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COMMENTARY

When shooting a coyote kills a wolf: Mistaken identity or misguided management?

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Abstract The recovery of wolf populations in the United States (U.S.) is hampered by ongoing human-wolf conflicts. In particular, the illegal killing of grey wolves (*Canis lupus*), red wolves (*Canis rufus*), and Mexican wolves (*Canis lupus baileyi*) protected under the U.S. Endangered Species Act has contributed to relatively high mortality rates in some areas. One issue is that wolves are often mistaken as coyotes (*Canis latrans*) and illegally shot by hunters. To minimise cases of mistaken identity, stricter regulation of coyote hunting is being adopted in some areas where endangered wolves exist. Here we argue that such management should be adopted more widely, and especially in areas where wolves are at low densities or recolonising new areas. Such a proposal may face opposition, particularly where coyote hunting is common, or where coyotes are perceived as a threat to human enterprises such as livestock ranching. Appropriate education and training is needed to ensure that the public is aware that (i) wolves and coyotes are difficult to distinguish from a distance and (ii) coyotes are far too resilient to be affected by most periodic eradication programs, let alone from derbies or recreational hunting. We conclude that recreational hunting of coyotes could restrict wolf recolonisation while providing little benefit to animal agriculture. Consideration of new management strategies is therefore required to assist with wolf restoration efforts and to minimise ongoing human-wildlife conflicts.

Keywords Canis · Endangered Species Act · Illegal killing · Wolves

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Introduction

The United States (U.S.) Endangered Species Act (ESA) provides for the protection of species that are in danger of extinction within a significant portion of their former range (Enzler and Bruskotter 2009). The enactment of the ESA provided the legislative framework for the U.S. Fish and Wildlife Service's (USFWS) reintroduction of grey wolves (*Canis lupus*) into Yellowstone National Park and central Idaho in 1995/1996 (Smith and Bangs 2009), the 1987 reintroduction of red wolves (*Canis rufus*) into eastern North Carolina (USFWS 2014a), and the 1998 reintroduction of Mexican grey wolves (*Canis lupus baileyi*) into the Blue Range wolf recovery area (USFWS 2014b). These reintroduction initiatives are encouraging steps towards meeting the objectives of the ESA—the conservation of species that were nearly eliminated from the conterminous U.S. However, despite the potential for wolves to provide ecosystem services and trigger ecological cascades (Ripple et al. 2014), wolf management has become one of the most vexed issues in conservation, with ongoing litigation and divided opinions about whether these predators have a place in a world dominated by humans (Carroll et al. 2010; Bruskotter and Wilson 2014). Currently, grey wolves only occupy roughly 15 % of their historic range within the conterminous U.S. (Bruskotter et al. 2014), while Mexican wolves and red wolves are among the rarest terrestrial mammals in the world, with minimum population estimates in the U.S. in the wild of only 109 and 175 respectively (USFWS 2015a, b).

Illegal killing of wolves

Illegal killings of wolves in the U.S. and elsewhere continues to hamper restoration efforts. In the western U.S., analysis of mortality patterns of 711 radio-collared grey wolves revealed that 12.2 % were illegally killed between 1982 and 2004 (Murray et al. 2010). Most recently, in December 2014, a federally protected female grey wolf (that likely dispersed from the northern Rocky Mountains) was shot and killed in Utah after reportedly being mistaken for a coyote (*Canis latrans*) (Center for Biological Diversity 2014). This incident follows similar cases involving red wolves, which are seven times more likely to be killed during the two month deer hunting season than during the rest of the year (Hinton et al. 2013), with illegal shooting (including cases of mistaken identity) accounting for approximately 25 % of red wolf mortalities to date (Murray et al. in press). In the case of Mexican wolves, many young individuals disappear during the fall hunting season, and illegal killings including shooting and trap related mortalities have accounted for approximately 55 % of deaths from 1998 to 2013 (USFWS 2014b). It is important to highlight that illegal wolf killings can be difficult to quantify, as demonstrated in Scandinavia where it was estimated that more than two-thirds of poaching events went undetected; a source of mortality termed 'cryptic poaching' (Liberg et al. 2012). However, even if the statistics in the U.S. are considered an estimate or even a maximum, they indicate that illegal killing of wolves represents a substantial failure in current management, and a persistent threat to the restoration of wolves in the conterminous U.S., especially the diminutive red wolves and Mexican wolves that are not much larger than coyotes.

Court battles

The issue of illegal killing came to head in the U.S. in a recent court case where conservation groups challenged the practice of hunting coyotes in parts of the State of North Carolina where red wolves were present (Red Wolf Coalition, et al., V Cogdell, et al., No. 2:13-cv-60-BO [E.D. N.C filed Oct 17, 2013]). This legal challenge resulted in stricter regulation of coyote hunting within the red wolf recovery area, except that (i) coyotes may be taken on State-owned game lands by a permit holder for a specific hunt opportunity, and (ii) coyotes may be taken on private lands by permit holders during daylight hours (Leagle 2014). The North Carolina Wildlife Commission (NCWC) responded with a resolution asking the USFWS to terminate the red wolf recovery program (North Carolina Wildlife Resources Commission 2015). Irrespective of whether the red wolf recovery program continues, this ruling raises a couple questions. First, could such regulations actually prevent illegal killings of wolves? Second, should similar actions be undertaken to assist the survival of endangered wolves in other areas?

The first question can only be answered with time and monitoring, but it may be the case that day and nighttime bans on coyote hunting are required to actually reduce cases of mistaken identity (Fig. 1). As for the second question, lessons can be drawn from a case study in Wisconsin during the grey wolf recovery era of the 1980s. There, the State implemented a coyote hunting ban during the deer hunting season in the northern third of the State to eliminate wolf killing due to mistaken identity (Thiel 2001). After the coyote hunting ban was implemented, the local wolves experienced unprecedented population growth (Thiel 2001).

Fig. 1 A wolf or coyote? Distinguishing them at a distance can be difficult even during the daytime. *Photo credit* T Newsome

Banning coyote hunting to save the wolf

The idea of banning coyote hunting in some areas (even during the fall hunting season) could spur a strong, emotive debate and create resistance to the presence of wolves, as NCWC's resolutions demonstrate. Resistance may be particularly strong where coyote hunting is common, and it is sometimes argued that coyote hunting and derbies help to reduce negative impacts on human enterprises such as livestock ranching. However, most individual coyotes do not depredate livestock, and even if offending depredators are removed, they are quickly replaced by other individuals (Crabtree and Sheldon 1999; Knowlton et al. 1999; Gese 2005). Indeed, coyote populations are far too resilient to be affected by most periodic control eradication programs (Hinton et al. 2013), let alone from derbies or recreational hunting, because persistent and high rates of human-caused mortality are required to reduce coyote abundance over the long term (Connolly and Longhurst 1975; Knowlton et al. 1999). High rates of anthropogenic wolf mortality (from legal control or harvest, illegal killing and vehicle collision) may be compensated for in areas where natural hazards (including old age, disease, accidents, intraspecific strife and interspecific killing) are low (Murray et al. 2010). However, for expanding wolf populations anthropogenic mortality is a critical risk factor that requires management, especially when individuals move into new territories unoccupied by other wolves or if there is a management imperative to retain the natural behavioral dynamics of wolf packs (Borg et al. 2015). Indeed, intact wolf packs can be natural controls on coyote populations because wolves can kill and harass coyotes that reside within their home ranges (Ripple et al. 2013). This could result in the surprising scenario where wolves potentially benefit livestock ranchers by controlling coyotes.

Conclusion

To meet the objectives of the ESA, it has been argued that wolf populations need to recolonise significant portions of their former range (Vucetich et al. 2006; Carroll et al. 2010; Bruskotter et al. 2014). Reducing or eliminating illegal killing of wolves where their populations are recovering is one hurdle to achieving that goal. However, management strategies can be implemented to help mitigate this threat. One strategy is the banning of coyote hunting at least during the ungulate hunting season to prevent cases of mistaken identity, especially where wolves are at low densities or recolonising new areas. This strategy may face opposition—especially from predator hunters; however, existing evidence (see Wisconsin example above) indicates it can be effective for reducing wolf mortality and assisting in recovery. Appropriate education and training where wolves are present could also help to ensure the public is aware that wolves and coyotes are difficult to distinguish from a distance, and may help curb cases of mistaken identity. Many other management strategies could be implemented, and so our intent with this article is to inspire discussion about whether new management strategies are required to ensure that highly endangered wolves do not continue to be illegally killed by humans. By the way, the canid in Fig. 1 is a coyote. Were you correct or was it a case of mistaken identity?

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