Idaho Department of Fish and Game Predation Management Plan for the Sawtooth Elk Management Zone

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SAWTOOTH ELK PREDATION MANAGEMENT PLAN

SOUTHWEST REGION

INTRODUCTION

The IDFG Policy for Avian and Mammalian Predation Management (2000) identifies how predation might be managed when prey populations are not meeting management objectives (Appendix A). Managers recognize the role of predators in an ecological and conservation context. Impacts of the removal of individual predators on the structure of predator and prey populations will be considered. The actions by the Department must be based on the best available scientific information, and will be evaluated in terms of risk management to all affected wildlife species and habitats.

Predator populations will be managed to assure their future recreational, ecological, intrinsic, scientific, and educational values, and to limit conflicts with human enterprise and values. Where there is evidence that predation is a significant factor inhibiting the ability of a prey species to attain Department population management objectives and the Department decides to implement predation management actions, the management actions will ordinarily be directed by a predation management plan (IDFG 2000).

The first Predation Plan was developed for the Lolo Elk Zone in 1999 and finalized in 2011 (IDFG 2011). In 1999, cougars and black bears were the primary cause of mortality for elk calves, and plans were implemented to control the predation impacts of those carnivores. Since that time, wolves became well established in the Lolo Zone and became the primary proximate cause of mortality of elk, though bears and cougars were still impacting neonates (Pauley and Zager 2011). Moreover, cougars continue to prey on adults, but becoming more difficult to verify because scavenging by wolves complicates mortality site investigations.

Gray wolves (*Canis lupus)* were listed in Idaho as an experimental nonessential population under Section 10(j) of the Endangered Species Act (ESA) when they were reintroduced into Idaho and Yellowstone National Park in 1995 and 1996. By 2002, wolves had reached recovery levels of 30 breeding pairs well distributed among Idaho, Montana, and Wyoming for 3 consecutive years. However, delisting did not occur until 2009, the first year Idaho Department of Fish and Game (IDFG) set harvest seasons for wolves. In 2010, responsibility for wolf management went back to the U.S. Fish and Wildlife Service because efforts to renew a 2006 agreement giving day-to-day management to Idaho Fish and Game had failed. Wolves were de-listed again in 2011 after Congress passed the federal budget which included a rider to republish the 2009 delisting rule returning day- to- day management of wolves back to IDFG.

Prior to delisting, Idaho and Montana developed management plans and enacted laws that provided adequate regulatory mechanisms that would assure long-term survival of wolves.

Idaho's plan discussed the possibility of reducing the impacts of predation by removing wolves affecting big game populations (IDFG 2002). During the past 5-10 years IDFG reviewed statewide elk data to determine if elk populations were below management objectives. Included among the zones below elk management objectives was the Sawtooth Zone that includes Game Management Units (GMUs) 33, 34, 35 and 36 (Figure 1).

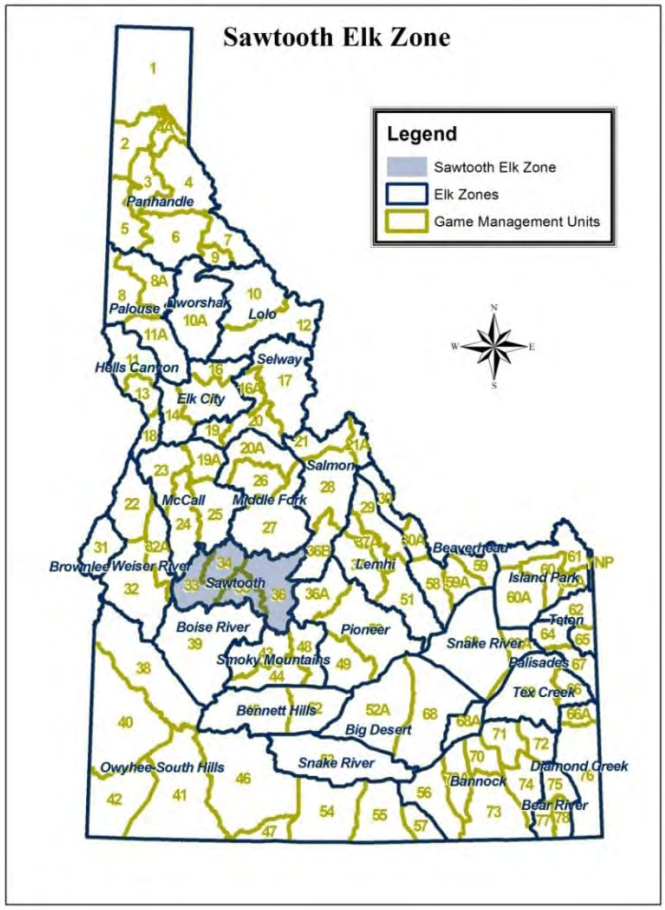

Figure 1. Sawtooth Elk Management Zone.

This plan reviews evidence that wolf predation may be a major mortality cause preventing the Sawtooth Zone elk population from reaching IDFG population management objectives. It also identifies ongoing efforts to reduce adverse impacts of other factors influencing the Sawtooth Zone elk population, including habitat alteration and harvest, and identifies techniques to monitor the effects of lethal wolf removal. This plan provides the analysis that sets the stage for increased regulated harvest of wolves and agency wolf removal.

DEFINITION OF PROBLEM

Elk populations in the Sawtooth Elk Management Zone (Sawtooth Zone) are below historic levels and current population management objectives. Data analysis on radio-collared elk demonstrates that wolf predation and malnutrition of cow elk and elk between 6 months and 1-year are the primary causes of mortality and are preventing the cow elk component of the population from reaching management objectives (Pauley and Zager 2011). Based on survival data and computer modeling, the cow segment of the Sawtooth Zone elk population was expected to continue to decline at a rate of 3 to 5% annually since 2009. The 2013 population estimate obtained from an aerial survey showed an 11% decline or an average decline of ~3% annually (Table 1). The bull segment of the Sawtooth Zone elk population had the potential to double with an increase of 26% annually. The bull segment realized an increase at a rate of 7% annually.

ELK POPULATION OBJECTIVES AND CURRENT STATUS

Management objectives for elk in the Sawtooth Zone (GMUs 33, 34, 35, 36) since 1999 are 3,050 – 4,550 cow elk and 600 - 975 bull elk (Kuck 1999). The 2014 draft elk plan adjusted the Sawtooth Zone objectives very little. Proposed objectives for the Zone are to maintain an elk population consisting of 3,000 – 4,500 cow elk, 630-945 bull elk, and 360-540 adult bull elk (In Prep 2014). The 2009 survey indicated that all components of the elk population were below population objectives in the Sawtooth Zone. Cow and bull elk remained below objectives during the 2013 surveys (Figures 2 and 3).

Table 1. Current population objectives and status of Sawtooth Zone elk, 2009 and 2013 survey.

Cows		**Bulls**		**Adult Bulls**		**Bull:Cow Ratios**		**Adult Bull:Cow Ratios**	
Objectives	**Status**	***Objectives***	**Status**	***Objectives***	**Status**	***Objectives***	**Status**	***Objectives***	**Status**
3,050-4,550[1]	**2,696**	*600-975*	**251**	*355-575*	**182**	*18-24*	**9**	*10-14*	**7**
3,000-4500[2]	**2,396**	*630-945*	**324**	*360-540*	**202**	*18-24*	**14**	*10-14*	**8**

[1] 2009, [2] 2013

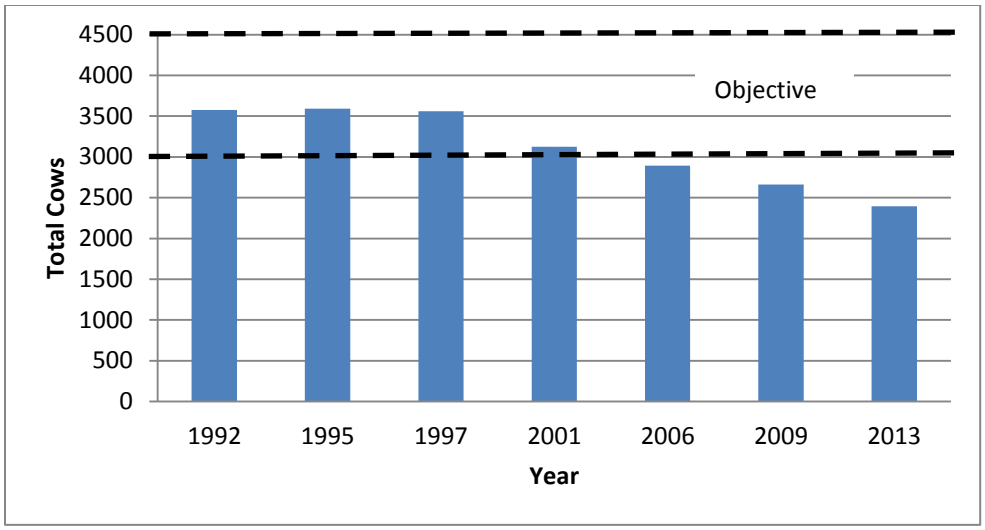

Figure 2. Total number of cow elk in the Sawtooth Zone, 1992-2013. Cows remained within objective until 2006.

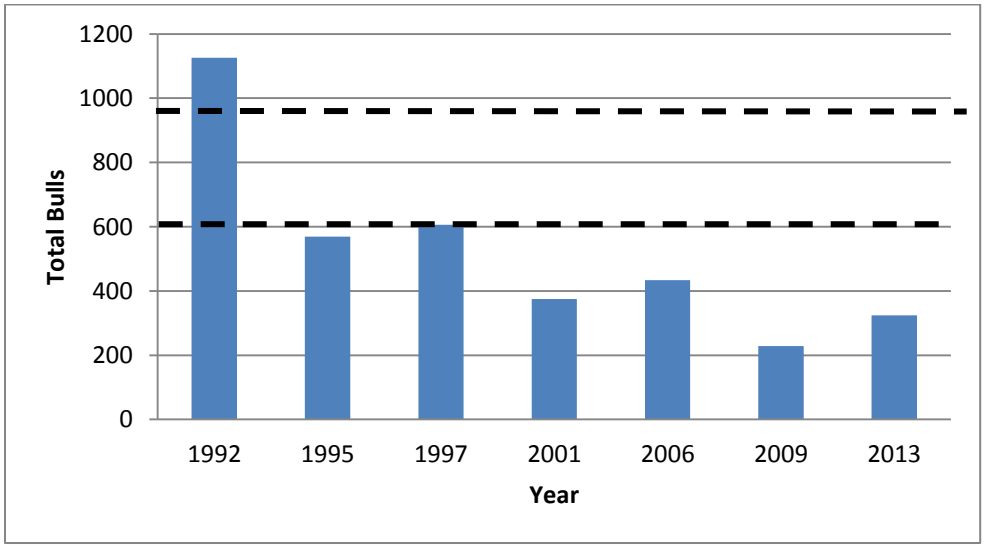

Figure 3. Total number of bull elk in the Sawtooth Zone, 1999-2013 and bull objective..

Background – Sawtooth Elk

Elk harvest in the Sawtooth Zone occurs in each GMU, however, elk typically migrate from higher elevations in GMUs 34, 35 and 36 to lower elevation winter ranges in GMUs 33 and 35. Harvest objectives and population estimates target these concentrated wintering elk herds. Winter ranges in GMUs 33 and 35 are not geographically isolated from each other, with elk moving between the two GMUs among years. No elk are known to winter in GMU 34 and a

small number of elk were sustained by winter feeding during the 1990's in GMU 36, near Stanley, where natural winter range is very limited. Population objectives for the last 15 years were established in the elk management plan finalized and adopted by the Idaho Fish and Game Commission in 1999 (Kuck 1999). Objectives during this time period reflected a balance between habitat potential, harvest opportunity, and concerns/experience with ungulate damage to private property. Habitat potential is evaluated by considering historic numbers of elk in an area, current population levels, and associated vegetative conditions. IDFG primarily uses aerial surveys to estimate elk populations, informal reviews of vegetative conditions to assess carrying capacity (due to the difficulty of large-scale forage assessment, informal reviews are often the only habitat data available to biologists), and mandatory harvest reports to glean harvest information.

Aerial surveys were conducted in parts of the Sawtooth Zone as early as the 1950s; however the low quality of information (primarily the lack of sightability modeling) prevents relating the results to population trend. Sightability–corrected aerial surveys began in the early 1990s. At that time, winter elk population estimates were within or above objectives set in the 1999 elk management plan (Kuck, 1999).

History of Elk Population Status

Calf:cow ratios estimated from aerial surveys remained stable (>30 calves:100 cows) in all surveyed units ($r^2 = 0.0087$) until 2009 ($r^2 = 0.121$), when recruitment ratios dipped below 20 calves:100 cows (Figure 4 and 5).

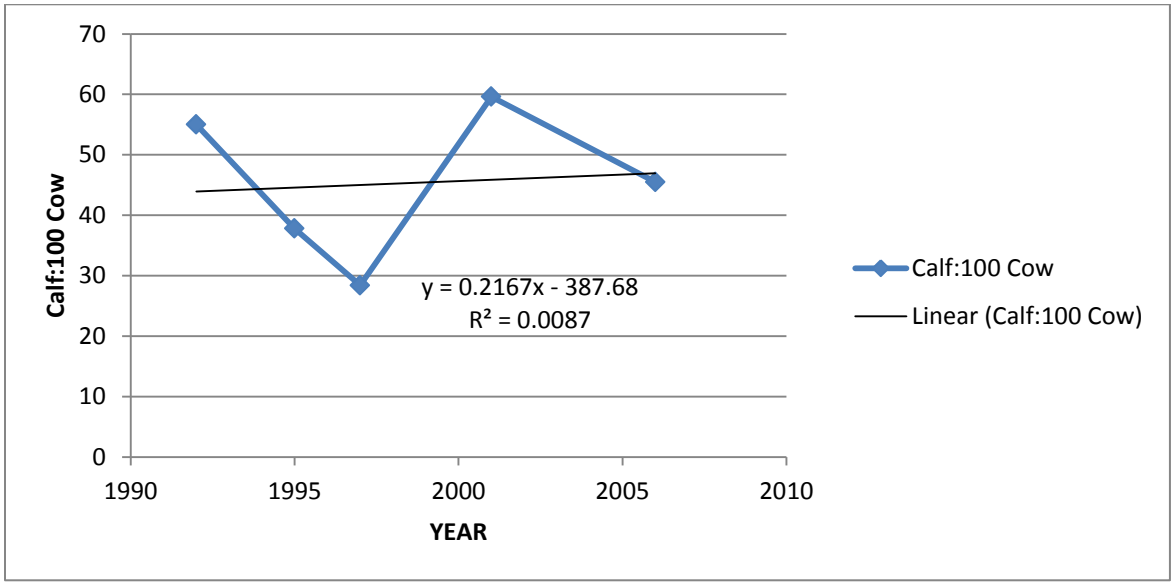

Figure 4. Calf:100 Cows in Sawtooth Elk Zone, 1990-2006.

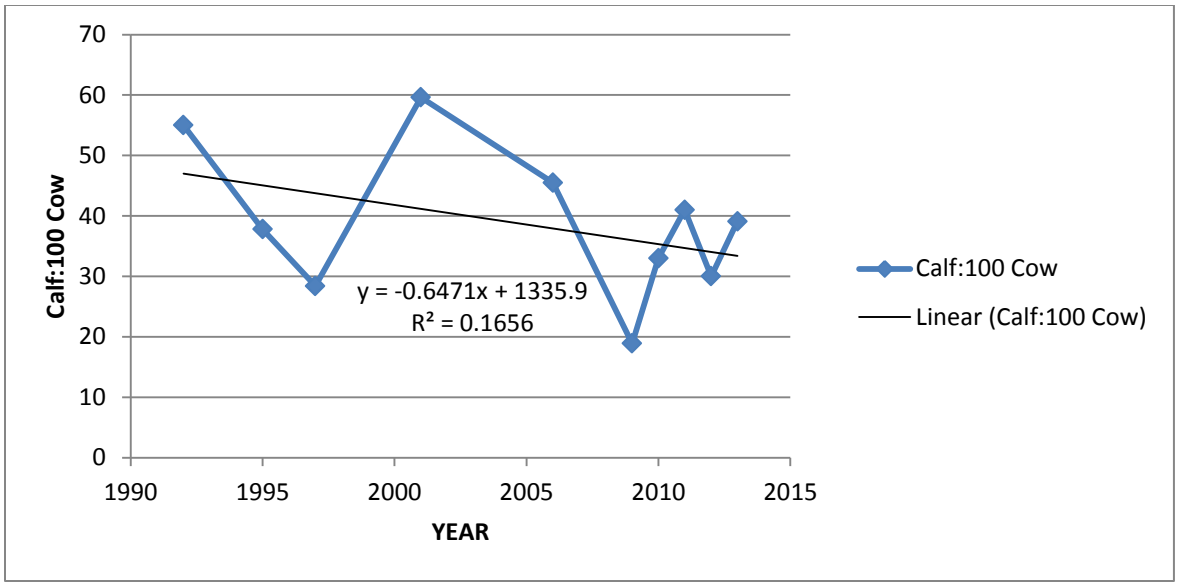

Figure 5. Calf:100 Cows in Sawtooth Elk Zone, 1990-2013. Early winter calf:cow ratios did rebound following the 2009 survey.

Annual population growth rates were calculated from winter aerial survey population estimates. No significant ($P<0.05$) trends were observed in any of the GMUs, however mean growth rates ($R=0.94$) indicated declining populations since 2001(Figure 6).

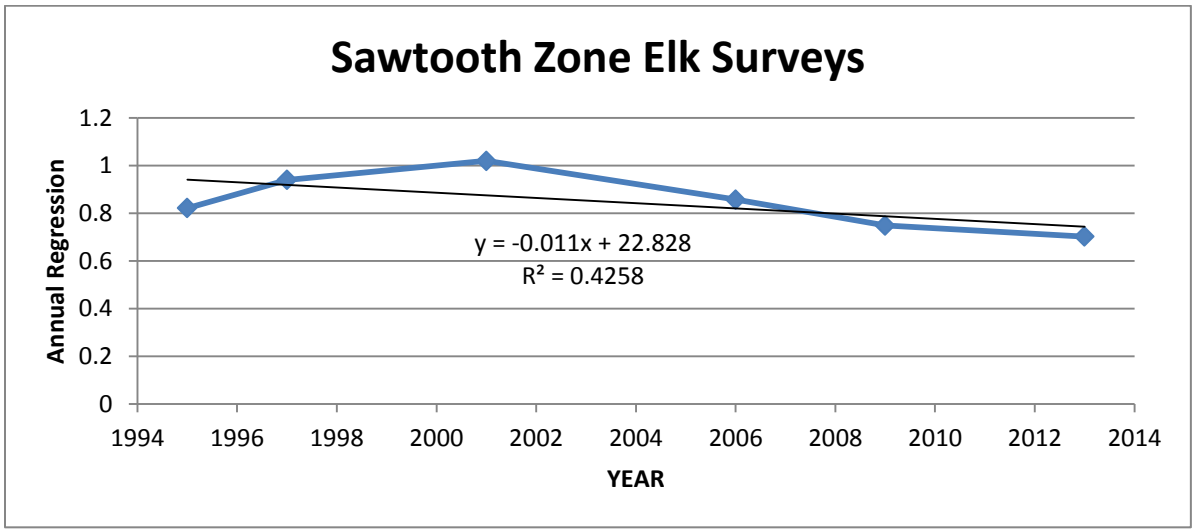

Figure 6. Annual growth rate of elk in the Sawtooth Zone 1992-2013.

Annual Survival of Elk

During January and February 2006 – 2012, IDFG research staff captured and radio-collared 233 elk (95 adult females, 51 adult males, 47 female calves, 40 male calves) to measure annual survival and reproduction. Only elk $\geq$ 6 months were radio-collared because earlier research

showed wolf caused mortality was very low in neonates (<6 months old). Neonates were killed primarily by bears, cougars, malnutrition, and other causes which varied among years (White et al. 2010). Calves were monitored for survival status through June 1 when calves were fully "recruited" into the adult population. The Kaplan-Meier staggered entry method (Pollock et al. 1989) was used to produce annual survival estimates of adult cow elk based on biological years beginning 1 June 2008 and ending 31 May 2012 (Table 2).

Table 2. Annual survival rates of adult elk, and 6-month (approx. Jan – 31 May) survival rates of calf elk, radio-collared on the Lowman study area in Idaho *(Table adapted from Wolf Elk PR11 S11 9-13)*.

	Bulls		Cows		Calves	
Year	S[a]	(SE)	S	(SE)	S	(SE)
2008	0.42	(0.08)	0.74	(0.05)	0.35	(0.06)
2009	0.65	(0.09)	0.92	(0.04)	0.30	(0.06)
2010	0.47	(0.08)	0.87	(0.04)	0.78	(0.09)
2011	0.76	(0.11)	0.84	(0.05)	0.40	(0.11)
2012	0.85		0.90			

[a] Survival rates and standard errors calculated following Pollock et al. (1989).

Based on the radio-collared elk data and modeling, cow and calf elk survival rates may be inadequate to sustain growth or stability of the cow elk population, preventing cow abundance from reaching management objectives within the Sawtooth Zone. Elk population growth rates are sensitive to adult cow survival and populations that are stable or increasing typically exhibit cow survival rates ≥90% (Eberhardt 1985). Furthermore, low calf survival (and ultimately recruitment) likely contributes substantially to population decline as variation in population trends are often linked to juvenile vital rates (Gaillard et al. 1998, Raithel et al. 2005) (Table 3).

Table 3. Calf elk recruitment rates in the Sawtooth Elk Zone.

Year	Calf:Cow January	Cows - January	Calves - January	Cow Survival	Calf Survival	Cows June	Calves June	Calf:Cow* June
2008	26:100	1090	280	0.74	0.35	807	98	**12:100**
2009	19:100	1103	207	0.92	0.30	1015	62	**6:100**
2010	33:100	1154	394	0.87	0.78	1004	307	**31:100**
2011	39:100	764	300	0.84	0.40	642	120	**19:100**
							AVG	**17:100**

*June calf:cow ratios assumes cow survival rate is 100% through December.

Cause Specific Mortality of Elk

Cause specific mortality rates were estimated from radio-telemetry data. Dead radio-collared elk were investigated to establish the cause of death using techniques reported by Hamlin et al. (1984). Mortality events were attributed to one of six causes: 1) wolf predation, 2) wolf predation/malnutrition, 3) mountain lion predation, 4) human harvest, 5) malnutrition, and 6) unknown causes (includes automobile accident). Wolf predation was the leading cause of mortality for all elk combined, followed by harvest, wolf predation related to malnutrition, malnutrition, unknown/other, and cougar predation (Figure 7). Legal harvest was the leading cause of mortality for adult bull elk and wolf predation and malnutrition were the leading causes of mortality for both cows and calves.

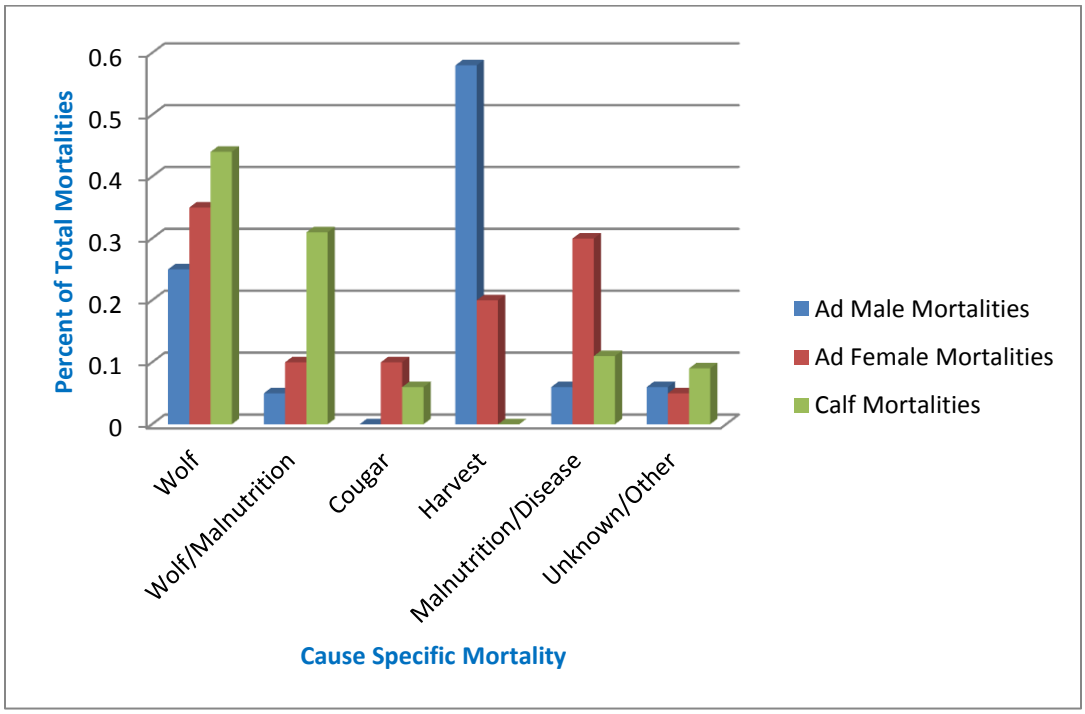

Figure 7. Cause-specific mortality (Adult male: n=36, Adult female: n=20, 6 month calf: n=36, total: n=92) of elk ≥6-months old in the Sawtooth Elk Zone 2006-2012.

Evidence from other wolf-elk systems provides some insight into additive mortality. In systems without wolves, cow elk survival rates, in the absence of hunting mortality, are typically in the range of 0.90 or higher (White 1985, Freddy 1987, Leptich and Zager 1991, Unsworth et al. 1993, McCorquodale et al. 2003, White and Garrott 2005). With the addition of wolf predation, adult cow survival rates are often much lower (0.71 for cow elk ≥ 8 years and 0.86 for cow elk between 3-7 years [Kunkel and Pletscher 1999] and 0.85 in YNP [White and Garrott 2005]).

Density Dependence, Weather, and Habitat

Winter plays an important role in predator/prey relationships. Ungulates become much more vulnerable during deep snow winters due to impediments to mobility and malnutrition, which may pre-dispose them to an assortment of maladies, including predation (Smith et al. 2004). Wolves are much more effective during winter, and especially during harsh winters. In addition to increasing vulnerability to predators, harsh winters cause starvation at a higher rate. Mortality during these times may be mostly compensatory, that is ungulates killed by predators may have died from starvation anyway. On a population level, this can be significant. Predators potentially could reduce the overall mortality due to starvation if they can reduce the impacts of prey on their winter range, thus allowing more animals to survive (Murphy et al. 2011). However, predator/prey interactions on winter range and predator impacts on carrying capacity are not well understood.

It is unlikely that the Sawtooth Zone elk population is currently limited by a density-dependent response to habitat. The abundance of elk estimated during the 2013 aerial surveys (3,649 elk in combined GMUs 33 & 35) was well below the maximum abundance estimated during 1992 (6,743 elk in GMUs 33 & 35) (IDFG unpublished data). Further, growth rates over that period indicate declining populations (Figure 6). A density-dependent response to these population declines should produce increased recruitment. However, recruitment rates did not increase (Table 3), which casts doubt on the prospect that the Sawtooth Zone elk population is limited by density dependent mechanisms.

EFFORTS TO ADDRESS ELK DECLINE

Changes in Elk Hunting Seasons and Harvest Strategies

In response to declines in elk numbers and extremely low calf:cow ratios in 2009, the Department made several changes in the Sawtooth Elk Zone. During the 2008 season the Department eliminated a controlled hunt targeted at alleviating elk depredation problems in GMU 33. It also moved the muzzleloader cow hunt from the general season 'A' tag to an unlimited controlled hunt. In 2009, the Department reduced the unlimited controlled muzzleloader cow hunt to a 50 permit hunt, reducing the number of hunters from 900 to 50 and decreasing the number of cows harvested from 200-500 to <50. IDFG also began progressively implementing restrictions on elk hunting in 2009. Zone tag quota reductions equating to a 46% reduction from 2008 tag numbers were phased in over a 3-year period, through the allocation formula of 50% of the reduction in 2009, 25% reduction in 2010, and the remaining 25% reduction in 2011 based on the 5-year average A and B tag sales from 2004 – 2008 (Table 4).

Table 4. Sawtooth Elk Zone harvest statistics 2003-2012.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012

Antlerless Harvest	**369**	**284**	**579**	**324**	**229**	**104**	**42**	**44**	**40**	**42**
'A' Tag	274	202	469	269	159	15	7	14	9	17
'B' Tag	2	2	3	2	1	10	2	0	0	0
CH Tag	93	80	107	53	69	79	33	30	31	25
Antlered Harvest	**526**	**613**	**596**	**410**	**358**	**376**	**292**	**339**	**254**	**332**
'A' Tag	129	129	124	108	94	68	68	56	47	60
'B' Tag	387	476	468	295	260	304	219	268	195	268
CH Tag	10	8	4	7	4	4	5	15	12	4
Hunter Numbers	**5665**	**6024**	**5975**	**6100**	**4999**	**4037**	**3010**	**2892**	**1987**	**2104**
'A' Tag	2136	2373	2332	2792	1990	952	683	656	543	554
'B' Tag	3259	3379	3326	3096	2769	2550	2231	2118	1336	1455
CH Tag	270	272	317	212	240	535	96	118	108	95
% 6+ Points	20	20	24	25	27	28	32	23	26	33

Changes in Elk Habitat

The Sawtooth Zone comprises a total of 6,580 km^2 (GMU 33 = 1,735 km^2, GMU 34 = 1,151 km^2, GMU 35 = 975 km^2, GMU 36 = 2,719 km^2). Most of the area is in federal ownership, predominately United States Forest Service (USFS). These areas historically had high levels of disturbance. Approximately 15% of the Sawtooth Zone burned in wildfires between 1970 and 1994. An additional 17% burned between 1994 and 2012. Fire suppression efforts throughout the 20^{th} century eliminated much of the natural disturbance once part of the system.

Although the Sawtooth elk population does not appear to be limited by density-dependent responses to habitat, there are data that indicate annual vegetation activity has decreased. Satellite imagery has captured Normalized Difference Vegetation Index (NDVI) for the continental US. From this, annual statistics are generated that characterize the vegetation's performance. Preliminary assessments of the annual "output" of vegetation in terms of NDVI (compilation of all active chlorophyll activity that has occurred within a 250 m pixel in one year) indicate that GMU's 34 and 36 (elk summer range) have shown decreases in their annual vegetation activity. Further, most of the higher elevation summer range has seen decreases across the time period of 2001-2011 (Figure 8). Cook et al. (1996) discussed the importance of late summer forage quality on over-winter calf elk survival. Inadequate nutrition during late summer and fall can reduce fertility, growth, and survival of elk (Cook et al. 1996). This may explain the high prevalence of malnutrition (Figure 7) on radio-marked elk in the Sawtooth Zone. Most of the malnutrition events occurred during winter 2008; a long winter with deep snows that followed an unusually dry summer and fall.

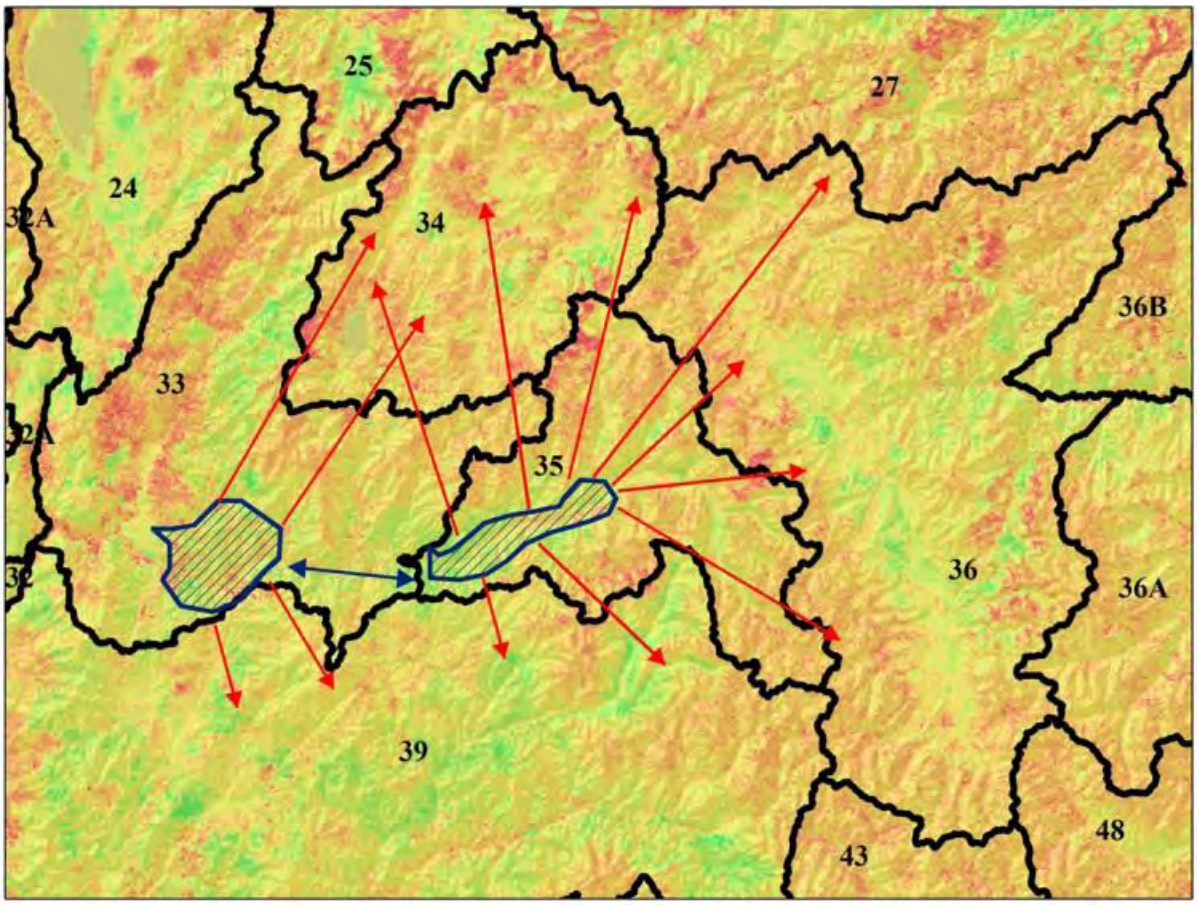

Figure 8. Total annual vegetation phenology trajectories within GMUs 33, 34, 35, and 36. Green colors represent areas that have seen a positive increase in their annual vegetation phenology, yellow-orange are areas not seeing increasing or decreasing trends, and red where decreasing trends are prevalent (2001- 2011 data). Blue hash shows elk winter range. Arrows indicate elk movement between winter and summer range based on GPS collared animals.

Most of IDFG's habitat management efforts are focused on collaboration with the U.S. Forest Service. The focus has been to increase fire frequency through prescribed fire and more liberal "let burn" policies. IDFG has also actively encouraged efforts to control noxious weeds and efforts to close roads to improve elk habitat effectiveness and harvest vulnerability.

Beginning in 1949, after a severe winter which killed 90% of the original bitterbrush stand, IDFG, in cooperation with the USFS and the Intermountain Forest and Range Experiment Station, began numerous re-vegetation attempts in the Sawtooth Zone (IDFG unpublished data). These bitterbrush plantings were attempted throughout the 1950s, 60s, and 70s, with patchy success. USFS also regularly conducts small-scale plantings of crested wheatgrass. At this time, it is unknown whether the plantings have had any effect on big game populations.

Historically, winter range in the Sawtooth Zone has been limited due to invasion of non-native weed species, erosion, and drought conditions. During harsh winters, IDFG conducts winter feeding in GMU 33 in efforts to prevent heavy winter mortalities that have been common in the past (Kuck 1999). Over the past 15 years, winter feeding occurred during only 2 winters (2001/2002 and 2007/2008).

Changes in Black Bear and Mountain Lion Hunting Seasons

Cause-specific mortality rates on elk ≥ 6 months of age suggest that mountain lion predation plays only a minor role in the decline of Sawtooth Zone elk populations; therefore, no changes to the lion harvest have been implemented. Additionally, the 2009-2012 mountain lion harvest in GMUs 33, 34, 35, and 36 was 47% lower than reported between 2005 and 2008 and represents a continued decline over the last decade (IDFG, unpublished data, 2012).

In response to livestock depredations in the late 1990s, the 2000 - 2010 Black Bear Management Plan established heavy harvest goals in the Sawtooth Zone. Accordingly, spring and fall black bear seasons in GMUs 34, 35 and 36 were extended to encourage higher harvest. Historically, January calf:cow ratios ≥30:100 cows provided little indication that black bear predation on neonate elk calves was a driving factor. The recent rebound in January calf:cow ratios indicate that if black bear predation was impacting neonate elk calf survival it was temporary.

Wolf Hunting Seasons and Population Estimates

In 2008, IDFG established Wolf Management Zones to facilitate state monitoring and management. Wolf management zones were created by combining one or more Elk Management Zones with similarity in wolf population, prey base, and current or potential conflicts with livestock. In preparation for the first Idaho wolf hunt in 2009, IDFG set a statewide harvest limit and individual harvest limits by Wolf Zone. In subsequent seasons, the statewide harvest limit and some Wolf Zone limits were removed. The wolf harvest limit within the Sawtooth Wolf Zone was set at 60 in 2009, 2011, and 2012 seasons. There was no season during 2010 due to relisting under the Endangered Species Act.

The Sawtooth Wolf zone includes the Sawtooth (GMUs 33, 34, 35, and 36) and Boise River (GMU 39) Elk Zones (Figure 9). However, for the purposes of this predation management plan, only data pertinent to wolf populations residing in the Sawtooth Elk Zone will be presented. Population estimates, mortality, and harvests associated with wolves in the Boise River Elk Zone (GMU 39) are not presented.

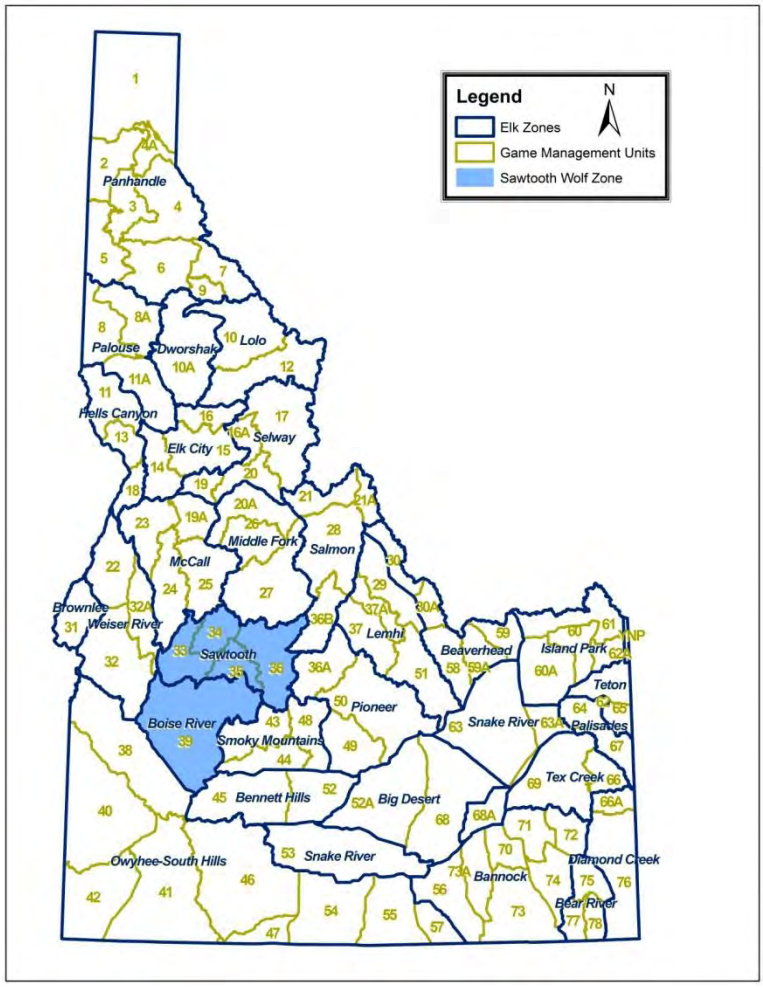

Figure 9. Sawtooth Wolf Management Zone includes Sawtooth and Boise River Elk Zones.

Wolf population estimates are determined using documented packs, mean pack size, number of wolves documented in small groups not considered packs, and a percentage of the population believed to be lone wolves. The formula is presented as:

Wolf Population Estimate = [(# Wolves in documented packs with complete counts) + (# Documented packs lacking complete counts * mean pack size) +

(# Wolves in other documented groups ≥2)] * (lone wolf factor of 12.5%)

Example: 2008 estimate = [(83 + (1*8.3) + (5)]*1.125 = 108.33

Table 5 describes wolf population estimates based on statewide averages and marked Sawtooth DAU wolves. Wolf mortality is based on known wolf deaths and does not include a percentage of other unknown deaths. Between 2008 and 2012, 42 wolves were taken through Wildlife

Services control action, 55 through regulated harvest and 32 through other means (natural causes, illegal take) in the Sawtooth Elk Zone (Table 5).

Table 5. Wolf mortality and population estimate within the Sawtooth Elk Zone (GMU 33, 34, 35, and 36) between 2008 and 2012.

Mortality Type	**2008**	**2009**	**2010**	**2011**	**2012**
Control	10	14	3	3	12
Harvest	0	18	10	11	16
Other	8	11	1	8	4
Total Known Mortality	**17**	**43**	**14**	**22**	**32**
Total Number Packs	**10**	**11**	**11**	**12**	**12**
Wolf Population Estimate	**108**	**95**	**86**	**86**	**69**

RISK ASSESSMENT

Predator Population

The reduction in predators will be limited to wolves based on the evidence presented. Wolf predation is a contributing factor influencing the survival of elk in the Sawtooth Elk Zone.

As of December 31, 2012 there was a minimum of 69 wolves in 12 packs in the Sawtooth Elk Zone area. Wolves outside of Units 33, 34, 35, and 36 will not be affected by actions authorized under this predator management plan.

Removal rates of 30-35% or less typically do not cause any long-term changes in wolf abundance, while removals of 40% or more may cause long-term reductions (Gasaway et al. 1983, Keith 1983, Peterson et al. 1984, Peterson and Page 1988). However, wolf populations have sustained human-caused mortality rates of 30 to 50% without experiencing declines in abundance (Fuller et al. 2003). Gasaway et al. (1983) found wolf abundance was unchanged with 16-24% harvest, but declined 20-25% after harvests of 42-61%. Based on mean pack size of 8, mean litter size of 5, and 38% pups in packs, Boertje and Stephenson (1992) suggested 42% of juveniles and 36% of adults must be removed annually to achieve population stability. In their analysis of multiple data sets, Adams et al. (2008) found human caused mortality rates $\leq$29% did not cause wolf population declines. Wolf populations tend to compensate for low removal rates and return to pre-removal levels rapidly, potentially within a year. It is hypothesized that compensatory mechanisms include increased survival, immigration, and possibly increased fecundity (Seal et al. 1975), Van Ballenberghe and Mech 1975, Fuller 1989). However, Adams et al. (2008) found compensatory survival and fecundity shifts were of insufficient magnitude to influence demographics, and that shifts in immigration and emigration rates served as the primary compensatory mechanisms. Therefore, under the Idaho scenario with

surrounding populations of wolves being under the similar heavy harvest objectives, increase of the population would be expected to be based more on compensatory survival and fecundity shifts as opposed to high levels of immigration. Immigration would be reduced though not eliminated, and populations would be expected to increase in a short time if hunting were to be curtailed or stopped.

Prey Populations

Elk will be the primary species benefitting from the proposed actions in this plan. Other prey species may benefit such as mule deer.

Hunting and Wildlife Associated Recreation Opportunity

The Department has substantially reduced elk hunting opportunity in the Sawtooth Elk Zone since 2008. Implementation of actions designed to reduce the impacts of predation on elk may result in a subsequent increase in opportunities for sportsmen and for other wildlife-associated recreationists whose focus is elk. Harvest and viewing opportunities will continue for bear, lions, and wolves under the actions of this plan.

PROGRAM

Boundaries

Efforts to reduce the number of wolves addressed in this predation plan will be focused on those wolf packs that are located in the Sawtooth Elk Zone (GMUs 33, 34, 35, and 36) in the winter (see Figure 1).

Current Status

The most recent population survey for elk in the Sawtooth Zone was conducted in 2013 and showed a slight increase in the elk population compared to 2009. Bull numbers and number of calves increased 22% and 45% respectively. However, overall cow numbers dropped 22%. Cow survival between 2010 and 2012 averaged 87% indicating that survival has been stable. Estimated calf recruitment went from ≤12:100 in 2008 and 2009 to ≥19:100 in 2010 and 2011indicating a potential for population stabilization and eventual growth.

Proposed Actions

IDFG's actions are currently focused on wolf reduction since elk survival studies in the Sawtooths indicate this is the primary limiting factor. Sport harvest is the Department's preferred tool for reducing wolves in the Sawtooth Zone. Actions proposed in this plan start

with regulated harvest and outcomes will be monitored to determine if elk populations stabilize and then increase. If the desired elk population objectives cannot be achieved through regulated harvest then other actions beyond sport harvest will be considered.

In addition, control actions authorized by IDFG have also been used to reduce wolf numbers and/or eliminate whole wolf packs when wolves have been implicated in livestock depredations. Control actions in response to livestock depredations will continue to be used as needed. Other tools that may be considered include extended hunting seasons, allowing trappers to trap in portions of the Zone (GMUs 34 and 35) during winter, and hiring professional trappers to target wolves in high wolf-use areas during winter.

Wolf populations will be reduced by a minimum of 40% of the highest population reached in 2008 and maintained at that level for 3 years to monitor the results of the reduction. The 2008 wolf population estimate in the Sawtooth Elk Zone was 108. A 40% reduction equates to maintaining no more than 65 wolves by March 31 in GMUs 33, 34, 35, and 36. By the end of 2012 (December 31), the wolf population in the Sawtooth Elk Zone was approximately 65 wolves.

Regulated Sport Harvest

Currently, regulated sport harvest consists of a wolf hunting season that runs from 30 August through 31 March. During the 2009, 2011, and 2012 wolf hunting season's hunters legally harvested 34, 20, and 19 wolves, respectively, within the Sawtooth Elk Zone. A harvest limit of 60 wolves was established for the wolf management zone, which includes Unit 39. Because of the high human-use and possible negative effects for pet owners, regulated trapping seasons will not be encouraged under this management plan within most of the Sawtooth Elk Zone.
If wolf populations cannot be maintained with current harvest structure and elk populations decline (determined by low calf:cow ratios, sightability surveys, and survival of radio-collared 6-month old calves and cow elk), additional tools may be implemented to retain wolf and elk population objectives.

Regulated Sport Harvest Tools to Consider:

1. Allow limited regulated trapping during winter in portions of the Sawtooth Zone away from heavy recreational use areas.
2. Extend hunting/trapping seasons to June 30.
3. Eliminate wolf harvest limit for the zone.
4. Offer depredation hunts in areas with chronic livestock depredation problems.
5. Increase number of hunting tags that can be used per individual in the Sawtooth Zone.

Other Actions

After reducing the wolf population by 40% and maintaining lower wolf densities, if elk populations continue to decline under regulated wolf harvest, then other actions will be implemented.

Other Action Tools to Consider:

1. Hire USDA Wildlife Services and/or other professional trappers to trap wolves during winter.
2. Contract with USDA Wildlife Services to allow aerial removal of wolves on elk winter range.

Objective and Measures of Success

The objective of this Predation Management Plan is to affect an increase in elk numbers in the Sawtooth Elk zone to move these populations toward stabilization and eventual recovery by reducing predator populations. Success will be measured by comparing elk status with IDFG elk population objectives.

MONITORING

Elk

Progress toward the elk plan objectives will be evaluated by monitoring:

- Changes in elk population estimates using the sightability survey approach (Unsworth et al. 1994); timing of future surveys will follow IDFG's big game survey schedule.
- Annual herd composition obtained during mid-winter
- Survival estimates of 6-month old calves and cows using radio-collaring; estimates will be used with herd composition ratios to determine end of the year recruitment rates
- Additional monitoring may include radio-collaring of neonates if mid-winter composition ratios decline below 30 calves:100 cows

Harvest of bears, mountain lions and wolves will be monitored through the standard process of completion of Big Game Mortality Report Forms by each successful hunter. These forms provide detailed information for each individual animal harvested and are accompanied by extraction of a tooth for aging and attachment of an identification tag to each pelt.

Wolves

The number of wolves will be determined from observation and enumeration of packs with radio collars, observations of unmarked packs, and observations of individual wolves during wolf tracking surveys or during removal efforts. Wolf abundance estimates will be determined annually throughout the predation management action. Wolves determined to be in the Sawtooth Wolf Zone may include any pack members or transients that occur within Units 33, 34, 35, and 36 at any time.

Monitoring efforts in the Sawtooth Zone have been very thorough during the past 5 years because of the wolf monitoring team efforts, research efforts, and work conducted by University of Montana graduate students. As those efforts wrap up and funding for wolves begins to diminish, it will be more difficult to continue high level monitoring. However, some of the tools developed may be used to continue monitoring efforts. Surveying historic and predicted rendezvous sites (Ausband et al. 2010), conducting howl box surveys to verify presence/absence (Ausband et al. 2011), using trail cameras to verify production, and linking harvest data to specific packs may be used in absence of radio-collared animals.

Budget

Most funds required to implement monitoring in this plan are available as part of larger, ongoing IDFG programs. Aerial surveys to estimate zone-level elk population estimates are funded though statewide ungulate monitoring budgets. Funds to conduct annual composition and obtain survival rates may partly be available from annual Regional budget but additional funding may need to be identified. Funding to monitor wolves has been from federal wolf appropriations but this funding is declining. Funds in the future are likely to be a combination Pittman-Robertson funds and IDFG license dollars. Additional funds will be determined as necessary.

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APPENDIX A

Policy for Avian and Mammalian Predation Management.

ADOPTED AUGUST 24, 2000

I. PURPOSE

The Idaho Department of Fish and Game (Department) has a responsibility to preserve, protect, perpetuate and manage all wildlife in the state and to provide continued supplies of such wildlife for hunting, fishing and trapping. To fulfill its responsibility, the Department must efficiently and effectively manage populations of predators as well as populations of prey species to meet management objectives. The Department recognizes predator management to be a viable and legitimate wildlife management tool that must be available to wildlife managers when needed. However, the Department also recognizes that predator removal is controversial both publicly and professionally. The purpose of this policy is to provide the Department direction in managing predator populations consistent with meeting management objectives for prey species populations.
This policy does not apply to emergency response situations where the Department must act to protect human health and safety.

II. DEFINITIONS

A. "Predation" means the act of an individual animal killing another live animal.
B. "Predator" means any wild animal species subsisting, wholly or in part, on other living animals captured through its own efforts. Predators are defined in Idaho Code as 'big game animals' (black bear and mountain lion), 'migratory birds' (American crow), 'fur- bearing animals' (badger, bobcat, fisher, marten, mink, otter, raccoon, and red fox), and 'predatory wildlife' (coyote, skunk, and weasel). For the purpose of this policy, "predator" will include primarily those avian and terrestrial species subject to Idaho jurisdiction, but may in some cases include species which are protected under the Migratory Bird Treaty Act or the Endangered Species Act. For predatory species protected under these or other federal statutes, the Department may cooperate with the USDA Animal and Plant Health Inspection Service and/or the U.S. Fish and Wildlife Service in addressing predation problems caused by such species.
C. "Predation management" means the application of professional wildlife management technology to increase or decrease predator populations. Predator management may include management of habitats to benefit or depress populations, selective harvest of individual animals, or generalized harvest over a geographic area.

D. "Predator removal" means the physical removal of an animal, alive or dead, from an area where its presence is undesirable. Physical removal of live animals for release in habitats already occupied by the same species has been shown to create additional problems as individual animals seek living space (i.e., a home range) within already-occupied suitable habitat; for that reason, predator removal will often but not necessarily require lethal methods.
E. "Prey" means any animal hunted or killed as food by a predator.

III. POLICY

Predator populations, as with all wildlife in Idaho, will be managed to assure their future recreational, ecological, intrinsic, scientific, and educational values, and to limit conflicts with human enterprise and values. Where there is evidence that predation is a significant factor inhibiting the ability of a prey species to attain Department population management objectives and the Department decides to implement predation management actions, the 14 management actions will ordinarily be directed by a predation management plan.

Predator populations will be managed through habitat manipulation and/or predator removal as appropriate. Wildlife managers and administrators implementing predation management options will consider the ecological relationships that will be affected. Management decisions will be consistent with objectives or management plans for predators, animals that constitute or contribute to the predator's prey base, affected habitat, and other biological and social constraints.

Idaho Code provides that predatory wildlife (i.e., coyotes, jack rabbits, skunks, starlings, raccoons and weasels) may be taken by any legal means at any time.

On lands managed by the Department, efforts to limit the size of predator populations may include habitat manipulation. The Department may encourage other land management agencies to manipulate habitat under their jurisdiction in a manner to limit the size or effectiveness of predator populations.

The Department, when and where feasible, will rely on sportsmen (licensed hunters and trappers) to take predators classified as game animals and fur-bearing animals, and may alter seasons or harvest rules to meet wildlife management objectives. However, the Department will not support any contests or similar activities involving the taking of predators which may portray hunting in an unethical fashion, devalue the predator, and which may be offensive to the general public. The Department opposes use of bounties as a predator control measure. The Department will not implement a program based, in whole or in part, on utilizing methods involving sterilization or birth control in wild animals.

The Department will cooperate with the Animal and Plant Health Inspection Service (APHIS) Wildlife Services Program to address specific areas and species, particularly on private lands, in a manner consistent with the approved interagency Memorandum of Understanding.

The Director may implement a Predation Management Plan in those circumstances where wildlife management objectives for prey species cannot be accomplished within two years by habitat manipulation, sportsman harvest, or interagency action designed to benefit the prey species, and where there is evidence that action affecting predators may aid in meeting management objectives. Essential components of such a Predation Management Plan are defined below.

This policy does not affect existing predator management policies and procedures used to administer livestock depredation issues.

IV. PROCEDURES

Managers recognize the role of predators in an ecological and conservation context. Impacts of the removal of individual predators on the structure of the predator population, as well as the prey population, will be considered. The actions by the Department must be based on the best available scientific information, and will be evaluated in terms of risk management to all affected wildlife species and habitats. Valid concerns for human health and safety exist. Predator management will consider the need to avoid risk of human injury, loss of life, or potential for disease transmission.

Predator management may occur but is not limited to the following circumstances:

1. In localized areas where prey populations are fragmented or isolated, or where introductions or transplants of potentially vulnerable wildlife species (e.g., bighorn sheep, wild turkeys, sharp-tailed grouse, and others) has occurred or is imminent. Control may be intensive and of sufficient duration to allow transplanted animals and their progeny to become established and to become self-sustaining, or selective with removal efforts directed at specific offending animals.
2. In specific areas where managers are unable to meet management goals and objectives for prey populations due to predation. For example, in areas where survival or recruitment of game animal populations is chronically low and management plan objectives have not been or cannot be met and where there is evidence that predation is a significant factor, predator control may be initiated.
3. On wildlife management areas, especially those which are managed primarily to provide for production of specific species (e.g., waterfowl), provision of critical

winter range, and those acquired and managed to provide specific mitigation for wildlife losses elsewhere.

Predation Management Plans will consider options other than just predator removal. Various kinds of habitat manipulation can sometimes negate or minimize the effect of predators, including constructing nesting islands, providing cover plantings, or removal of roosts used by avian predators. Preventative actions are important in reducing conflicts with predators; therefore, the Department will seek ways to reduce the vulnerability of prey species to predation, and will cooperate with federal and state agencies, counties, and others to promote activities on public and private lands that will limit predator impacts. Such activities may include working with landowners and land managers to reduce winter concentrations of prey species (especially where artificially concentrated by food resources), and working with recreation managers to direct or reduce human activities that may increase the vulnerability of prey species to predators.

PREDATION MANAGEMENT PLANS

Predation management plans will be prepared using the following outline:

1. Definition of the problem. This definition must include a rationale for the proposed action. Such a rationale may include:
   A. a proposed management action (such as the introduction of a small number of animals into suitable but unoccupied habitat) that may be adversely affected by the presence and predictable actions of predators,
   B. a finding that approved wildlife management objectives are not being met due in large part to the actions of predators, or
   C. evidence that wildlife recruitment or populations has been or will be adversely be impacted by the presence of predators.

2. Risk Assessment. A discussion of the ramifications of the program, including potential effects on:
   A. predator populations (i.e., will removal of avian roosting trees near a waterfowl production area affect non-targeted species, such as bald eagles? Will removal of specific individual animals result in vacant home ranges that will be especially attractive to transient predators of the same species?)
   B. prey or benefiting species,
   C. sportsmen and wildlife-associated recreational opportunity,
   D. landowners in or near the impacted area, and
   E. groups that will strongly favor or oppose the proposed action.

3. Program. A discussion of the specific proposed treatment, including:
    A. clearly-defined boundaries,
    B. the species of predator(s) affected,
    C. the prey or other species to benefit from any proposed action,
    D. the method or techniques identified to address identified concerns, including habitat manipulation where appropriate and the method(s) of predator removal (if removal is a component of the program),
    E. the objective and measure of success used to determine whether that objective has been achieved,
    F. date of initiation of actions,
    G. measurable objectives and monitoring plans to access program effectiveness, and
    H. budget.

All predator management plans will be reviewed by the chief of the Bureau of Wildlife and regional supervisor. Predator management plans must be approved by the director. Predator management plans will be reviewed and evaluated annually.

REVISION DATE: This policy shall be reviewed on or before June 30, 2005.

APPENDIX B

Sawtooth Zone wolf population estimates based on statewide pack size averages:

YEAR	# PACKS	# PACKS REMOVED	#WOLVES IN PACKS (COMPLETE COUNTS)	# PACKS USING COMPLETE COUNT	# PACKS USING MEAN PACK SIZE	MEAN PACK SIZE	# WOLVES IN OTHER DOC GROUPS	# WOLVES USING FORMULA
2008	10	1	83	9	1	8.3	3	106
2009	11	1	35	5	6	7.8	3	95
2010	11	0	37	6	5	7.1	3	85
2011	12	0	22	4	8	6.5	2	86
2012	12	1	26	6	6	5.5	2	69