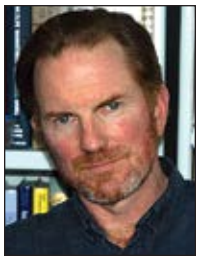
WOLVES, COUGARS, ELK, AND DEER IN OREGON



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Wildlife managers and hunter-conservationists have long been interested in understanding the impacts of predators on game species. In the United States, predators were persecuted relentlessly from the pioneer days through the mid-20th century. The driving force for most of this persecution was conflict between humans and predators, principally over agricultural activities. In the early 20th century, groups including the American Society of Mammalogists (publisher of the highly regarded *Journal of Mammalogy*) protested against policies of the U.S. Bureau of Biological Survey (predecessor of the U.S. Fish and Wildlife Service) for their wolf extermination programs. Aldo Leopold's classic essay, "Thinking Like a Mountain" chronicled his change in attitude towards wolves, from his early years in believing the only good wolf was a dead one, to a realization that wolves played a key role in ecosystem balance by preventing large herbivores like deer from stripping vegetation from the landscape. Today, the management and conservation of carnivorans (mammals in the Order *Carnivora*) remains one of the most controversial and contested components of the wildlife conservation enterprise.

Two species that are front and center in management discussions are the gray wolf (*Canis lupus*) and cougar (*Puma concolor*). Much has been written and debated about the impact of reintroduced and expanding wolf populations on elk in the Greater Yellowstone Ecosystem. Likewise, controversy over controlling cougar populations to aid recovery of isolated threatened populations of desert bighorn sheep has been ongoing for a number of years. Focusing on a predator species' impact on a particular prey species may seem simple, but teasing out the science is complex. It is difficult to control for the myriad variables that can cause "noise" in the system. The traditional and proven method of capturing animals and fitting them with telemetry devices is extremely costly, especially for rare and elusive carnivorans. Work in "the field" is different than work in a laboratory setting; in the field it is difficult, if not impossible, to conduct a true experiment where, for example, you can study a prey population in an environment with no predators, and another with only the predator species you are interested in. In the field, you work with what you have, and in most cases it is not ideal.

Now that I've established the challenges in predator-prey studies, let's consider another dimension. Let's suppose you have a cougar population that preys on deer and elk, and wolves from a neighboring state enter the picture and recolonize. What's the impact on cougars? What's the impact on deer and elk? Now that's a challenge, but it is a challenge the Oregon Department of Fish and Wildlife (ODFW) and the USGS Oregon Cooperative Fish and Wildlife Research Unit (Coop Unit) set out to investigate.

Graduate student Elizabeth Orning and Dr. Katie Dugger of the Coop Unit, along with Darren Clark of ODFW examined wolf and cougar predation patterns before (2009-2012) and after (2014-2016) wolves recolonized the Mt. Emily Wildlife Management Unit in northeast Oregon. Since the fall of 2013 they have GPS collared 28 cougars and 11 wolves (from 4 packs). The wolves were collared as part of the ODFW wolf monitoring program. They identified 1,213 and 541 prey items utilized by cougars in the pre- and post-wolf periods, respectively. They also identified 158 prey items utilized by wolves. Cougar diet was similar between the pre- and post-wolf time periods. Cougar preyed predominantly on deer, (mule deer [*Odocoileus hemionus*] and white-tailed deer [*O. virginianus*]; (58 percent and 53 percent of all ungulate kills pre- and post-wolf, respectively) and primarily killed fawns (53 percent and 44 percent of all deer kills, pre- and post-wolf, respectively). When cougar preyed on elk (*Cervus canadensis*), they primarily preyed on calves pre – (77 percent) and post-wolf (71 percent) recolonization. Wolves preyed predominantly on elk (61 percent of all ungulate kills) and primarily killed the calf age class of elk in summer (83 percent) and winter (49 percent), but preyed on adult elk nearly as often as calves in winter (46 percent).

Through field investigation and GPS collar data for both wolves and cougars, the researchers documented 20 cases of wolf-cougar interactions (direct and indirect). The most common interaction they documented was wolves at cougar caches or

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kills (70 percent). From cluster work (both wolf and cougar), they have identified seven cases of wolves scavenging kills from cougar and four cases where wolves visited a cougar cache but scavenging could not be determined. They also identified two cases where cougar visited a wolf kill. Further, they have identified two cases where wolves chased cougars up trees, three cases of wolves chasing a collared cougar off a fresh kill, and one case of wolves killing young cougar kittens.

With wolves on the landscape, cougars killed deer and elk less frequently in late winter and spring, contrary to expectations that they would have to kill more frequently to compensate for wolves chasing them off of their kills. Strong selective predation on elk calves coupled with high density cougar populations explained the low recruitment and reduced population growth rates of elk in Oregon prior to this study and before wolves recolonized the state. The continued selection of elk calves by cougars, previously measured at high densities, coupled with additional pressures of wolf predation, could intensify the effects of carnivorans on elk populations. However, lower kill rates and longer kill intervals suggest the net effect on elk calf recruitment may be "compensatory." If cougar populations decline in response to the presence of wolves, this could provide further evidence toward compensatory predation effects with little change relative to pre-wolf conditions. Of note, is that elk populations in Mt. Emily WMU (and the rest of northeast Oregon) have actually been increasing in the presence of wolves (and cougars), where elk in the study area increased from 2,800 in 2011 to 3,100 in 2015.

There often is a tendency to react to things such as news of a recolonizing ungulate predator on the landscape. Prior to management intervention, it is critical to establish a scientific basis for decisions. So much uncertainty exists in these complex predator-prey systems, we need to tease out the facts, and establish a base so that we can truly measure the effects of management actions— and learn from them. Kudos to ODFW for investing in science; the wildlife resource and those of us who value it will be the beneficiaries. ■

Graduate student Elizabeth Orning collared cougars in 2013 in northeast Oregon as part of the ODFW wolf monitoring program.