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9 **RH:** Additional Considerations of Wolf Management

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11 **Additional Considerations for Gray Wolf Management after their Removal from**
12 **Endangered Species Act Protections**

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17 **ABSTRACT** Mech (2010) provided a review of options involving regulated, public
18 hunting of gray wolves (*Canis lupus*) when states regain control of wolf management.
19 We agree with his general conclusion that the use of lethal management should focus
20 more in areas of conflict and less in wilderness areas, especially near protected places
21 like national parks. Here, we expand on Mech's work and provide additional
22 considerations that could be incorporated into state management plans to make them
23 more acceptable to an increasingly diverse group of interested stakeholders, including: 1)
24 the use of human dimensions research to understand the conditions under which
25 stakeholders find lethal management acceptable, and to evaluate the acceptability of
26 agency efforts to increase tolerance for wolves; 2) employing preventative measures to
27 protect livestock and pets, especially in cases where wolf packs are highly visible to the

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28 public; and 3) selective use of sport hunting in areas where wolf impacts are deemed
29 unacceptable.

30 **KEY WORDS** *Canis lupus*, ethics, harvest, human-wolf conflict, hunting, non-lethal
31 management, wildlife watching, wolf.

32 Mech (2010) provided recommendations for state wildlife management agencies
33 preparing for a public harvest of gray wolves (*Canis lupus*) after their removal from
34 federal protections under the Endangered Species Act (ESA). These recommendations,
35 aimed at improving the acceptability of wolf harvest, include delaying the start of hunting
36 seasons until after pups are nearly full-size and closing seasons before gravid females
37 whelp. We generally agree with Mech's recommendations for making wolf harvest more
38 acceptable to the public, but stress that maximizing public acceptability of wolf harvest
39 and, more generally, wolf management will require other efforts to both increase
40 tolerance for wolves and decrease the controversy associated with their management.

41 Herein, we offer additional suggestions aimed at helping managers to maximize the
42 acceptability of wolf management without alienating non-traditional (i.e., non-
43 consumptive) stakeholders.

44 **MINIMIZING THE CONTROVERSY ASSOCIATED WITH WOLF
45 MANAGEMENT**

46 We agree with Mech (2010) that hunting wolves is divisive and much of the public will
47 judge the success of wolf harvest and management by its perceived ability to decrease
48 conflicts with livestock producers. However, despite Mech's (2010) focus on
49 "minimizing public animosity," the paper makes no mention of the considerable literature
50 on public tolerance for wolves and the acceptability of various wolf management

51 practices. This literature provides insights that are relevant to managers making decisions
52 about how to structure wolf management to maximize tolerance for wolves, while
53 minimizing the controversy associated with wolf management (hereafter we use the
54 phrase “lethal management” generally to include any lethal form of wolf management
55 and reserve the term “harvest” for regulated public hunting or trapping of wolves).

56 Although research indicates that the acceptability of lethal management of
57 carnivores increases with the severity of carnivore impacts (Arthur 1981, Zinn et al.
58 2000, Decker et al. 2006, Whittaker et al. 2006, Don Carlos et al. 2009), generally,
59 people find non-lethal methods (especially changes in animal husbandry practices) to be
60 more acceptable (Arthur 1981, Bruskotter et al. 2009) and humane (Arthur 1981, Reiter
61 et al. 1999) than lethal forms of management. In fact, lethal management, at least without
62 adequate justification, can actually promote social conflict with substantial consequences
63 for wildlife managers, including litigation, legislation, tourist boycotts, and ballot
64 initiatives (see Nie 2004*a, b*). Such controversies may be avoided, at least in part, by
65 understanding how relevant stakeholder groups view various management actions
66 (Bruskotter et al. 2009), and the conditions under which these actions are deemed to be
67 acceptable (Zinn et al. 2000, Decker et al. 2006, Whittaker et al. 2006).

68 Bruskotter et al. (2009) found that non-lethal measures (i.e., harassment, livestock
69 guarding dogs, relocation) of dealing with livestock depredation were acceptable to a
70 broad array of stakeholders in Utah, whereas lethal measures (including hunting) were
71 socially divisive; that is, they were generally acceptable to people who indicated that
72 agricultural or sportsmen’s groups represented their interests, but unacceptable to people
73 who indicated environmental or wildlife preservation groups represented their interests.

74 Bruskotter et al. (2009) emphasized the importance of encouraging the use of non-lethal
75 measures proactively to avoid more controversial forms of management. This research
76 shows how information about stakeholders' preferences can be used to understand what
77 management actions are likely to be controversial and select management actions likely
78 to reduce the controversy associated with management (see also Riley and Decker 2000).

79 Research in the human dimensions field also emphasizes the importance of
80 context (e.g., the location of management action, the severity of the impact) for
81 understanding whether management actions are acceptable (e.g., Decker et al. 2006, Don
82 Carlos et al. 2009). For example, Decker et al. (2006) showed that support for lethally
83 controlling wolves among Alaskans ranged from 30–64% based upon the extent of the
84 severity of impact of wolves on caribou and moose populations. Similar studies that
85 assess the acceptability of lethal management across a variety of species show the same
86 pattern; the acceptability of lethal management increases with the severity of the impact
87 (e.g., Loker et al. 1999, Zinn et al. 2000, Whittaker et al. 2006, Don Carlos et al. 2009).

88 The type of impact can also be an important factor affecting support for lethal
89 management. For example, Bruskotter and Schmidt (The Ohio State University,
90 unpublished data) found that although 75% of Utah residents supported lethal
91 management of wolves that prey upon livestock, only 41% supported the use of lethal
92 management when wolves negatively affected big game populations.

93 Taken together, these studies suggest that in general, most people will support
94 lethal management of wolves so long as it is undertaken to address what they perceive to
95 be legitimate impacts (Treves and Bruskotter 2011), and management actions are scaled
96 relative to those impacts. This type of adaptive management is what Decker et al. (2006)

97 refer to as “situation-specific [and] impact dependent” (see also Riley et al. 2003).
98 Implementing such management will require state agencies to reach beyond familiar
99 ecological concepts and collect social data on humans to determine where and under what
100 conditions wolves are most and least likely to be tolerated (Bruskotter et al. 2010,
101 Bruskotter and Treves 2011, Treves and Martin 2011). If a goal of wolf harvest is to
102 increase public tolerance of wolves, then it is critical that agencies not only quantify the
103 effectiveness of harvest for reducing the major sources of conflict (i.e., predation on wild
104 ungulates, domestic livestock, and pets), but also evaluate its effectiveness for increasing
105 tolerance for wolves among various types of stakeholders (Treves 2009, Treves and
106 Martin 2011). Likewise, if a goal of wolf management is to reduce the level of
107 controversy associated with the species, then managers will need human dimensions data
108 to determine which actions hold the most promise in this regard.

109 **WOLF ECOLOGY AND BEHAVIOR: CAN WOLF HARVEST REDUCE
110 CONFLICTS WITH LIVESTOCK AND APPEASE NON-CONSUMPTIVE
111 USERS?**

112 The ecology and behavior of wolves also point to some potential problems with using
113 public hunting as a solution to livestock depredation problems (Mech 2010). Because
114 wolves are territorial (Mech and Boitani 2003), areas subject to random removal of
115 wolves (i.e., through opportunistic sport hunting, as opposed to targeted removal of
116 known predators) could open up territories for new individuals or packs and potentially
117 exacerbate conflicts by fragmenting packs that could kill more prey per wolf (Bangs and
118 Shivik 2001, Treves and Naughton-Treves 2005, Treves 2009, MacNulty et al. 2010).

119 Random removal could replace individuals or packs not depredating livestock
120 with those that will—evidence for this is found in the recurrence of depredations after
121 wolf removal (Bradley 2004, Harper et al. 2005, Musiani et al. 2005, Treves and
122 Naughton-Treves 2005, Treves et al. 2011). Indeed, Musiani et al. (2005) found that even
123 targeted removal of depredating wolves did not decrease depredations at the regional
124 scale; rather, they found strong seasonality in wolf attacks which tended to reoccur even
125 after wolves were removed. Still, they acknowledged that targeted removals could be
126 useful for arresting the losses of individual livestock producers and, perhaps, increasing
127 tolerance for wolves among these individuals. They concluded that improved animal
128 husbandry provided “the greatest promise for reducing wolf depredation” (Musiani et al.
129 2005:885).

130 Furthermore, research on dingoes (*Canis lupus dingo*; Wallach et al. 2009) and
131 eastern coyotes/coywolves (*Canis latrans x lycaon*; Way et al. 2009) has shown that the
132 effect of lethal management on abundance was neither consistent nor predictable –
133 meaning that killing canids did not necessarily reduce abundance in a given area.
134 Research indicates that wolf populations are capable of sustaining heavy annual human-
135 caused mortality (>30%) with little impact to populations (Mech and Boitani 2003;
136 although see Creel and Rotella 2010). These data suggest that for wolf harvest to be an
137 effective tool for reducing livestock depredations or impacts on wild ungulate
138 populations, harvest will need to be heavy. Yet, heavy harvest (i.e., purposely reducing
139 populations; see Creel and Rotella 2010) or other forms of population reduction are likely
140 to be viewed with extreme skepticism by the non-hunting public (Nie 2002, Treves and
141 Naughton-Treves 2005, Treves 2009). Furthermore, the management of wildlife entails a

142 broad range of practices and policies, and many of the most socially-divisive (e.g., aerial
143 shooting, foot-hold traps, hunting over bait) tend to be used with canids (see Reiter et al.
144 1999, Bruskotter et al. 2009, Mech 2010). Thus, although Treves and Naughton-Treves
145 (2005:105) noted that regulated wolf harvest had the potential to increase tolerance for
146 carnivores among some stakeholders, managers risked “alienate[ing] urban constituents
147 who place higher value on non-consumptive use of wildlife.” Similarly, Nie (2002:68)
148 cautioned that the hunting and trapping of wolves is “perhaps the most divisive and
149 potentially explosive issue in the entire wolf debate.” Skepticism among non-hunters is
150 likely to be further exacerbated by the perception that agency decisions are driven by
151 hunters, who typically dominate state wildlife boards and commissions, and are often
152 viewed as paying clients by wildlife management agencies (see Decker et al. 1996; Gill
153 1996; Jacobson et al. 2010; Nie 2004*a, b*).

154 Research indicates that canids are highly intelligent, social, and family-oriented
155 animals that cooperatively raise young together, yet can be remarkably individualistic in
156 nature (e.g., Haber 1996; Way 2007; Way and Timm 2008; Smith et al. 2010; R.
157 McIntyre, Yellowstone Wolf Project, personal communication). Highly visible
158 individuals or packs (such as those in and adjacent to national parks) in some cases have
159 attained celebrity status among local populations and national park visitors (e.g., wolf
160 302 in Smith et al. 2010). Removal of such wolves via either harvest or lethal control
161 actions could generate substantial controversy and create animosity towards wolf hunters
162 and state management agencies.

163 State agencies could reduce the controversy generated by the lethal management
164 of these individuals or packs and potentially increase trust among non-hunting

165 stakeholders by providing additional protections (e.g., restricted or limited harvest) for
166 highly visible packs and by designating suitable areas for wolf watching, especially given
167 the increasing importance of wildlife watching in general (Organ and Fritzell 2000, U.S.
168 Department of the Interior et al. 2008), and wolf watching (Duffield et al. 2008). In part,
169 this could be accomplished by cooperating with federal land management agencies (e.g.,
170 U.S. Forest Service, Bureau of Land Management) during their planning processes to
171 designate separate areas for wolf viewing. The U.S. Forest Service, in particular, has long
172 used a form of zoning in its planning to separate incompatible recreational uses such as
173 cross-country skiing and snowmobiling (Clark and Stankey 1979).

174 The controversial nature of wolf management detailed in this section may be
175 mitigated by the proactive use of non-lethal measures, especially improvements in animal
176 husbandry practices (see Bangs and Shivak 2001, Shivik et al. 2003, Treves and
177 Naughton-Treves 2005). Non-lethal measures tend to be acceptable to all stakeholders, at
178 least when species impacts are not severe (Reiter et al. 1999, Bruskotter et al. 2009).
179 Because such measures can decrease the number of conflicts (see Shivik et al. 2003,
180 Gehring et al. 2006, Shivik 2006, Gehring et al. 2010), they may help create tolerance for
181 wolves among livestock producers, while simultaneously removing the need for more
182 controversial forms of lethal management. However, we recognize that selecting the most
183 effective non-lethal technique requires managers to examine a host of variables (Bangs
184 and Shivak 2001, Treves and Naughton-Treves 2005), and agencies may be deterred by
185 the cost, time, and complexity associated with these methods—especially in tough
186 economic times. Similarly, targeted lethal control, although effective for removing
187 specific individual predators and potentially pacifying affected livestock producers, can

188 also be costly (Mech 2010); thus, hunting and trapping wolves will always be a tempting
189 alternative.

190 **DISCUSSION**

191 Although Mech's (2010) article focused on using sport-hunting as the main management
192 tool to control wolf populations, we find reason to doubt that recreational hunting would
193 effectively reduce livestock depredation unless control actions (and sport hunting
194 opportunities) are focused in problem areas. Furthermore, we note that heavy harvest of
195 wolf populations is not only likely to be controversial, but could potentially exacerbate
196 conflicts with livestock. In our view, an effective and publicly acceptable management
197 scenario for wolves would first proactively employ non-lethal methods of wolf
198 management and encourage improved animal husbandry in an attempt to avoid conflicts
199 with pets and livestock in the first place. In these areas, managers would encourage non-
200 depredating packs to live in multi-generational, socially-stable groups (Haber 1996,
201 MacNulty et al. 2010, Wallach et al. 2009) that teach their offspring to avoid humans and
202 livestock. In areas where conflicts occur despite attempts at non-lethal coexistence, or
203 where wolves are found to be negatively affecting other wildlife populations, sport-
204 hunting could be used selectively (rather than as the de facto management tool) to reduce
205 wolf populations, consistent with Mech's (2010) recommendations. This could be
206 accomplished by matching potential wolf hunters with affected producers.

207 Wildlife management agencies should also consider increasing protections for
208 highly visible individuals or packs (e.g., those adjacent to national parks). This could
209 potentially be accomplished by collaborating with federal land management agencies to
210 separate incompatible uses via existing forms of recreational zoning, and could help

211 establish trust with non-traditional stakeholders. Finally, management agencies should
212 use human dimensions research both to better understand when lethal management is
213 justified and to evaluate their efforts to increase tolerance for wolves and decrease the
214 controversies associated with wolf management.

215 Controversies surrounding wolf management are likely to arise for different
216 reasons, reflecting varied and often competing interests of stakeholders (Wilson 1997,
217 Bruskotter et al. 2009). Accordingly, wolf management will be undertaken to meet a
218 variety of management goals that reflect these competing interests (e.g., reduce livestock
219 depredation, reduce impact to wild ungulate populations, conserve a viable population,
220 etc.). It is important to recognize that, under some conditions, the goals of various
221 stakeholders may be mutually exclusive. The key to selecting which management
222 methods will be most appropriate in a given situation is understanding both the ecological
223 and social conditions that foster conflicts, and scaling management efforts relative to the
224 problem (Decker et al. 2006, Bruskotter et al. 2010).

225 **MANAGEMENT IMPLICATIONS**

226 Although some have suggested that wolves can and will be managed “like any other
227 species” under the North American model of wildlife conservation (i.e., hunter-based
228 management; Hammill 2010), we agree with Mech (2010) that fair-chase sport hunting
229 will not provide a complete solution to wolf management. Rather, we believe that broader
230 approaches that include non-lethal controls (Reiter et al. 1999, Bangs and Shivik 2001,
231 Shivik et al. 2003, Shivik 2006, Gehring et al. 2010) and the admission of ecological
232 (Beschta 2005, Ripple and Beschta 2007, Stolzenburg 2008, Wurthner 2009) and

233 societal benefits (Duffield et al. 2008, Smith et al. 2010) associated with wolves have the
234 best merit for successful wolf management.

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