Carnivore – Ungulate Winter Research on Big Creek 1999-2003

Data summary by Holly & Jim Akenson
For IDF&G meeting to discuss future wolf-ungulate research topics
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With Steve Nadeau, Brad Compton, Pete Zager,
Toni Ruth, Janet Pope, Jim Pope

Wolf – Cougar Project Objectives 1999-2003

1. Determine the effect of large carnivore predation on wintering elk, mule deer, bighorn sheep, and moose.
2. Assess the nature of interspecific relationships of wolves and cougars during winter.
3. Document den and rendezvous sites in summer with Taylor Ranch students.

Ungulate Population Status

Historical ungulate abundance

1. Relative abundance of elk, mule deer, bighorn sheep, moose (and carnivores):100 years
2. Ungulate biomass: 4 decade historical reconstruction
3. Elk vs mule deer abundance

Elk population status and change: Which time frames should be used to assess population changes?

1. Pre-wolf effect (≤1996) and post wolf effect (≥1997)
2. Helicopter sightability IDF&G (1989, 1992, 1995, 2002)
3. Elk aerial surveys IDF&G (1965-2002)
4. 100 year history of ungulate and carnivore relative abundance on Big Creek
5. In general, elk were uncommon 100 years ago, but started to increase on Big Creek in the 1940s. Numbers increased steadily, with minor fluctuations from 1965 to 1989. Elk numbers were stable in the early 1990s, but calf recruitment declined. Elk numbers have declined in the late 1990s and recruitment has been low.

Elk population dynamics: potential limiting factors

1. Wolf predation
2. Cougar predation: appears to be stable relative to previous studies. Elk numbers have increased and deer numbers decreased since the original 1960s cougar study.
3. Hunter harvest: data needs to be evaluated to assess the contribution of hunter harvest, cow hunts, and regulation changes on elk numbers.
4. Carrying capacity/nutrition/health

a. Cow elk April pregnancy rates were ~95% based on fecal progesterone levels.
b. Calf recruitment was very low, 7-18 calves:100 cows
c. Cow ages were old, median age from carcasses was 13.5 years old and from hunter harvested animals was 9.0 years old.
d. There was a high incidence of past injuries and arthritis in carcasses early in the study and some dead elk had high numbers of ectoparasites (lice, ticks, ear ticks).
e. 29% of dead elk were in poor condition (<50% marrow fat)
f. Fetal/calf nutritional condition: we will measure cow elk metatarsus length vs year of birth to assess whether a change in fetal nutrition occurred in the early 1990s (n=20+ samples to date)

5. Habitat change (fire)

Mule deer population status and change: A good population estimate and census protocol is needed. Little empirical data is available. We crudely estimated a population on Big Creek of 600 mule deer in 1995 and 750 in 2002.

1. No IDF&G annual data sets are available.
2. Best data may be ground surveys and estimates during 4 cougar research projects, IDF&G hunter harvest and success rate data (1950s, 1960s, ?).
3. Other sources of data include 1940s annual winter range ground counts & estimates, occasional winter composition counts conducted from TRFS, deer counts during elk or bighorn surveys.

Other ungulate population status and change

1. **Bighorns**: annual aerial survey data (1972-1990, every 3 years thereafter). We estimated 125 bighorns in 1995 and 175 bighorns in 2002.
2. **Moose**: no data? Incidental observations. We estimated 30 moose in 1995 and 30 moose in 2002, but numbers have likely declined since then.
3. Mountain goats: periodic 5-10 year interval surveys?

Carnivore Population Status

Wolf population status

1. Chamberlain Pack: Only one wolf pack, the Chamberlain Pack, used the Big Creek ungulate winter range, as well as the Chamberlain ungulate winter range from 1996-2002. Winter home range size of the alpha female in 2000 was 644 km^2 MCP. This pack summered in the Chamberlain Basin and Cold Meadows areas north of Big Creek.
2. The Chamberlain Pack was established in 1996 when 2 introduced and radio collared wolves had their first litter of 5 pups. Each year through 2003 reproduction was documented in this pack, typically 4-5 pups per year. In 2004 it was unclear whether the Chamberlain Pack reproduced or still existed. Pack size was similar each year and ranged from 7-11 individuals depending on time of year. In summer 2001 batteries died in radio collars on the alpha male and female. The Chamberlain Pack has not been radio instrumented since then. Three subadult

wolves had been collared in the Chamberlain pack over the years: 2 were illegally shot and one dispersed north of the Salmon River and established her own pack in the Gospel Hump Wilderness.

Cougar population status:

1. 10 resident adult cougars in the first 2 years of the study, then 6 resident adults in the last 2 years
2. We have data to determine cougar winter home range sizes. In 2000, 3 female cougars had MCP winter home range sizes of 42 km^2, 43 km^2, and 121 km^2, and one male had a winter home range of 375 km^2.
3. Reproduction was low and dispersal into "vacant" female home ranges took up to a year.
4. We documented 17 cougar deaths during the 4-year study and 6 more the next year. Mortality was high, particularly from hunter harvest, but there was also greater mortality than observed in previous cougar studies due to intraspecific killing of males by males, starvation, and injury.
5. Seven cougars were radio collared during this study and tracked from 2 months to 5 years.
6. We conducted 7 cougar predation sequences to determine kill frequency. Completing additional predation sequences may be most valuable to compare interkill intervals in the presence and absence of wolves to assess interference by wolves.

Cougars 4 decades comparisons (1960s, 1970s, 1980s, 1990s-2000):

1. Diets were similar.
2. Cougars killed more older aged cows in 1990s study and more calves in 1960s study, likely reflecting differences in vulnerability in 2 time periods
3. Resident adult cougar numbers varied from 9 to 13 individuals and generally reflected estimated ungulate biomass differences. Elk and deer numbers and proportions differed during the studies.

Wolf & Cougar Food Habits

Wolf and cougar diets. We examined192 large mammal carcasses.

1. Wolf and cougar diets were similar. Wolves and cougars did not show diet selection between elk and deer, but preyed on them in proportion to occurrence on winter range
2. Wolves killed a greater proportion of calves and fawns and animals in poor condition than did cougars. Both wolves and cougars killed a high proportion of older aged females and animals with previous injuries.

Wolf & Cougar Interactions

Wolf and cougar comparisons and interrelationships

1. The larger home range of wolves allowed them to be more adaptable to environmental changes such as fire or ungulate distributions.

2. Wolves likely benefited from cougar predation since they readily scavenged or took over cougar kills. In contrast cougars lost food to wolves and moved long distances away from core home range areas when wolves were in their home range.
3. Both wolves and cougars killed mid-sized carnivores. If coyote and bobcat numbers have declined, the effect of their predation on deer fawns has lessened, possibly shifting ungulate predation more toward elk calves.

Fire Effects

Fire effects on predator – prey relationships

1. Wolves were more adaptable than cougars in dealing with large-scale habitat change due to wildfire because of their ability to selectively use unburned areas within the pack's large home range where elk were concentrated, while cougars were limited to much smaller areas.
2. Many elk and the wolf pack moved to the Chamberlain winter range instead of Big Creek winter range in the winter following fire.
3. Cougars had a more diverse diet in the winter following fire than previous winters, but maintained a similar home range location. Two adult cougars likely died in the forest fire.
4. Ungulate numbers and productivity may have changed recently due to post-fire habitat changes: i.e. elk immigration into Unit 26, increased mule deer productivity and population size, increased bighorn productivity

Summer 2004 Undergrad Elk Calf Research

Summer 2004 elk production and age ratios: We supervised an undergraduate student, Troy Hinck, who searched for cow elk groups to assess calf:cow ratios in high elevation meadow areas (Cold Meadows) where wolves would be more abundant and in mid elevation steeper, drier summer ranges (Mile High to Taylor Ranch). His primary finding was that calf elk sizes within a herd varied widely and it appeared that the calving period (and the rut) lasted many weeks. He documented low calf:cow ratios of 40 calves:100 cows in early August. He did not find many calf mortalities.

New Questions to Investigate

Multiple study area comparisons: Big Creek (Unit 26) is a good choice for one of the Idaho study areas to compare wolf – ungulate relationships. There is already a 4-year data set for comparisons that has been done by Holly & Jim Akenson. Wolves have used the Big Creek drainage for 8 years now and their interactions with ungulates and other carnivores may have changed since their early colonization, furthermore their interactions may differ from other study areas with more recent wolf colonization. The University of Idaho Taylor Ranch Field Station provides physical access and University collaboration. Managers/Scientists Jim and Holly Akenson provide professional leadership for future research. The DeVlieg Foundation, headed by Janet Pope, is interested in developing a partnership among UI, IDF&G, and the DeVlieg Foundation and providing some funding for this project.

Monitor new wolf packs: Several new wolf packs have formed in the Big Creek drainage. Wolves in these packs need to be radio collared to determine how many wolves and packs use the Big Creek (Unit 26) & Chamberlain (Unit 20A) drainages for summer or winter range. Numbers and home ranges can be compared to past wolf use.

1. Golden Pack: In winter 2003 and 2004 wolves began using the area around Taylor Ranch Field Station, which had not been used by the Chamberlain Pack. A den area and 2 pups were observed near Golden Creek and in lower Big Creek in summer 2004. NezPerce Tribe radio collared 2 yearling wolves from that pack in summer 2004. The yearlings have travelled away from the pack, so we may not get telemetry locations on winter use by the Golden Pack.
2. Monumental Pack: We confirmed denning of this pack in Monumental Creek, a Big Creek tributary in 2003 and 2004. In summer 2004 NezPerce Tribe radio collared a subadult wolf in this pack. We do not know the home range use of this pack.
3. Wolf Fang Pack: This pack was radio collared several years ago and denned near the Big Creek community. They did not winter on Big Creek, except occasionally using the upper ¼ of the drainage, beyond the home range of the Chamberlain Pack. There are no collars on this pack and NezPerce Tribe did not document denning in the vicinity of the Big Creek community in 2004.

Ungulate mortality: Continue to document winter ungulate mortality, to assess the effect of predation on elk, mule deer, bighorn sheep, and moose. Attempt to assess summer wolf mortality on the gregarious ungulates: elk and bighorns.

Elk population dynamics: What effect will wolf predation have on the elk population, now that wolves have been on Big Creek for 8 years? Will the elk population continue to decline? Were elk near carrying capacity when wolves were reintroduced or has predation been the primary limiting factor on elk numbers? Are the contributions of potential limiting factors on this elk population (wolf predation, cougar predation, hunter harvest, nutrition, pregnancy, extended rut & calving period, calf recruitment, age, body

condition, health, fire/habitat) the same as they were when wolves first established a home range on Big Creek?

What "should" elk numbers and recruitment be? Management plan objectives? If deer numbers are up is it okay that elk numbers can be lower? Should total ungulate biomass be the critical variable?

Elk behavior: Have elk changed their habitat use and vigilance due to wolf predation in order to decrease predation risk. I.e. hunters have noted the lack of elk in traditional places and we have observed a new trend for elk to go into or across water when spooked. Cow elk with young calves may now favor antipredator strategies over maximizing intake of quality forage, which could affect their nutritional status and survival despite availability of food. In contrast, vegetation condition could improve with redistribution of elk.

Mule deer population dynamics: Why does the deer population appear to be growing (high production, recruitment, adult survival)? Are they less vulnerable to wolf predation than elk in summer & fall? Is it due to fire-changed vegetation, or a decrease in elk numbers and possibly coyote numbers? A good population estimate is needed.

Fire effects on predator – prey relationships: How will a potential increase in forage and/or ungulate carrying capacity post-fire influence ungulate and carnivore numbers and productivity? I.e. could we see an increase in ungulate numbers despite the presence of wolf and cougar predation? It appears that elk may have immigrated into Unit 26 and mule deer productivity has increased since the fire

Carnivore interspecific relationships. How much will wolves affect other predators? Will cougar numbers increase from 2002 levels? Will coyotes and bobcats decrease in significance as ungulate predators?