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Study Shows Effect of Predators on Idaho Elk

In the past few years, some Idaho big game hunters have complained that they no longer see elk in places they have hunted for years. Idaho Fish and Game spends more than $2 million annually tracking the state's big game populations, and recent aerial surveys do show some elk population declines.

But elk numbers have not declined everywhere – 10 of Idaho's 29 elk zones are above management objectives for female elk, 13 zones are within objectives and six are below objectives. (See Figure 1, next page) Elk populations are affected by a number of factors, including predators.

Since the return of wolves to Idaho 15 years ago, Idaho's overall elk population has dropped by 20 percent from 125,000 to about 100,000.

To find out why, Idaho Fish and Game biologists have been looking closely at the effects of predation in general on elk herds, and wolf predation in particular. They are learning how delisted wolves will fit into state management of big game and other wildlife species.

An ongoing study in 11 elk management zones shows that predators today are the primary cause of death among female elk in five zones. The zones represent the range of habitat, hunting opportunity and predator densities found in Idaho. In at least three of those zones, wolves are the primary cause of death of female elk and calves over six months old. (See Table 1, next page.)

Elk population trends depend on the survival rates of female elk and calves.

To maintain the population, typically about 88 percent of the breeding female elk must survive, and enough calves must survive to replace the adult animals that die each year.

Idaho Fish and Game biologists attach a radio collar on a captured elk calf as part of an ongoing elk survival study.

Elk survival depends primarily on four factors: habitat conditions, weather, predation and hunter harvest.

The influence of habitat on elk tends to be subtle. Pregnancy rates and calf survival may be 10 to 20 percent lower in poor habitat – small changes that can have important consequences over decades.

In the winter of 1996-97, unusually heavy snows arrived early in much of central and northern Idaho. Elk mortality during that winter was extensive, as high as 40 percent in some herds.

In 1995 and 1996, the U.S. Fish and Wildlife Service released 35 wolves into central Idaho – reintroducing a top predator to the landscape. Today, wolves in Idaho number more than 800. (See Figure 2 next page).

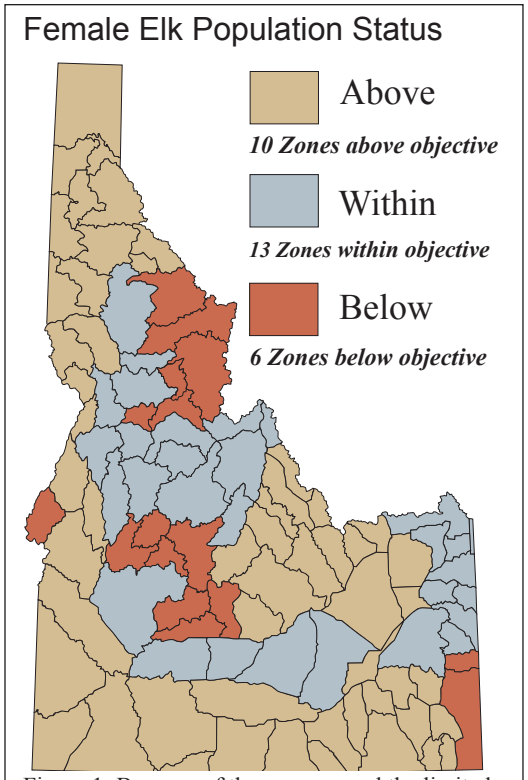

Figure 1: Because of the expense and the limited availability of resources, Fish and Game does not count elk numbers in every zone every year.

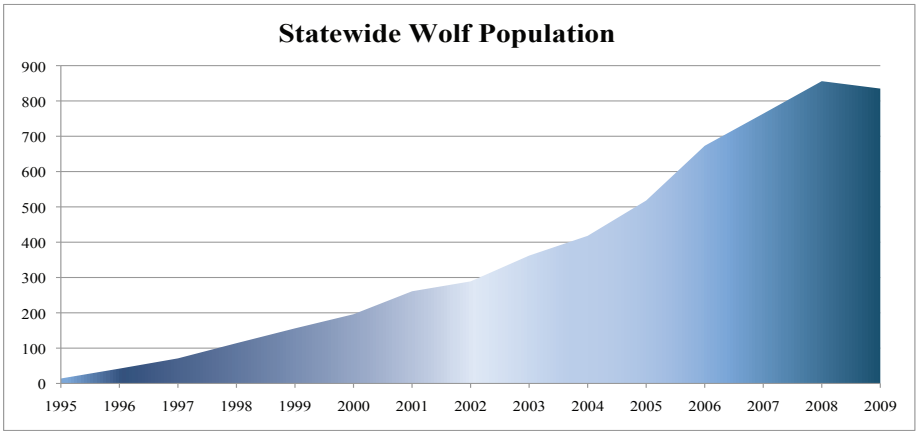

Figure 2: Estimated minimum numbers of wolves in Idaho.

In 2005 Fish and Game launched its elk survival study, the largest ever conducted in the state, covering 11 elk management zones (elk are managed in 29 zones, split up to allow populations to be managed on a smaller scale reflecting local conditions).

Biologists captured, radio-collared and monitored more than 500 adult female elk since the study began. They found the number of adult female elk surviving from one year to the next – survival rate – ranged from a low of 75 percent in the Lolo Zone to 89 percent in the Tex Creek and Weiser zones (See Table 2).

Predators were the primary cause of death in five zones, and of those, wolves were the primary cause of death in three zones – the Lolo, Smoky Mountains and Sawtooth zones. In the other two zones – the Elk City, and Salmon zones – mountain lions either equaled or exceeded wolves as the primary cause of elk deaths. (See Figure 3)

Since 1995, elk populations have declined in these five zones. Elk numbers are below management objectives in the Smoky Mountains, Lolo and Sawtooth zones, and within objectives in the Elk City and Salmon zones.

Harvest was the primary known cause of death in six zones – the Pioneer, Weiser, Tex Creek, Island Park, McCall and Boise River zones. Elk populations declined in the Pioneer and Island Park zones since 1995, while increasing in the Tex Creek and Weiser zones. Elk populations in the McCall and Boise River zones have been relatively stable since 1995.

The Weiser Zone is above objectives and the other five are within objectives.

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Causes of female elk mortality

Percent of population removed by cause			
Elk Zone	Wolf	Cougar	Harvest
Lolo	20	3	
Elk City	5	5	
McCall			6
Sawtooth	4	2	3
Boise River		3	5
Weiser	1		8
Smoky Mtns	5	4	3
Pioneer	1	3	6
Salmon	2	6	5
Tex Creek		1	8
Island Park		1	17

Table 1: Leading known causes of death of female elk in the study population.

Survival of female elk	
Elk Zone	**Annual Survival (%)**
Lolo	75
Elk City	87
McCall	81
Sawtooth	87
Boise River	85
Weiser	89
Smoky Mtns	81
Pioneer	88
Salmon	83
Tex Creek	89
Island Park	80

Table 2: Female elk survival by zone.

Though most of the research focused on adult female elk, it also evaluated calf survival and mortality in the Lolo and Sawtooth zones.

Between 2005 and 2009, biologists captured and radio-collared 272 six-month-old elk calves. In both zones, calf elk survival from December through June was considerably less than normal, which is about 82 percent. (See Table 3)

In the Lolo Zone, deteriorating habitat and other factors contributed to a long population decline, dropping from about 16,000 in 1988 to fewer than 8,000 elk by 1998. Since 1998, the numbers have dropped to about 2,000 – a decline of more than 70 percent. (See Figure 4 on back page)

Survival of the radio-collared six-month-old calves was 52 percent; wolf predation took nearly one-third of the calf population (See Table 3).

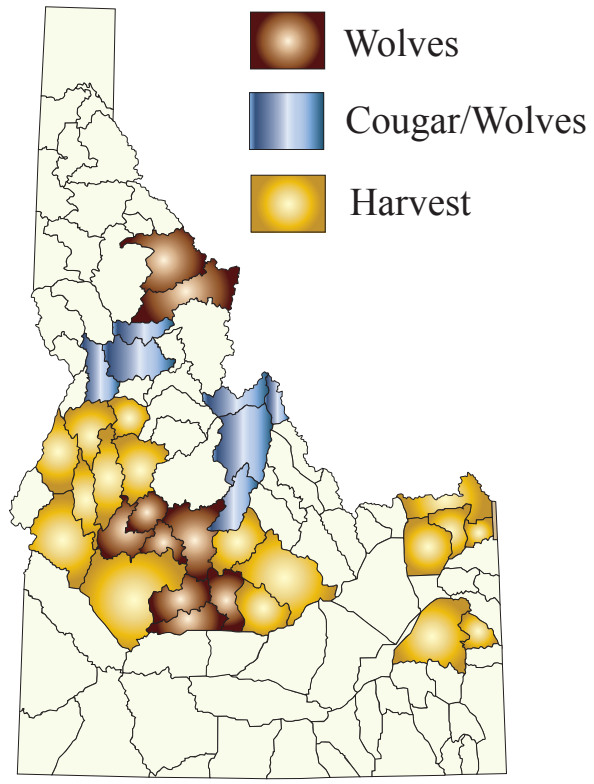

Figure 3, Leading known cause of mortality in 11 elk zones 2005-2008 (Lolo/Sawtooth through 2010)

Causes of elk calf mortality

Percent[4] of population removed by cause					
Elk Management Zone	Average Annual Survival[3]	Wolf Predation	Cougar Predation	Unknown Predation[1]	Other Causes[2]
Lolo	52	32	7	2	7
Sawtooth	30	38	3	13	18

[1] Cause of death determined to be from predation, but specific predator unknown.
[2] Includes death caused by accidents, disease, malnutrition, other predator, and unknown causes.
[3] Calves monitored from December to June.
[4] Percentages may not add up to 100 because of rounding.

Table 3: Survival of elk calves more than six months old and leading known cause of death, 2005-2009.

In the Sawtooth Zone, elk numbers also have declined (See Figure 5). Here survival of six-month-old calves was about 30 percent during the study. Overall, predation by wolves was the leading cause of death, but malnutrition was also an important factor during the difficult winter of 2007-08. (See Table 3)

In both these zones, wolf predation was the leading cause of death of six-month-old calves. Earlier research shows that in some areas predation by black bears was the primary cause of death of calves less than six months old.

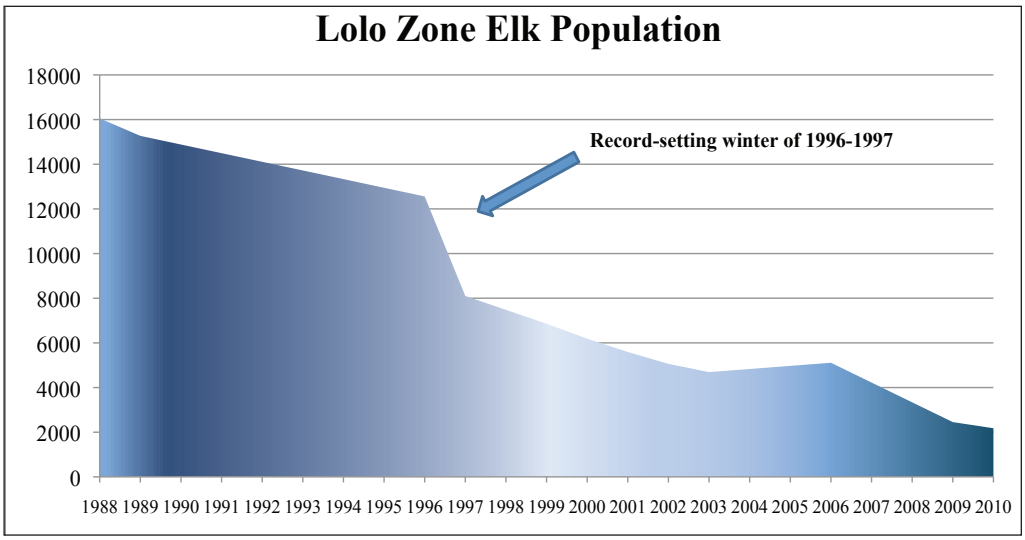

Figure 4: Elk population numbers in the Lolo zone in north Idaho's Clearwater Region.

As the elk numbers in the Lolo and Sawtooth zones have declined (See Figures 4 and 5), Fish and Game has raised limits on predators, reduced hunting opportunities and stopped female elk harvest in the Lolo Zone since 1998.

Meanwhile, in some other areas elk are so numerous they are causing trouble for landowners.

The information from this study may not apply in other parts of the state, but it may help Fish and Game biologists evaluate declines in other areas.

Wildlife managers have no control over the weather and only little control over habitat. In 2009, however, Idaho Fish and Game conducted the state's first regulated wolf hunt. Hunters harvested 188 wolves in an orderly hunt and followed the strict reporting requirements.

Recognizing that effects of predators on elk would increase as the numbers of predators increase, the Idaho Fish and Game Commission has set a wolf population goal at about 500 – the population in Idaho in 2005, the year when wolf depredations on elk herds and domestic livestock began to rise sharply.

Fish and Game has shown that professional wildlife managers can manipulate wildlife populations to limit their effects on each other and on people, as they have done with elk that cause damage to crops or take over habitat occupied by mule deer. They will to do the same with wolves in places, such as the Lolo – not to wipe them out, but to reduce their effects where elk herds are in trouble.

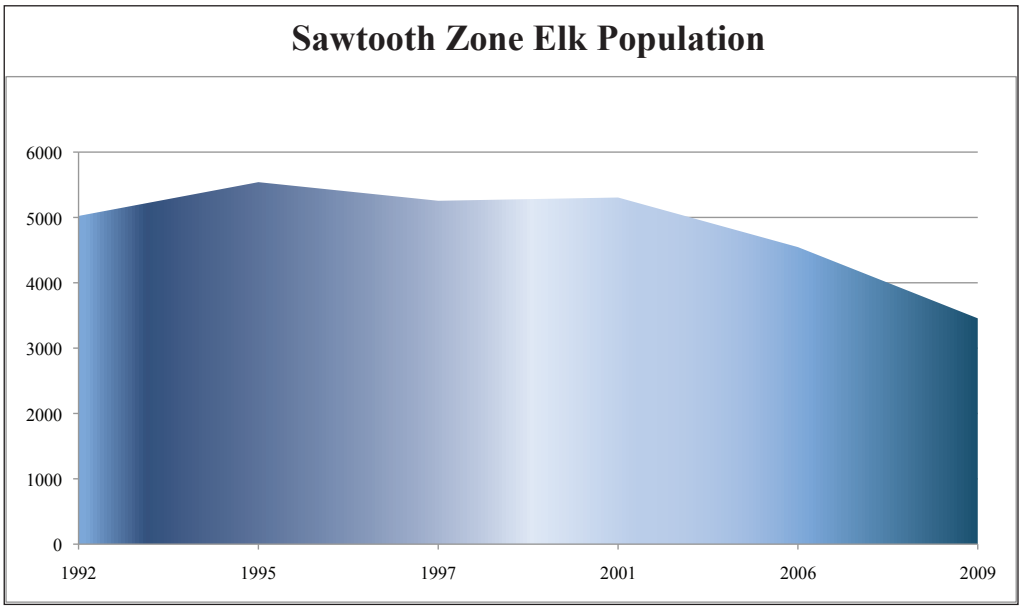

Figure 5: Elk population numbers in the Sawtooth zone in central Idaho.

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