific understanding of the biology of either the predator or the prey. But the courts will fall back on the credible information base to settle conflicts that are brought to their attention. And this is virtually inevitable. It is to be hoped that eventually wolves will be routinely managed as part of a predator component that requires regulation in certain circumstances. While there will always be controversy, a generally broader understanding by the interested public of how the several big game species respond to predation, and how the predators respond to control efforts, should reduce concerns to levels that allow the agencies to manage problems efficiently and effectively. In short, I am a strong believer that reliable knowledge will provide the basis for relieving conflicts and supporting integrated management of these predators and their big game prey.

Perhaps the least well understood principle involving big game population dynamics is the relationship between population size and productivity. The literature is replete with illustrations of how high densities of the several ungulate species have lower production and survival of young than when populations are at lower densities. The inverse relationship between density and productivity dates back to the beginnings of our understanding of how wild populations behave. Textbooks in ecology have reported on this relationship ever since Elton's initial text was published in 1927. A few studies are listed below that illustrate the point, and it would take a major literature review to include even a majority of similar work.

Coulson, T. et al. 1997. Population substructure, local density, and calf winter survival in red deer (*Cervus elaphus*). Ecology 78: 852-863. (red deer are conspecific with our wapiti).

Morellet, N. et al. 2007. Indicators of ecological change: new tools for managing populations of large herbivores. Journal of Applied Ecology 44: 634-643. (roe deer fill an ecological niche in Eurasia similar to our white-tailed deer)

Festa-Bianchet, M., and J. T. Jorgenson. 198. Selfish mothers: reproductive expenditure and resource availability in bighorn ewes. Behavioural Ecology 9: 144-150. (Alberta bighorns)

Cheatum, E.L. and C.W. Severinghaus. 1950. Variations in fertility of white-tailed deer related to range conditions. Transactions North American Wildlife Conference 15: 170-190.

Keyser, P.D. et al. 2006. Relative density-physical condition models: a potential application for managing white-tailed deer populations. Wildlife Society Bulletin 34: 1113-1120.
Caughley, G. 1976. Wildlife management and the dynamics of ungulate populations. Applied Biology 1: 183-246.
Singer, F.J. et al. 1997. Density dependence, compensation, and environmental effect s on elk calf mortality in Yellowstone National Park. Journal of Wildlife Management 61: 12-25.
Stewart, K.M. et al. 2006. Herbivore optimization by North American elk: consequences for theory and management. Wildlife Monographs 167: 1-24.

Effects of wolf predation on big game species have been investigated dating back to Adolph Murie (1944) in Alaska, Ian McTaggart Cowan (1947) in western Canada, Durward Allen (1957) on Isle Royale, Michigan, David Mech in northeastern Minnesota (1971) and Douglas Pimlott (1967) in Algonquin Park, Ontario, among others. Without exception, wolves are found to prefer to prey on young-of-the-year, older, and infirm animals. A suite of investigations across the current wolf range, including central Idaho and the Yellowstone region, simply confirm this.

Wapiti, a major prey species for wolves in ID, MT and WY, reached high population levels in the 1990s. These levels may actually have been historical highs, given the recent information suggesting that aboriginal man and predators may have kept populations at lower levels (see Laliberte, A.S. and W.J. Ripple. 2003. Wildlife encounters by Lewis and Clark: a spatial analysis of interactions between native Americans and wildlife. Bioscience 53: 994-1003, and Martin, P.S. and C. R. Szuter. 1999. War zones and game sinks in Lewis and Clark's west. Conservation Biology 13:36-45). In the 1980s, information started coming in that showed low recruitment of calves. One of the reasons identified was inordinately heavy hunter harvests of bull wapiti that impeded calf production. But in many areas, sex ratios and adult bull survival were high enough to preclude this as a reason for low calf production and survival.

Of course, predators were held accountable for the losses of calves. At one time, there were three investigations within 150 miles of each other in northeastern Oregon, northcentral Idaho, and southeastern Washington that implicated black bears and cougars. And then the gray wolf population expanded in Idaho to where this species was also implicated.

But these investigations, and others, hardly considered why predation was the important mortality factor. We basically demonstrated the immediate cause of calf mortality, and then assumed that a reduction in predators meant an increase in calf production/survival. But wapiti populations at high densities relative to resources cannot be expected to be productive in any case. This scenario was in place when the gray wolf was reintroduced into old, unproductive wapiti populations existing at high density in both central Idaho and Yellowstone. Predation would be expected to be one of several intercompensating factors serving to limit populations, and may well be the main proximate cause of mortality. But those populations would be limited by other factors when they exist at high density relative to resources, in the absence of predators.

Page 36945 of the proposed rule change states that U.S. Fish & Wildlife Service expects the following to be addressed, among other criteria: what data indicate that the ungulate herd is below management objectives, what data show impacts of wolf

predation on ungulates, and how ungulate response to measures to reduce the impacts will be obtained.

So how are the management objectives for a population developed? If they are simply derived from goals for hunter harvest and do not address the relationship between density and productivity, then they are not defensible for the purpose of justifying wolf control. Conservative harvest levels on cows, maintained over some time, may allow wapiti populations, or those of other species, to reach high densities. In such cases, a higher proportion of a population will be vulnerable to predation, and calf production/survival is expected to be low regardless. This has been the case with many wapiti populations in Idaho since the mid-1970s, including the upper Clearwater drainage populations.

If management objectives are developed that account for retention of a population at levels relative to resources that maintain more productive and vigorous individuals, then predation should be less critical. In cases where management objectives take into account relationships with other herbivores including domestic livestock, level of tolerance for crop depredations, and other situations where populations are kept at lower levels, this is generally the case. Such management objectives are biologically defensible and can be used to justify reductions in wolf populations as well as other predators. The point is, some level of hunter harvest of adult females needs to be considered as part of any effort to reduce population vulnerability to predation. We need to integrate the management of both predators and prey more effectively, rather than just focus on the predators.

And what about data to indicate the effect of predation on the ungulate population? A simple calculation of the proportions of calves and adults taken from a population is insufficient, as is a low cow:calf ratio. Some idea of the density of the prey population relative to resources is needed.

The proposed rule should <u>suggest</u> what kinds of data may be used to determine management objectives and impacts of wolf predation. I think that indices of population vigor are necessary to address these objectives. A simple statement to that effect may suffice rather that risk criticism for intruding into issues that are the purview of the states. However, antler sizes of yearling males are a good index to male vigor if collected through time so a knowledge of what a habitat is capable of producing is obtained. For instance, we don't expect yearling wapiti males to grow multi-tined antlers often in the upper Clearwater River drainage in Idaho, but further west on the Palouse, multi-tined antlers in yearlings should be common if populations are not at high density. Length of spikes might be all that is needed in either case. Hind leg lengths, newborn calf weights, percentages of cows that are pregnant, weights at harvest, and age structures of both sexes are all useful indices if collected over time. These morphological data can be useful for any of the ungulate species. Other kinds of indices may be useful as well.

We should also have some idea of how adequate the forage base is for the ungulate population. We can use the condition of the animal to index this, or we can actually assess the appropriate plants themselves. A number of procedures, ranging from assessment of changes in plant communities through time with geographic information system technology to appraisals of species composition and utilization on the ground can be used. Since the hunter can help to obtain much of the data on the animal, it is preferable in most cases to use that approach to index density relative to management

objectives. Any of this data can be indexed against census estimates to arrive at defensible management objectives and to help assess the effects of predation.

The recent analyses from Yellowstone also point out the need to coordinate hunter harvest with predation. While hunters and predators generally kill different proportions of age classes of adults, both kill calves. It will be necessary in the future for harvest management to be more specific in order to accommodate predators more effectively, as one way to resolve conflicts, as current experience in Yellowstone is beginning to show.

All of these recommendations require significant effort and finances. Many wildlife managers will be concerned that these suggestions take time to acquire enough data to be meaningful, can be difficult and expensive to obtain, do not resolve the immediate needs to address wolf predation, and small sample size problems reduce the quality and reliability of the data. In any case continuing financial aid provided to the states will be important in acquiring more and better information. Small sample sizes for some populations thought to be in need of relief from wolf predation will always be a problem that will have to be addressed on a case-by-case basis. But I suspect that the expenses and time that the inevitable legal processes are going to cost will make a significant amount of the effort to accumulate defensible information look rather inexpensive and less demanding of time. And the legal decisions may well require these kinds of data at any rate.

So there will be a need to improve the level of knowledge about the prey base available for wolves to prey upon. Unproductive populations at high density relative to resources will not be good candidates for using predator reductions as a means to increase calf production/survival and subsequently numbers. Productive populations that show reductions attributable to predation as well as other factors are those that can benefit from a reduction in predators. A conclusion from R. D. Boertge et al. (1996. Increases in moose, caribou, and wolves following wolf control in Alaska. Journal of Wildlife Management 60: 474-489) concerning management of wolves in Alaska may well apply. During milder winters, wolf control seemed to have little effect on the moose and caribou prey, but during the more severe winters, a level of wolf control could help. And wolves could prosper when the prey base was less sensitive to the severe winters and could be maintained at generally higher levels. We can't ignore the condition of the prey populations, other factors that affect their dynamics and numbers, if we want to conduct a defensible, integrated management program involving predator and prey. And we can't ignore the population dynamics of wolves and other predators as we seek to manage their numbers to benefit their prey, something the proposed rule change does address.

I believe the proposed rule change can be improved if some guidelines for what kind of management objectives are appropriate and how the prey population is to be assessed so as to measure effects of wolf reductions effectively are incorporated. These are suggested as a way to improve our knowledge about our big game populations, to enlist the cooperation and better understanding of the interested public, and to foster a more professional approach to a problem in wildlife management.

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