



# Montana Fish, Wildlife & Parks

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Ref: DO396-10  
November 24, 2010

Mr. Steve Guertin  
U.S. Fish and Wildlife Service  
P.O. Box 25486, DFC  
Denver, CO 80225-0486

Dear Mr. Guertin:

Please find enclosed a Section 10(j) permit application from Montana Fish, Wildlife & Parks (FWP) to allow control of wolves in the West Fork Bitterroot where they are having an unacceptable impact on the elk population. Also enclosed is a summary of the peer review of the proposed project and the response to that peer review, as well as a summary of public comment. The proposal was approved by the FWP Commission at their November 19 meeting, following a month-long public review process. Based on discussions with your staff, it is our understanding that processing of this permit application is a priority of the U.S. Fish and Wildlife Service, and that it will be expedited to be completed as quickly as possible. It is our expectation that this remains the case.

In the 10(j) proposal, Montana proposes to reduce wolf numbers in Hunting District 250 from the minimum of 24 counted in December 2009 to a year-end minimum of 12 wolves represented by 2 – 3 packs, and maintain the wolf population there at 12 for a period of 5 years. Means of removal may include hunting or trapping by designated agents of the state, control actions by agency personnel or designees, or any combination approved by the FWP Commission.

The FWP Commission has requested a timeline by which we can expect issuance of the requested 10(j) permit. Therefore, I am requesting acknowledgement of receipt of the enclosed permit application, as well as a schedule for completion of the processing of the application.

Please feel free to call if there are any questions about the enclosed application.

Sincerely,

*fm*  
Joe Maurier  
Director

Enc: 10(j) permit application  
Response to Peer Review  
Summary of Public Comment  
Peer Review – David Mech  
Peer Review – Layne Adams  
Peer Review – Dean Beyer  
Peer Review – Bruce Dale  
Peer Review – McCorquodale

c: FWP Wildlife Bureau

**Public Comment Summary**  
**MONTANA RULE 10(J) PROPOSAL, WEST FORK OF THE BITTERROOT**  
**November 18, 2010**

**Introduction**

FWP received comments on the proposal to remove wolves in the West Fork Bitterroot via the website (survey monkey), email and hard copy mailings. The formal comment period was initiated on October 7, 2010 with that day's FWP Commission process and adoptions. An "interested person" letter generally describing the proposed quotas was posted on the website and mailed to an established list of interested parties.

In all, 162 comment entries were received through the deadline of 5:00 PM, November 10, 2010. All told, 147 entries were received electronically via the survey monkey web interface, with an additional 15 written/email comments. Most comments were from Montana addresses and included unique inputs as well as common or repeating messages.

This summary is not a tabulation of the number of supporting vs. opposing comments (both support and opposition were represented across the total comment set), but rather represents an effort to specify rationales and values that *repeatedly* surfaced in public comment. As such,, it is not intended to replace, dismiss or represent comments received and forwarded to the Commission and FWP staff.

**Specific Topics and Themes**

Consistent Themes

- Concern over killing wolves to benefit elk hunters; hunting is the problem with elk numbers; elk are not the property of hunters
- Concern that elk objective is too high/not sustainable
- Concern and perception that elk are favored over wolves
- Support from personal experience in the West Fork that elk numbers are low and wolf numbers should be managed
- Concern that wolf numbers in general are much higher than promised at the time of wolf reintroduction
- Appreciate wolves as part of the ecosystem and consider the 10j proposal to be in conflict with that view
- Support managing wolves like other managed wildlife species; the state should have management authority; appreciate local knowledge and expertise of FWP
- Concern about livestock loss to wolves
- Concern that livestock are an inappropriate reason to control wolves
- Proposed 10j hunt is the best option in the interim under federal wolf control
- Concern that wolf control efforts cannot reverse ungulate declines; this effort if misguided

- Concern that wolf is a scapegoat for environmental effects of increased human population growth, subdivisions; insufficient time for increased take of lions and bears
- Disagreement over cause of elk decline to include antlerless harvest
- Interest that managing for a balance between predator and prey is essential to the conservation of all wildlife; currently out of balance with too-high numbers of wolves
- Concern regarding a process that would select qualified hunters to remove the prescribed number of wolves
- Concern that killing wolves is inhumane
- Interest in applying proposals like this to other areas where wolves affect ungulates
- Concern that the removal of 12 wolves is not enough
- Concern that deer and moose numbers are affected by wolves, as well as elk
- Entire predator population should be managed to improve ungulate survival

#### Other Comments

- Hunter reports of low ungulate numbers in the West Fork
- Would support using aircraft for removal
- Wolf removal should be limited to resident hunters
- Interest in learning how to apply to participate in the removal action
- Support conducting the removals annually over 5 years
- Concern that the need is imminent if not too late in the West Fork
- Hunters or trappers should be used to remove wolves rather than paying federal trappers
- The elk objective for the West Fork EMU is too high as it pertains to the criteria for qualifying for a wolf removal under the 10j rule.
- The wolf removal that is prescribed may not bring the desired elk population response
- Concern that wolf removals could harm emerging wolf-watching economy
- Concern that wolf removals are needed to help outfitting businesses
- The Bitterroot Elk Study should occur before wolf removals
- Support hunters and hunting as the primary agent of wildlife conservation funding

## MONTANA RULE 10(J) PROPOSAL, WEST FORK OF THE BITTERROOT

### PROPOSED ACTION

Montana Fish, Wildlife, and Parks (MFWP) proposes to obtain a permit from the U.S. Fish and Wildlife Service (USFWS) for wolf take under Section 10(j) of the Endangered Species Act. Wolf removal would occur in the West Fork of the Bitterroot (Elk Hunting District 250), beginning as soon as possible for a period of 5 years. Data presented herein demonstrate that the West Fork of the Bitterroot elk population is below population management objectives and wolf predation is a major cause of mortality preventing the elk population from reaching management objectives. In combination with ongoing elk, lion, bear and habitat management, the integration of wolf management to include wolf take is needed to restore recruitment rates of 10-month-old calves to pre-2007 level of at least 25 calves per 100 cows.

Wolf numbers in Elk Hunting District (HD) 250 would be reduced from the minimum of 24 counted in December 2009 to a year-end minimum of 12 wolves represented by 2 – 3 packs from 2011 through 2016. The level of removal would be dependent on pre-treatment wolf abundance in an adaptive fashion based on annual wolf and elk population monitoring data. MFWP would be accountable to the USFWS for maintaining a minimum year-end count of 12 wolves through 2015 unless MFWP proposes and the USFWS accepts a new or amended proposal prior to 2015 in response to new information, or wolves are delisted.

Levels of wolf removal, timing, authorization of involved persons and means of removal in all or parts of HD 250 would be set annually by the Montana Fish, Wildlife & Parks Commission under established public process. Means of removal may include fair chase hunting or trapping by the public, control actions by agency personnel or designees, or any combination approved by the Commission.

## SUMMARY

The U.S. Fish and Wildlife Service (USFWS) reintroduced gray wolves to Yellowstone National Park and the wilderness areas of central Idaho in 1995 and 1996 as a Nonessential Experimental Population under Section 10(j) of the Endangered Species Act. The 10(j) rule was amended in 2005 and again in 2008 to allow states increased management flexibility to address wolf depredations on livestock and unacceptable impacts on wild ungulate populations. Wolf delisting and regulated public hunting is the preferred population management strategy identified in Montana's federally approved wolf conservation and management plan. Through regulated public harvest, MFWP intends to fine tune wolf numbers and distribution with respect to biological and social factors similar to the management approach taken for other wildlife species. However, MFWP has been prevented from fully implementing its management plan because of successful legal challenges that reversed delisting and resulted in renewed Endangered Species Act protections and federal regulations, even though the population is biologically recovered.

This proposal reflects an interim approach to relieve unacceptable impacts of wolf predation on an elk population, which would be ordinarily addressed through regulated, fair chase hunting of wolves had the species management been fully guided by Montana laws, administrative rules, and the state wolf management plan instead of federal regulations. MFWP is submitting this proposal consistent with Rule 10(j) to relieve unacceptable impacts of wolves on an elk population in the Montana portion of the central Idaho Recovery area that MFWP believes will continue to decline without intervention. Data presented herein demonstrate that the West Fork of the Bitterroot elk population is below population management objectives and wolf predation is a primary cause of mortality preventing the elk population from reaching management objectives.

MFWP proposes to reduce wolf numbers in HD 250 from the minimum of 24 counted in December 2009 to a year-end minimum of 12 wolves spatially represented by 2 – 3 packs from 2010 through 2015. For year 1 of this proposal (2010-2011), MFWP proposes to remove no more than 12 wolves, or 50% of the 2009 minimum population. This would provide significant progress towards the achievement of the wolf management objective of 12 wolves in the West Fork, and would be unlikely to reduce the population below 12 wolves. Annual adjustments to the number of wolves to be removed will be based on monitoring data and ultimately approved by the MFWP Commission each year.

The West Fork elk population is on the brink of a steep and unprecedented decline that can only be avoided by immediately and sharply elevating survival rates of calves through their first year of life. To improve elk numbers and recruitment in the West Fork, MFWP has already increased opportunities and harvest of mountain lions and black bears. Additionally, MFWP progressively implemented restrictions on elk hunting from 2008 through 2010 and eliminated antlerless harvest for the 2010 season. Working with cooperators, MFWP has worked to improve habitat and protect privately owned habitats from development. However, without the ability to manage the level of wolf predation by adjusting the number of wolves in the area, the West Fork elk population will continue to display poor recruitment and further decline. Montana expects wolf removal under the 10 (j) rule to be a short-lived and temporary measure in the interim before regaining full management authority for a delisted wolf population.

This removal effort is warranted due to unacceptable impacts of predation by a biologically recovered wolf population to elk numbers and specifically calf recruitment. Low calf recruitment is preventing the population from increasing to achieve management objectives. This localized removal action is

proposed for 1 of 44 elk management units in the state. FWP documented a minimum 37 breeding pairs of wolves in Montana by the end of 2009. Thirty-six of those 37 breeding pairs occur outside the proposed removal area.

Elk populations and wolf packs will be closely monitored through radio telemetry, aerial counts, and ground observations to assure that MFWP is meeting its management objective of maintaining 12 wolves in the project area and that elk population objectives are met.

## **INTRODUCTION**

Gray wolves (*Canis lupus*) increased in number and expanded their distribution in Montana because of natural emigration from Canada and a federal effort that reintroduced wolves into Yellowstone National Park (YNP) and the wilderness areas of central Idaho in 1995 and 1996. Reintroduced wolves are designated as a Nonessential Experimental Population under Section 10(j) of the Endangered Species Act (Figure 1). By December 2002, the experimental population and the naturally colonizing endangered population of northern MT and ID reached recovery levels of 30 breeding pairs in the northern Rocky Mountains of Montana, Idaho, and Wyoming and were well distributed among the three states for 3 consecutive years. The USFWS approved the Montana Gray Wolf Conservation and Management Plan in early 2004. However, permanent delisting of the biologically recovered wolf population has been delayed because of legal challenges in federal court.

Prior to delisting, Idaho and Montana developed management plans and enacted laws that provided adequate regulatory mechanisms to assure long-term survival of wolves. USFWS in cooperation with Idaho and Montana, developed a new rule under Section 10(j) that provided guidelines and allowed for management authorities to be transferred to states under a cooperative agreement with the USFWS or Memorandum of Agreement with Department of Interior to states with approved management plans. The 10(j) rule was adopted by the USFWS in February 2005 (*Endangered and Threatened Wildlife and Plants; Regulation for Nonessential Experimental Populations of the Western Distinct Population Segment of the Gray Wolf* [50 CFR Part 17.84]). The 10(j) rule was further modified in January 2008.

Under Section (v): *"If gray wolf predation is having an unacceptable impact on wild ungulate populations (deer, elk, moose, bighorn sheep, mountain goats, antelope, or bison) as determined by the respective State and Tribe (on reservations), the State or Tribe may lethally remove wolves in question."* Under the January 2008 rule, unacceptable impact is defined as *"Impact to a wild ungulate population or herd where a State or Tribe has determined that wolves are one of the major causes of the population or herd not meeting established State or Tribal population or herd management goals."* The 2008 10(j) rule listed the following elements that must be described in any removal proposal: 1) the basis of ungulate population or herd management objectives; 2) what data indicate that the ungulate herd is below management objectives; 3) what data indicate that wolves are a major cause of the unacceptable impact to the ungulate population; 4) why wolf removal is a warranted solution to help restore the ungulate herd to management objectives; 5) the level and duration of wolf removal being proposed; 6) how ungulate population response to wolf removal will be measured and control actions adjusted for effectiveness; and 7) demonstration that attempts were and are being made to address other identified major causes of ungulate herd or population declines or of State or Tribal government commitment to implement possible remedies or conservation measures in addition to wolf removal.

MFWP reviewed elk data in the Bitterroot Valley elk management units to determine if elk populations are below management objectives. The West Fork elk management unit is below objectives (Figure 2). This proposal reviews evidence that wolf predation is a major mortality cause preventing the West Fork

elk population from increasing and reaching MFWP management objectives. Additionally, this proposal identifies ongoing efforts to reduce adverse impacts of other factors influencing the West Fork elk population, and identifies approaches to monitor the effects of lethal wolf removal. This proposal provides a review of the available information and justification for wolf removal under Section 10(j) on an interim basis while the wolf remains listed. It represents the only wolf management tool available to MFWP since MFWP is unable to implement its management plan because of continuing ESA protections.

## **SECTION 10(j) REMOVAL PROPOSAL CRITERIA**

### **1) Basis of ungulate population or herd management objectives.**

Montana's elk management is currently guided by a statewide Elk Management Plan (Plan) that was formally adopted by the FWP Commission in December 2004. The Plan formalizes management objectives. Formal adoption by the FWP Commission culminated a public development process that included scoping and public review of a draft document. This effort included mailings sent to 1290 landowners, 2024 random elk hunters, 409 entities who submitted scoping comments, 204 entities on an "interested participant list" and public meetings attended by 364 people at 24 locations.

The Plan identifies specific elk populations throughout the state, which are assigned to one of 44 Elk Management Units (EMUs). Each EMU circumscribes a geographic area having unique habitats and landownership patterns, management challenges, population objectives, hunting season types, monitoring methods and management implementation criteria for each population. Population objectives are based upon habitat, historic population monitoring data and elk harvest and concerns/experience with game damage to private property.

Montana's Plan also outlines a range of harvest regulatory packages designed to manage elk numbers according to pre-determined objectives relative to the status of the population. Regulatory packages range from a set of liberal hunting opportunities if the elk population is above objective, standard if the population is meeting objectives, or restrictive if the population is below objectives. For the West Fork EMU, liberal hunting regulations when the elk population is above objective allow issuance of more than 350 licenses to harvest antlerless (cow-calf) elk and/or up to 5 weeks of opportunity for any general elk license-holder to harvest an antlerless elk. When the elk population is at objective, standard regulations allow an annual harvest of 100-175 antlerless elk by commensurate numbers of antlerless license-holders (no antlerless harvest by general license-holders). When the elk population is below objective, regulations allow the harvest of less than 100 antlerless elk by antlerless license-holders.

Within the context of Montana's Elk Management Plan, the West Fork EMU (Elk Hunting District 250) has a total population objective of 1600 – 2400 observed elk, with at least 10 bulls per 100 cows observed during aerial surveys. Additionally, 100% of annual bull harvest is prescribed to be brow-tined bulls (BTBs) with at least 15% having six points or more. These objectives reflect a population of elk in an area comprised largely of public lands with 5% of the EMU being private lands contributing 14% of critical wintering habitats. With 94% of elk habitat on National Forest lands primarily, the West Fork elk population contributes disproportionately to the public's enjoyment of elk in a state where only 45.3% of elk habitat is on the National Forests overall, and provides the enhanced opportunity by virtue of public land to manage elk habitat and achieve elk and carnivore harvests to meet Plan objectives.

In addition, a ratio of 25 calves per 100 cows is recognized in the Plan as a minimum standard for recruitment in the West Fork to maintain a stable elk population. Calf-cow ratios lower than 25 for two successive years when the elk population is below the midpoint of the objective range of 1600-2400 (i.e. 2000 total observed elk) trigger restrictive opportunities to harvest antlerless elk. This recognizes that a

recruitment rate lower than 25 calves per 100 cows generally does not produce a harvestable surplus of antlerless elk if the goal is to maintain or grow the population back to its objective. This recruitment standard for the West Fork was finalized in December 2004 when the FWP annual wolf count in the West Fork was 25% of its level in 2009, and should be revisited for its adequacy in managing an elk population subject to elevated predation pressure after adoption of the Plan.

The first Statewide Elk Management Plan for Montana was adopted in 1992 and set an objective of 980-1062 elk for the West Fork (HD 250). This objective represented intent by MFWP and the public to increase elk numbers that had been held by cow-calf harvests at the lower levels of 513-994 from 1980 through 1991 (Table 1). MFWP achieved this by lowering the cow-calf harvest rate through the 1990s, and elk numbers responded (Table 1). Elk counts increased to exceed this objective during every year in 1994-2004 before a higher provisional objective was set in 2005 and a final revised objective set in 2006. The West Fork elk population was within the current objective of 1600-2400 observed elk, and on an increasing trend during 2003-2005 in the years that most closely informed the current objective (Table 1). Justification for the increased objective in 2006 was the preponderance of public land in the West Fork and the increased habitat capacity provided by large wildfires earlier in this decade. Additionally MFWP supports the current objective as reflective of the higher elk population threshold required to sustain a standard package of harvest regulations in a multi-predator system. A lower objective would trigger standard hunting regulations under the Elk Plan that would be biologically unsustainable now that wolves are part of this system. As noted below, elk counts in 2008-2010 not only fell below the current objective, but also were 12-24% below the historic minimum population objective of 980, which was set in 1992 and met in all but 1 year prior to 2008 (Table 1). Cow-calf harvest rates that allowed elk numbers to grow in the 1980s were additive in 2005-2009 with the addition of wolves and their contribution to the cumulative effect on calf recruitment.

## **2) What data indicate that the ungulate herd is below management objectives.**

Unprecedented low calf recruitment in the period 2007-2010, as indicated by the ratio of 10-month-old calves per 100 cows in spring aerial surveys, is the impetus for this proposal. MFWP obtains calf:cow ratios and other elk field data annually by conducting spring (April-May) aerial surveys for elk in Hunting District 250. The annual surveys cover all winter and early spring range, counting all elk observed within these ranges and classifying as many as possible to sex and age-class. Fixed-wing aircraft were used to obtain elk counts and age/sex classifications. Harris (2007) reported that calf:cow ratios obtained from fixed-wing aircraft during late-winter in western Montana correlated well ( $r^2 = 0.95$ ,  $P=0.027$ ,  $n=4$ ) with model-averaged survival estimates from samples of calves radioed as neonates. All elk observed in the spring aerial surveys were successfully classified to sex and age-class in 2009 and 2010. In addition to the annual aerial surveys, FWP biologists keep field records of elk observed during normal ground operations or incidental observations of elk when flying other survey or telemetry duties. These classifications are used to supplement annual aerial survey observations and provide some insight into the timing and extent of calf production, recruitment and mortality.

Aerial counts were not corrected for sightability bias. Rather, methods were rigorously standardized to hold bias constant and the counts applied as a relative index of population trend (Caughley 1974). Raw counts were directly comparable to Elk Plan objectives (i.e., Elk Plan objectives were raw counts and ratios). For reference, MFWP estimated an average survey efficiency of 74.7% from replicated surveys of marked and unmarked elk in the Elkhorn Mountains (MFWP 1985, unpublished report), in habitats and using methods similar to those reported here in HD 250. The relationship of annual counts to absolute abundance is less important to the proposed removal of wolves than the relative calf:cow ratios that indicate increased natural mortality of calves sufficient to prevent population growth.

Sightability bias is least likely to affect calf:cow ratios, due to the relatively high and common probabilities of detecting calves and cows from aircraft, and is most likely to affect bull:cow ratios (Samuel et al. 1987). Older bulls are least likely to be detected in aerial surveys, thus biasing bull:cow ratios downward (Samuel et al. 1987). We present bull:cow ratios herein for the sake of completeness, but do not rely on them to justify the proposed wolf removal.

Based on field data, FWP concluded that the West Fork EMU elk herd is below the calf:cow ratio objective for the last several years. Low overall recruitment also contributes to the total elk population size being below the objective identified in the elk plan. Furthermore, bull:cow ratios are also not meeting the West Fork elk population objective. Wolf predation is a factor contributing to all three metrics being below objective, and all three may be traced back to the unprecedented drop in calf:cow ratios.

In 2007-2010, observed ratios of 10-month-old calves per 100 cows in the West Fork elk population were lower than observed in any previous 4-year period in the West Fork since calf:cow ratios were first collected in 1971 (Table 1). The average of 15 calves per 100 cows in 2007-2010 was 40% below the statewide Elk Management Plan standard of 25 calves per 100 cows for the West Fork EMU. Calf:cow ratios of 9-11 in 2009-2010 were 56-64% below the same standard, and were the lowest ever documented in the West Fork elk population. In 2010, a ratio of only 6 calves per 100 cows was obtained across the segment of the population within the interior of the national forest, comprising 75% of the West Fork population.

In 2008-2010, elk counts of 744-863 were 46-54% below the minimum population objective of 1,600 elk for the West Fork EMU. Although the minimum population objective was increased in 2005 and again in 2006, elk counts in 2008-2010 also were 12-24% below the historic minimum population objective of 980, which was set in 1992 and met in all but 1 year prior to 2008 (Table 1). The observed sex ratios were 7 bulls per 100 cows in 2009 and 4 bulls per 100 cows in 2010. Both of these sex ratios are below the management objective of 10 bulls per 100 cows for the West Fork EMU.

The effect of a depressed calf:cow ratio persists for years and is multiplied in its effect on population production and growth beyond any single year's occurrence. The 2009 recruitment cohort of females entered the breeding population as 2.5-year-olds in September 2010, and the 2010 recruitment cohort will enter the breeding population in 2011. In September 2011 the largest numeric cohorts of the female breeding population (i.e., 2.5 and 3.5-year-olds) will be 60% lower in number than expected. The suppressing effect on overall population production will persist in succeeding years as these two cohorts move through the prime reproductive ages. If poor calf survival occurs again in 2011, its effect will be magnified upon the lower production contributed by the 2009 cohort, and if again in 2012 its effect will be magnified upon the lower production across 2 breeding cohorts. In turn, poor calf survival and recruitment in 2011 and 2012 would form a block of 4 successive, severely underpopulated, reproductive cohorts. The West Fork population is poised on the brink of a steep and unprecedented decline that can only be avoided by immediately and sharply elevating survival rates of calves through their first year of life. A quantitative model to display and predict the cumulative effect of past and potentially continuing low calf recruitment on population growth rate will be produced as part of the Bitterroot Elk Study, now beginning.

### **3) What data indicate that wolves are a major cause of the unacceptable impact to the ungulate population.**

The sharp decrease in the West Fork calf:cow ratio during 2009 and 2010 is most likely due to increases in predation from a growing wolf population (Kunkel and Pletscher 1999, Smith et al. 2004, Becker et al. 2009). Elk numbers and particularly calf recruitment have declined as wolf numbers increased (Figure 3). Wolf counts in the West Fork explained an estimated 43% ( $R^2 = 0.4347$ ) of the variation in annual calf:cow ratios from 1999 to 2010 (Figure 3).

As described below, changes in black bear and lion population management, habitat conditions, and weather cannot explain the steep and sudden decrease in calf:cow ratios. The only factor affecting elk population dynamics that has changed significantly during this time period is an increasing trend in the total minimum wolf population and the wolf-elk ratio. Wolf-elk ratios, estimated as the number of wolves per 1000 observed elk, are higher in the West Fork than in adjacent elk populations and hunting districts (Table 2). At this wolf-elk ratio, the elk population is expected to be impacted by wolf predation through the effects of wolf predation on calf recruitment (Hamlin et al. 2009). Wolves in the West Fork are supported by prey populations of mule deer as well as elk, and potentially by adjoining elk populations in the East Fork of the Bitterroot that occur in higher density under more advantageous circumstances for assimilating wolf predation. Also, the West Fork is connected to high wolf densities in remote areas of Idaho. Therefore, wolf numbers may remain at high levels and drive elk populations lower for many years before a natural adjustment in wolf numbers to declining prey availability would be expected (Hebblewhite 2007). Without the ability to manage the wolf population at levels that are compatible with maintaining the West Fork elk herd within objective, the West Fork elk herds will continue to decline further below objective.

Wolves first established in the West Fork in 2001 with the formation of the Painted Rocks pack. Three other packs were documented in 2005, 2007 and 2008 and the population has shown continuous growth (Table 3). These packs are believed to predominantly reside in Montana but may spend some time in Idaho. Likewise, packs that reside primarily in the Salmon and Selway Zones of Idaho may spend time in the West Fork. In 2010, one pack (Trapper Peak) was mostly removed due to livestock conflicts and status of this pack is unknown at this time. Also in 2010, a new pack was documented for the first time in the upper West Fork, adjacent to the Painted Rocks pack.

Elk harvest by hunters does not explain the sharp decline in calf:cow ratios in 2007-2010. Hunter harvests of calves in the fall prior to spring surveys varied from 3 to 7 in 2006-2009 and were negligible historically (Table 1). Conversely, hunter harvests of adult cow elk varied from 65 to 181 during the same period 2006-2009, which would elevate the calf:cow ratio post-harvest due to the harvest of cows. Calf:cow ratios declined in 2007-2010 as the elk population declined, demonstrating an independence of this calf recruitment decline from population density and carrying capacity.

Calf recruitment is essential to replace hunter harvest and other mortality across the elk population. Calf mortality due to causes other than hunting apparently has increased in the West Fork since 2005, which affects sustainable harvest rates. Cow-calf harvest rates of 9-13% of the spring total elk count, which were sustainable historically, have not been sustainable in the West Fork since 2005 (Table 1). Spring total elk counts declined from 1,914 in 2005 to 764 in 2010 at this harvest rate. Historically, spring total elk counts increased steadily from lower levels (513 elk) in 1981 to a count of 969 elk in 1988 under similar or slightly higher cow-calf harvest rates than those applied since 2005 (Table 1). Antlered bull harvest rates were similar in both periods, varying from 16 to 19% since 2005 and generally from 16 to 22% in 1981-1988. The coincidence of these data suggest that the recent decline in calf recruitment rate is a principal cause of the failure of the West Fork elk population to increase in response to reduced cow-calf harvests since 2005.

Cow-calf harvest rate was increased by instituting liberalized hunting regulations in 2004 to temper the population growth rate as West Fork elk numbers increased within population objective, and were on a trajectory to exceed objective. From 2004-2006 the cow-calf harvest rate was about 3 times higher than it had been in the prior 14 years (Table 1). Hunters tend to harvest antlerless elk with the highest reproductive potential (Wright et al. 2006), which could impact subsequent calf recruitment. However, from 1980-1985 the cow-calf harvest rate in HD 250 was similar to that in 2004-2006, but corresponding calf:cow ratios were about 3-5 times higher in 1980-1989 than in 2007-2010. Unpublished data from Darby Check Station suggest no gross differences between the age-structure of the antlerless harvest between the 1980s and 2000s in HD 250. Likely due to the addition of increasing predation by wolves and other relevant factors (Wright et al. 2006), the West Fork elk population, by 2007, was incapable of sustaining the same population stabilizing cow-calf harvest rate that it had sustained in the 1980s. Lowered cow-calf harvests in 2008-2009 represented an effort by FWP to responsively implement conservative hunting regulations that would increase elk numbers, but instead resulted in consistent rates of harvest due to the sharply declining population and calf recruitment levels. By 2009 FWP concluded that the West Fork population no longer produced a harvestable surplus of cow-calf elk, and regulations for 2010 provide for negligible cow-calf hunting opportunity (<1% harvest rate allowed).

Lion predation alone does not explain the sharp decline in calf:cow ratios in 2007-2010. MFWP does not conduct annual surveys of lion populations. However, MFWP did conduct intensive lion research from 1997 through 2007 in the Garnet Mountains of west-central Montana, about 50 miles northeast of HD 250. The Garnets study area was selected as representative of lion populations and habitats across much of western Montana. The study was initiated during a period of lion population growth and expansion across western North America, after near extirpation in the 1930s (Cougar Management Guidelines Working Group 2005). In the Garnets, as well as HD 250 and the rest of west-central Montana, MFWP actively prescribed lion harvests with the intent of reducing populations from high levels that exceeded human social tolerance (Figure 4). As a result, lion populations in the Garnets declined from 4.0 lions/100 km<sup>2</sup> in 1997 to 2.2 lions/100 km<sup>2</sup> in 1999, before recovering to 3.6/100 km<sup>2</sup> in 2006 (H. Robinson and R. DeSimone, in prep.). MFWP prescribed lion harvest with the intent of achieving a higher harvest rate and a lower lion population in HD 250 than in the Garnets until 2001 (Figure 4), and assumes a slower recovery rate in HD 250 as a result.

These data and experiences, as well as the documented perceptions of MFWP wildlife managers as indexed by the lion hunting regulations that they recommended (Figure 4), suggest that elk population data for HD 250 (Table 1) correspond with: (1) a period of relatively low lion abundance from 1980 through about 1990, (2) a period of increasing or high abundance from 1991 through 2000, (3) a period of low abundance through about 2005, and (4) a period of recovery from 2006 to the present. The highest calf:cow ratios in HD 250 occurred when lion populations were relatively low in the 1980s (Table 1). Although calf:cow ratios were not collected during 1993-1998, calf:cow ratios in 1991-1992 and 1999 met the recruitment standard for the West Fork EMU and the elk population steadily increased from 844 to 1,285 elk from 1990 to 1999 (Table 1), during the period of increasing or high lion abundance. Relatively low lion abundance in the early 2000s produced little apparent response in calf:cow ratios before 2004. However, the elk population growth rate (i.e., the rate of change between successive spring elk counts) appeared to increase in the early 2000s at the lowest lion levels (Table 1). Calf:cow ratios have decreased as perceived lion numbers have increased in the late 2000s, but have decreased to levels lower than those observed at or near the historic lion highs of the 1990s. The magnitude of decline in elk calf recruitment corresponding with the addition of increasing wolf densities in 2007-2010 is unprecedented across 30 years of data (Table 1).

Black bear predation alone does not explain the sharp decline in calf:cow ratios in 2007-2010. Predation by black bears may be a primary cause of neonatal calf mortality (White et al. 2010). The West Fork is moderately productive of black bears. Mace and Chilton (2010) determined that black bear density at DNA study areas across Montana correlated with precipitation patterns. Using this relationship, they arrived at a mean population estimate for the state of Montana of 13,307 black bears, and a mean density of 12.5 bears/100 km<sup>2</sup>. Bear density generally decreased from north to south. The West Fork is included in the larger Bear Management Unit (BMU) 240, which was ranked seventh (tied with BMU 108) in relative black bear density (a predicted 15.4 bears/100 km<sup>2</sup>) among 12 BMUs west of the Continental Divide in Montana (Mace and Chilton 2010). For comparison, the Glacier Park/Blackfoot Reservation area in northernmost Montana had the highest black bear density (25.4 bears/100 km<sup>2</sup>) in Montana, and BMUs 106 and 107 just south of the Park supported  $\geq 20$  bears/100 km<sup>2</sup> (Mace and Chilton 2010). Jonkel and Cowan (1971) estimated black bear density at 38 bears/100 km<sup>2</sup> in northwest Montana and Beecham (1980) estimated that 48 bears/100 km<sup>2</sup> inhabited his study areas in Idaho. Based on black bear relative density, the West Fork does not stand out as an area where predation by black bears alone would produce calf:cow ratios as low as MFWP observed there since 2007.

Harris (2007) documented total summer survival of 79% among 192 uncensored radioed elk calves from 2002-2006 in the Garnet Mountains, about 50 miles northeast of the West Fork, where black bears and lions were the principal predators and wolves were absent. Although predation was the primary cause of summer mortality in Harris's study, summer mortality attributable to predation was lower in the Garnets (14%) than in studies conducted in Yellowstone National Park pre-wolf reintroduction (22%, YNP, Singer et al. 1997), and in Idaho (29%, Zager et al. 2002). Bear predation was the primary source of mortality in elk calves across all studies, but was much lower (27%) in the Garnets compared to rates reported by Smith and Anderson (50%, 1996) and Singer et al. (52%, 1997). Predicted black bear densities were higher (20 bears/100 km<sup>2</sup>) in the Garnets (BMU 290, Mace and Chilton 2010) than in the West Fork (BMU 240).

Elk survey and classification data indicate that MFWP has historically managed black bear populations in the West Fork at levels that did not appreciably impact the elk population's ability to compensate for predator and hunter-caused mortality. Any hunter may purchase a license to harvest black bear, and bear seasons consistently have been open to all licensed hunters from April 15 to May 31 and September 15 to the end of November since 1985 (the spring season was lengthened by 2 weeks and an archery season added in the fall of 2010). Bear Management Unit (BMU) 240, which includes the West Fork, averaged 30 hunter-harvested black bears annually from 1994 to 2009. West Fork calf recruitment averaged 27 calves per 100 cows from 1990 through 2004. This calf recruitment average occurred prior to the 2007 increase in wolf numbers. This compares with a calf recruitment average of 15 calves/100 cows from 2007 to 2010.

Forest succession or vegetation changes do not explain the sharp decline in calf:cow ratios in 2007-2010. Elk select burned areas as habitat (Pearson et al. 1995, Singer and Harter 1996). Approximately one-third of the West Fork (150,000 acres) burned in the wildfires of 2000 and 2005 (Figure 5). The remaining two-thirds of the West Fork have not burned since the early 1900s, except for small acreages. As expected, calf:cow ratios in 2002-2006 were similar to or higher than calf:cow ratios observed in the 2 years preceding the fires of 2000-2005 (Table 1). While calf recruitment response to the landscape-scale wildfires was neutral or positive, there was no similarly large, abrupt habitat change to explain the sudden and sustained drop in recruitment in 2007-2010.

Habitat loss to human development does not explain the sharp decline in calf:cow ratios in 2007-2010. Forest Service land comprises 94% of the West Fork, where human development or comparable habitat losses did not occur (Figure 6). Private land comprises 14% of the elk winter habitat, and accounted for a minority (39%) of the annual elk observations on spring green-up in 2002 (MTFWP 2005) and 2010 (~25%). Although subdivision and development of elk habitat is an important issue in west-central Montana, it's realized pace and potential effect on elk calf recruitment in the West Fork in 2007-2010 was negligible.

Weather does not explain the sharp decline in calf:cow ratios in 2007-2010. Snowfall was slightly above or far below the 1948-2009 average of 45.1 inches at Missoula Airport in the winters of 2006-2007 through 2009-2010 (-25.2, +4.7, 0.0, -26.2). Annual precipitation was slightly above or below the 1948-2009 average of 13.82 inches in the June-May periods of 2006-2007, 2008-2009 and 2009-2010 (+0.3, -0.31, -1.71), with reduced winter precipitation replaced by growing season precipitation. Weather in June 2007-May 2008 would have been expected to offer the greatest nutritional challenge to elk calves, due to a shortage of 4.1 inches of annual precipitation (mostly in the growing season) coupled with 4.7 inches of snowfall above normal. However, the resulting ratio of 25 calves per 100 cows in May 2008 was the highest observed in the period 2007-2010, which further supports the independence of the steep decline in calf:cow ratios to any weather pattern or event.

In the Garnet Mountains where wolves were absent, but black bears and lions were important predators on elk calves, Raithe (2005) found that the highest neonatal calf mortality in 5 years of study coincided with near-record low temperatures and precipitation during the last trimester of gestation in March-May 2002. Even so, the resultant late-winter calf:cow ratio under these weather extremes in Raithe's study was 19 calves/100 cows. For comparison, deviations from normal temperature and precipitation did not approach such extremes during 2007-2010 in the West Fork (HD 250), and the resulting calf:cow ratios of 15, 9, and 11 in 2007, 2009 and 2010 were lower where wolves were present than Raithe (2005) documented where wolves were absent.

#### **4) Why wolf removal is a warranted solution to help restore the ungulate herd to management objectives.**

Effective management of ungulate and large carnivore populations requires an approach that strives to integrate and balance the value and contribution of big game species like elk with the value and ecological contributions of large carnivores. Furthermore, the management of these populations is influenced by variable and dynamic environmental conditions that affect habitat quality and quantity for all species over time. Management of ungulate populations at objective levels provides highly-valued recreational opportunities to the public as well as providing a prey base that can support more robust carnivore populations. A multiple carnivore guild including black bear, mountain lion and wolf such as now found in the Bitterroot, adds additional management complexity to this scenario.

Managing adult female elk survival and annual calf recruitment rates is a prerequisite to successfully sustaining and meeting population objectives. MFWP currently has management authority to modify elk, bear and lion hunter harvest rates in order to attempt to meet population objectives. However, comprehensive overall management of all the wildlife resources and elk in particular has been compromised by the loss of authority and flexibility to manage wolf numbers in an integrated fashion across this same landscape. The West Fork elk population is substantially below State of Montana Elk Management Plan objectives for Hunting District 250. Given low calf survival rates, the number of adult cows is expected to further decline unless remedial and immediate action is taken. MFWP has implemented conservation measures to reduce antlerless harvest rates by hunters and to address bear and lion predation rates at current population levels. This proposed 10(j) action focuses on the wolf

component which represents the major factor not currently addressed in attempting to restore elk recruitment (calf:cow ratios) to objective levels.

**5) The level and duration of wolf removal being proposed.**

Montana proposes to reduce wolf numbers in HD 250 from the minimum of 24 counted in December 2009 to a year-end minimum of 12 wolves represented by 2 – 3 packs from 2010 through 2015. The level of removal would be dependent on pre-treatment wolf abundance in an adaptive fashion based on annual wolf and elk population monitoring data. This level of removal follows specific direction given by the Montana Fish, Wildlife & Parks Commission for the management of wolves to meet 10 fundamental objectives:

- 1) Maintain a viable and connected wolf population.
- 2) Gain and maintain authority for State of Montana to manage wolves.
- 3) Maintain positive and effective working relationships with livestock producers, hunters, and other stakeholders.
- 4) Reduce wolf impacts on livestock.
- 5) Reduce wolf impacts on big game populations.
- 6) Maintain sustainable hunter opportunity for wolves.
- 7) Maintain sustainable hunter opportunity for ungulates.
- 8) Increase broad public acceptance of sustainable harvest and hunter opportunity as part of wolf conservation.
- 9) Enhance open and effective communication to better inform decisions.
- 10) Learn and improve as we go.

The Commission's decision in July 2010 was the product of extensive public involvement and MFWP input. For the larger Wolf Management Unit (WMU) including the West Fork, the Commission approved a harvest quota of 34 wolves for 2010, with the intent that a harvest of 34 wolves was needed to meet the objectives stated. The need for reducing wolf numbers counted in 2009 by 50% in the West Fork was incorporated in the Commission's harvest prescription for the WMU as a whole. The proposed wolf removal to a level of 12 wolves under 10 (j) seeks to implement this direction in the West Fork where an imminent need exists and the consequences of delay will only exacerbate the current situation.

MFWP would maintain a minimum of 12 wolves in the West Fork over the 5-year duration of this proposed action (December 2010 through 2015). This level of wolf presence corresponds with the maximum range (11-14) of wolf numbers that most recently produced elk calf:cow ratios of at least 25 calves per 100 cows (Figure 3), and would represent a 50% reduction in wolf numbers documented in December 2009. A reduction to a level of 12 wolves would adjust West Fork wolf numbers to levels documented in 2005 and 2006, 3 and 4 years post-recovery (Table 3). A harvest of 12 wolves early in 2011 would adjust the population to the desired level of 12 wolves, based on the 2009 count. Removals during subsequent years would be adjusted in response to updated wolf counts and their relation to the objective of 12.

Levels of wolf removal and means of removal would be set annually by the Montana Fish, Wildlife & Parks Commission under established public process. Means of removal may include fair chase hunting or trapping by the public, control actions by agency personnel or designees, or any combination approved by the Commission.

**6) How ungulate population response to wolf removal will be measured and control actions adjusted for effectiveness.**

MFWP will monitor wolf and elk populations annually. The wolf population response to wolf removal will be measured by a December-January enumeration of packs and wolf numbers per pack, as in Table 3. The ungulate population response to wolf removal will be measured according to 2 metrics: total population size and calf recruitment rate. Wolf removals will be considered effective if the total elk count increases toward a minimum objective level of 1,600 elk (the lower limit of the objective range), and if calf recruitment rates increase toward a minimum of 25 calves per 100 cows.

The need for a biologically meaningful correction in the elk calf:cow ratio is immediate if a more severe and lasting decline in the West Fork elk population is to be avoided. Therefore, Montana is beginning an investment in elk research in the West Fork to assess cause-specific mortality of elk calves in relation to habitat, nutrition, predation by wolf, lion and bear, and any other discernable factors. A principal management application of this research will be to adaptively refine harvest levels by species (i.e., lion, bear, wolf) for the purpose of achieving the most rapid and sustainable response in calf recruitment consistent with the long-term conservation of large carnivore populations. This intended management application of research results in real time will provide the information needed to prescribe and direct actions at magnitudes and scales that require specific supporting data obtained with intensified scientific rigor, and resulting management may focus more or less heavily on resources in addition to wolf harvest in succeeding years. Although this research is not essential to implementing this proposal, it represents an enhancement that Montana hopes to deliver, contingent on obtaining additional grants of supplemental funding. MFWP has discussed incorporating estimations of lion and black bear abundance into the research project, as priorities and funding may allow. Annual minimum counts of wolves and wolf packs will be an essential monitoring component.

**7) Demonstration that attempts were and are being made to address other identified major causes of ungulate herd or population declines or of State or Tribal government commitment to implement possible remedies or conservation measures in addition to wolf removal.**

Montana progressively implemented restrictions on elk hunting from 2008 through 2010 in response to sharply declining elk numbers and low calf:cow ratios. As a result, in 2010 elk hunting regulations in the West Fork are the most restrictive among the 25 hunting districts and across 10,000 square miles in west-central Montana where a general rifle season is offered. In 2008, the hunting of antlerless (cow-calf) elk was eliminated as an opportunity for an estimated 1,367 general elk license-holders who reported hunting elk in HD 250 (although low realized harvests by disabled hunters with a permit to hunt from a vehicle, youth ages 12-15, and archers in the archery-only season remained valid). In 2009 antlerless (cow-calf) permits were reduced from 25 to 5, and in 2010 Montana eliminated the opportunity for low harvests of cow-calf elk by disabled hunters with a permit to hunt from a vehicle, youth ages 11-15, and archers in the archery-only season in HD 250. In 2010, no more than 5 cows or calves may be legally harvested in HD 250. This represents an 86% decrease from the lowest realized harvest in the past 30 years (Table 1) and is the lowest since a harvest of only 1 cow and 1 calf occurred in 1979. Actual cow-calf harvests in 2008, 2009, and the maximum for 2010, were 56%, 55% and 4% of the 2007 harvest.

FWP also is considering whether the opportunity to hunt antlered bull elk on the general license can be sustained under calf recruitment levels observed in 2007-2010, and whether HD 250 should become the second general elk hunting district in Montana to restrict all elk hunting to low and limited numbers of permit-holders in response to unprecedented elk declines. If implemented, permit-only hunting for bull

elk in the West Fork would represent a setback as measured against the Statewide Elk Recreation Objective to provide for a diverse elk hunting opportunity within, as much as possible, a 5-week general season and a 5 to 6-week archery season.

Montana increased hunting opportunities and harvest targets for mountain lion in the West Fork in response to sharply declining calf:cow ratios. In 2009, FWP more than doubled the number of lion special licenses from 4 in 2008 to 10. For 2010, FWP increased lion special licenses to 15, and increased the female subquota from 1 to 2. The lion license level for 2010 in the West Fork is the highest (alongside 2 other Bitterroot districts) for a single deer-elk hunting district in west-central Montana.

In combination with increased lion harvest targets, FWP lengthened the black bear spring hunting season in the West Fork by 2 weeks for 2010 and 2011. The spring bear season is now open through June 15<sup>th</sup>. In 2010 this extension increased the bear spring harvest in HD 250 from 2 to 5, and by 2 females. Spring bear seasons in the West Fork and adjacent HD 270 are the longest in west-central Montana (seasons elsewhere in west-central Montana still close on May 31). The fall bear season is standardized across west-central Montana; i.e., open to general bear license-holders for archery only during September 4-14 and for rifle from September 15 through November 28.

Although habitat is not limiting the West Fork elk population, FWP works closely with the Forest Service, Ravalli County, and private landowners to improve habitat and protect privately owned habitats from development. FWP is presently working with the West Fork and Sula Ranger Districts of the Bitterroot National Forest on prescribed fire projects totaling over 8,000 acres. A primary focus of these projects is to enhance winter range forage conditions for elk, mule deer and moose. FWP has also encouraged and supported several large-scale thinning and fuel reduction projects on USFS administered lands in HD 250 in 2009 and 2010. These projects have affected almost 22,000 acres, over 80% of which occurred on big game winter range, in HD 250 since 2000. FWP routinely provides technical assistance to Ravalli County when reviewing subdivision regulations and development proposals, though only 5 minor (<63 acres) proposals of this type have come to FWP's attention in the West Fork since 1998. Similarly, FWP advises the Bitterroot Land Trust, Rocky Mountain Elk Foundation, other land trusts and Ravalli County in prioritizing private lands for soliciting and accepting grants of perpetual conservation easements, and for allocating the county's open space funds.

## REFERENCES AND LITERATURE CITED

- Atwood, T. C., E. M. Gese, and K. E. Kunkel. 2007. Comparative patterns of predation by cougars and recolonizing wolves in Montana's Madison Range. *Journal of Wildlife Management* 71: 1098-1106.
- Becker, M., R. Garrott, P. J. White, C. Gower, E. Bergman, and R. Jaffe. 2009. Wolf prey selection in an elk-bison system: choice or circumstance? *in* R. A. Garrott, P. J. White, and F. G. R. Watson, editors. *The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies*. Elsevier, Academic Press, San Diego, California, USA.
- Beecham, J. J. 1980. Some population characteristics of two black populations in Idaho. *Ursus* 4:201-204.
- Caughley, G. 1974. Bias in aerial survey. *Journal of Wildlife Management* 38:921-933.
- Compton, B. 2009. Idaho Fish and Game Progress Report, June 30, 2009. Boise, Idaho, USA.
- Hamlin, K. L., R. A. Garrott, P. J. White, and J. A. Cunningham. 2009. Contrasting wolf-ungulate interactions in the Greater Yellowstone Ecosystem. Pages 541-577 *in* *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*. Academic Press.
- Harris, N.C. 2007. Monitoring survival of young in ungulates: a case study with Rocky Mountain elk. Thesis, The University of Montana, Missoula, USA.
- Hebblewhite, M. 2007. Predator-prey management in the national park context: lessons from a transboundary wolf, elk, moose and caribou system. *Transactions of the 72<sup>nd</sup> North American Wildlife and Natural Resources Conference*, pp. 348-365.
- Husseman, J. S., D. L. Murray, G. Power, C. Mack, C. R. Wegner, and H. Quigley. 2003. Assessing differential prey selection patterns between two sympatric large carnivores. *Oikos* 101:591-601.
- Jonkel, C.J., and I.M. Cowan. 1971. The black bear in the spruce-fir forest. *Wildlife Monographs* 27.
- Kunkel, K. E., and D. H. Pletscher. 1999. Species-specific population dynamics of cervids in a multipredator ecosystem. *Journal of Wildlife Management* 63:1082-1093.
- Mace, R.D., and T. Chilton-Radandt. 2010. Black bear harvest research and management in Montana: Final Report. Montana Department of Fish, Wildlife & Parks, Wildlife Division, Helena, Montana, USA.
- Myers, W. L., B. Lyndaker, P. E. Fowler, and W. Moore. 1996. Investigations of calf elk mortalities in southeastern Washington: Progress report. Washington Department of Wildlife, Olympia, USA.
- National Research Council. 1997. *Wolves, bears, and their prey in Alaska*. National Academy Press, Washington, D.C., USA.
- Pearson, S., M. Turner, L. Wallace, and W. Romme. 1995. Winter habitat use by large ungulates following fire in northern Yellowstone National Park. *Ecological Applications* 5:744-755.

- Raithel, J.D. 2005. Impact of calf survival on elk population dynamics in west-central Montana. Thesis, The University of Montana, Missoula, USA.
- Raithel, J., M. Kauffman, and D. Pletscher. 2007. Impact of Spatial and Temporal Variation in Calf Survival on the Growth of Elk Populations. *Journal of Wildlife Management* 71:795-803.
- Samuel, M. D., E. O. Garton, M. W. Schlegel, and R. G. Carson. 1987. Visibility bias during aerial surveys of elk in north-central Idaho. *Journal of Wildlife Management* 51:622–630.
- Singer, F. and M. Harter. 1996. Comparative effects of elk herbivory and 1988 fires on northern Yellowstone National Park grasslands. *Ecological Applications* 6:185-199.
- Singer, F. J., A. Harting, K. K. Symonds, and M. B. Coughenour. 1997. Density dependence, compensation, and environmental effects on elk calf mortality in Yellowstone National Park. *Journal of Wildlife Management* 61:12-25.
- Sime, Carolyn A., V. Asher, L. Bradley, K. Laudon, N. Lance, M. Ross, and J. Steuber. 2010. Montana gray wolf conservation and management 2009 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 173 pp.
- Smith, B. L., R. L. Robbins, and S. H. Anderson. 1996. Patterns of neonatal mortality of elk in northwest Wyoming. *Canadian Journal of Zoology* 74:1229-1237.
- Smith, D. W., T. D. Drummer, K. M. Murphy, D. S. Guernsey, and S. B. Evans. 2004. Winter prey selection and estimation of wolf kill rates in Yellowstone National Park, 1995-2000. *Journal of Wildlife Management* 68:153-166.
- White, C., P. Zager, and M. Gratson. 2010. Influence of predator harvest, biological factors, and landscape on elk calf survival in Idaho. *Journal of Wildlife Management* 74:355-369.
- Wright, G.J., R.O. Peterson, D.W. Smith, and T.O. Lemke. 2006. Selection of northern Yellowstone elk by gray wolves and hunters. *Journal of Wildlife Management* 70:1070-1078.
- Zager, P.C., C. White, and M.W. Gratson. 2002. Elk ecology. Study IV. Factors influencing elk calf recruitment. Job #'s 1-3. Pregnancy rates and condition of cow elk. Calf mortality causes and rates. Predation effects on elk calf recruitment. Federal aid in Wildlife Restoration , Job Progress Report, W-160-R-29. Idaho Department of Fish and Game, Boise.)
- Zager, P., and C. White. 2003. Elk ecology: Factors influencing elk calf recruitment. Progress Report, Project W-160-R-30, Study IV. Idaho Department of Fish and Game, Boise, USA.

Figure 1. Map of the federal wolf management areas in Montana showing the endangered area where the 1999 Interim Wolf Control Plan applied and the experimental area where the 10(j) regulations apply. The central Idaho and Greater Yellowstone experimental areas are shown as one since the approved status of Montana's state wolf plan allowed the special 10(j) regulations to apply equally in each area. Relative position of the West Fork Bitterroot is shown.

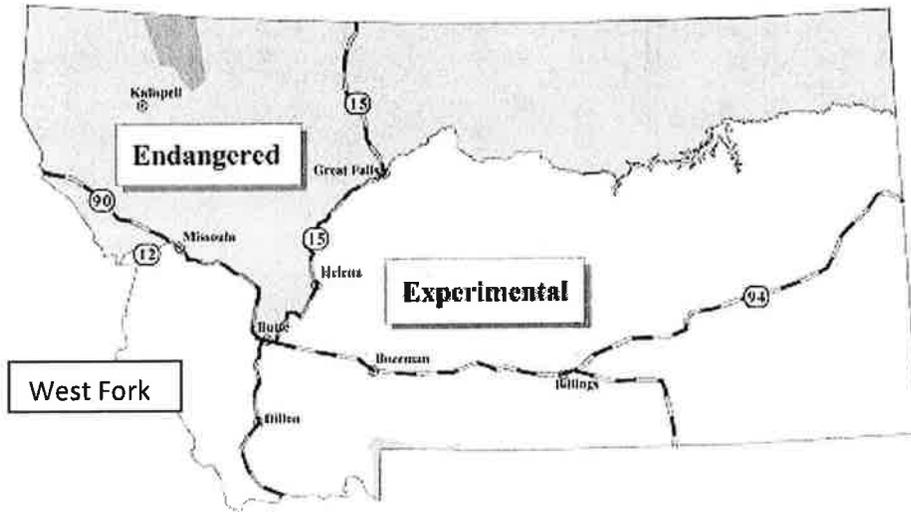


Figure 2. Map of the West Fork Elk Management Unit (EMU). The West Fork EMU is a 707-square-mile area encompassing the West Fork of the Bitterroot River drainage. The Idaho state line bounds the west and south sides. The USDA-Forest Service-Bitterroot National Forest administers 94% of this EMU and 5% of this EMU is private land.

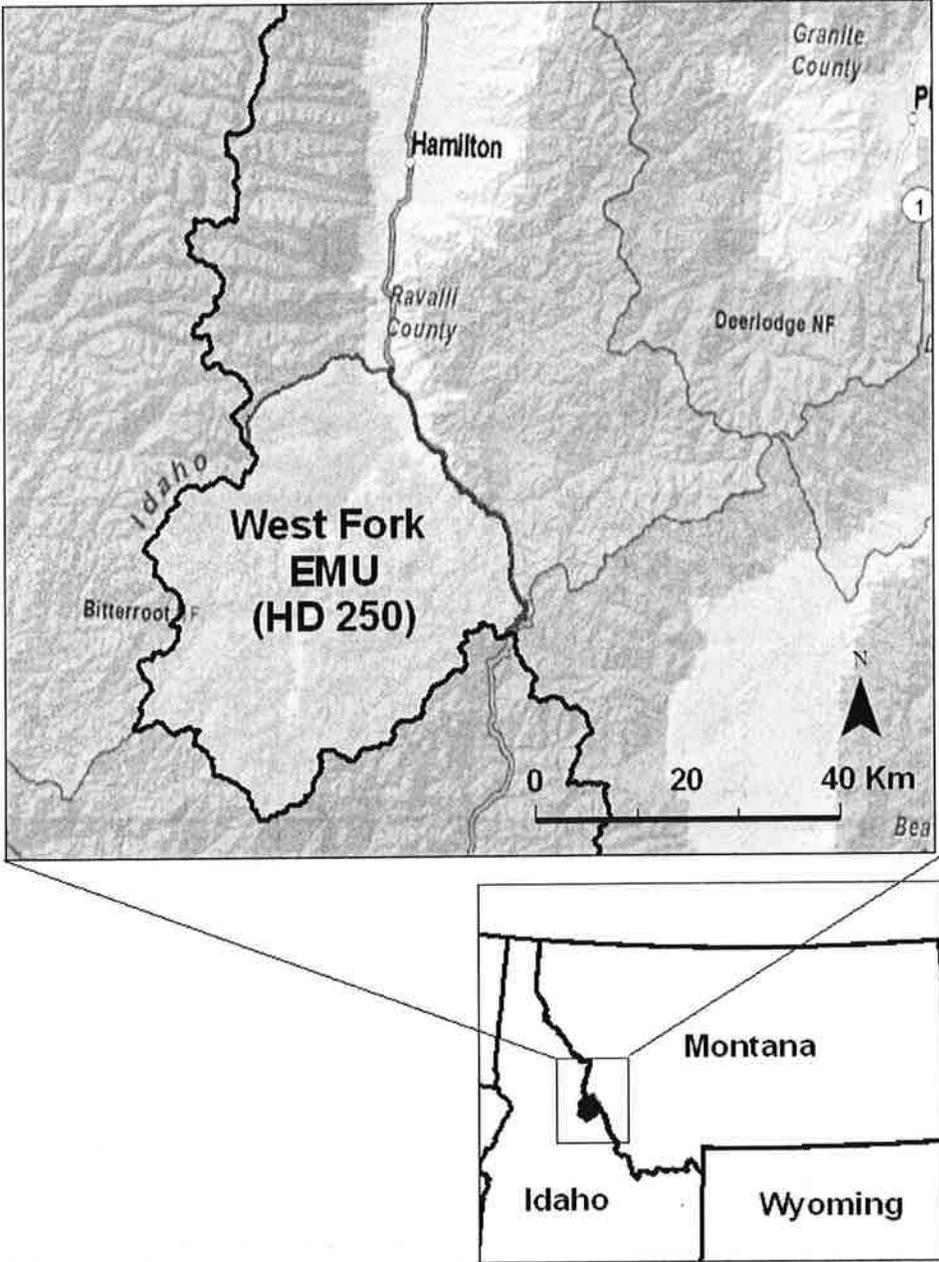


Figure 3. Relationship of December-January wolf numbers and late-winter calf:cow ratio in the West Fork, December 1998-April 2010.

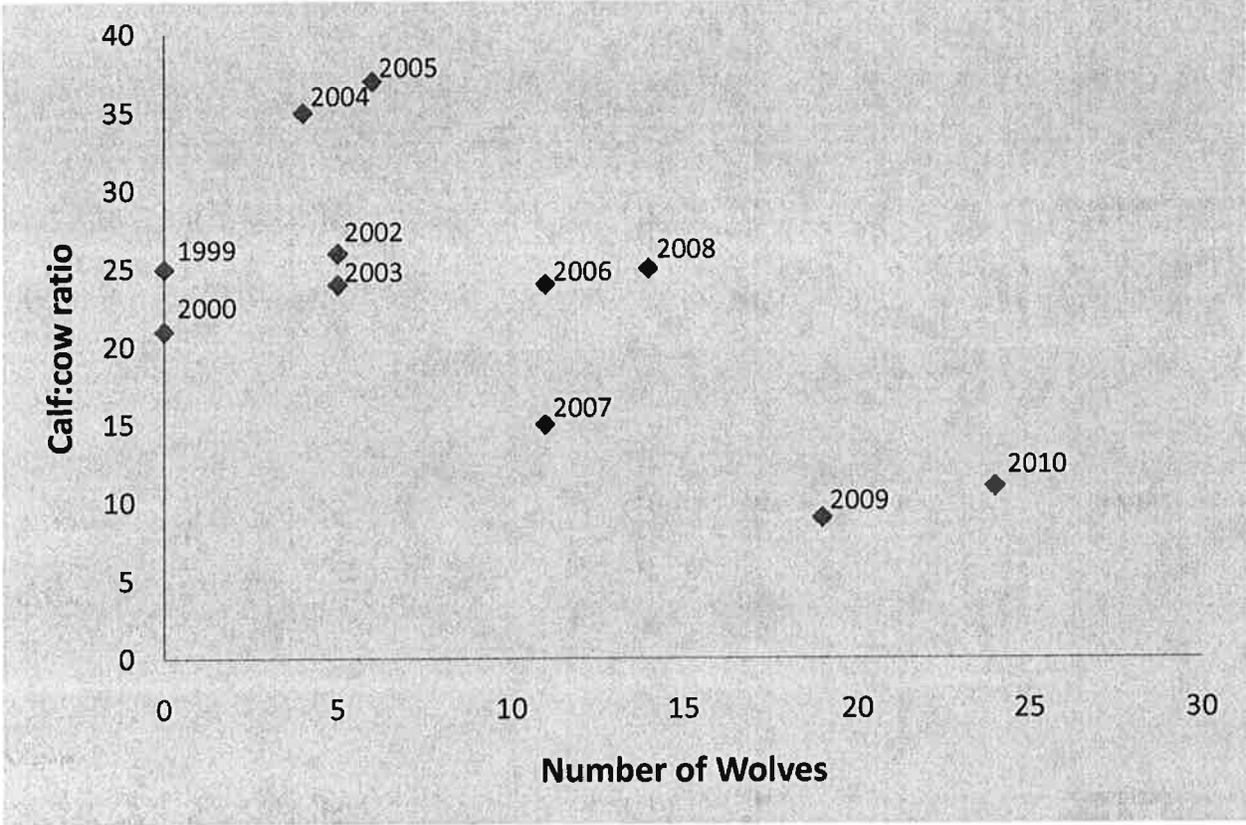


Figure 4. Lion hunting history in the West Fork (HD 250), 1980-2010. The winter harvest for 2010 is yet to begin. All harvests pertain only to HD 250. Harvest quotas from 1996 to 2010 pertain only to HD 250. Prior to 1996, quotas pertain to HD 250 and HD 270. Harvest was not limited by a quota prior to 1988.

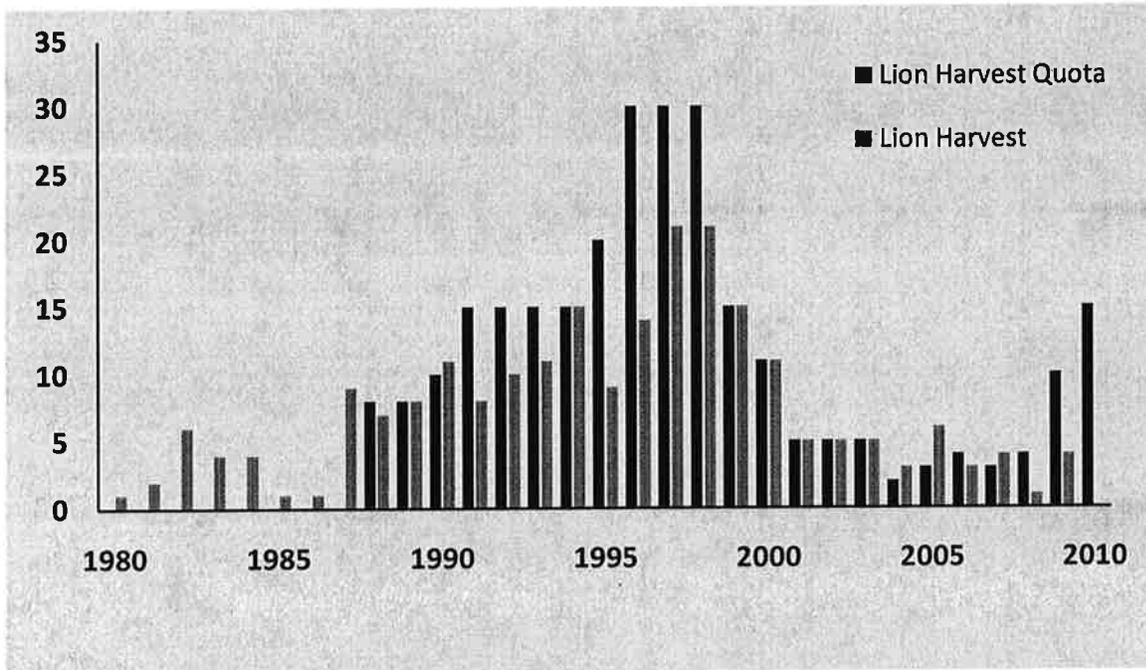


Figure 5. Fire perimeters by decade in the Bitterroot National Forest, 1870-2009. The approximate boundary of the West Fork EMU (Hunting District 250) is outlined in black.

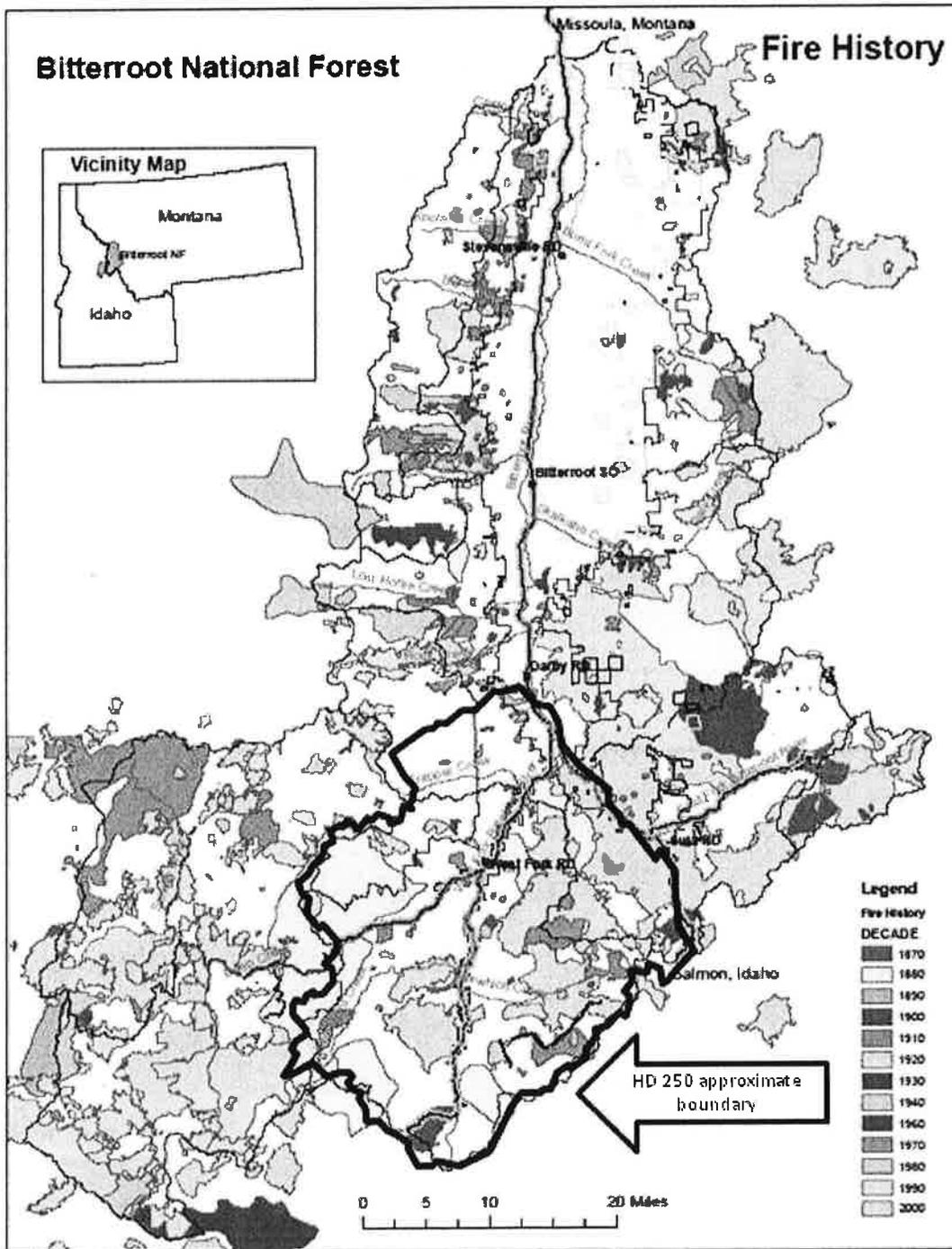


Figure 6. United States Forest Service and private land contributions to elk habitat in the West Fork, Hunting District 250.

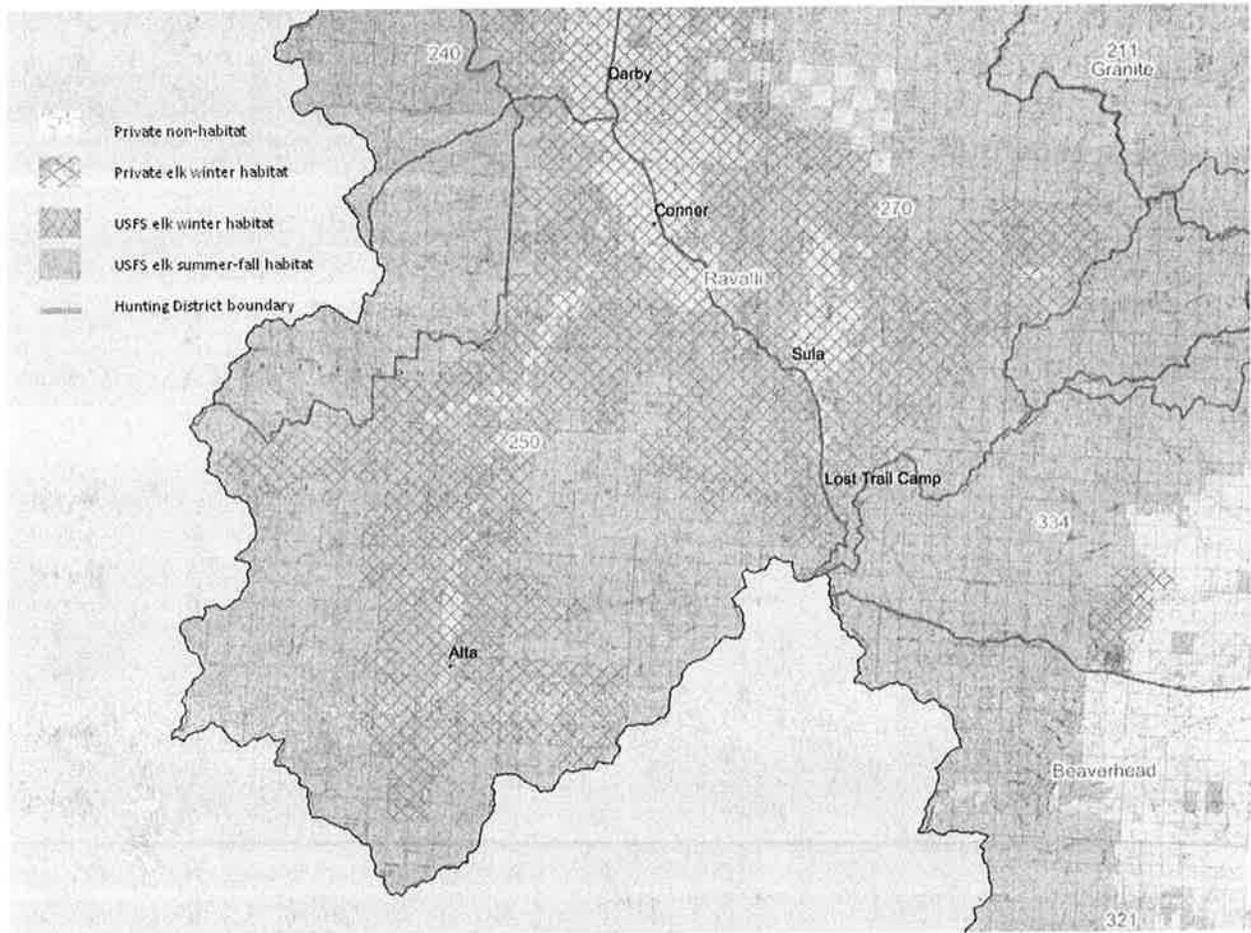


Table 1. West Fork elk trend count, population objective as defined by the Statewide Elk Mngament Plan, harvest regulations and statistics, calf per 100 cow ratio, and bull per 100 cow ratio data, 1980-2010. Calf recruitment is indexed by the number of calves per 100 cows determined during late-winter elk classification surveys. The number shown for cow-calf harvest and harvest rate in 2010 is the highest legal harvest allowable. Harvest rates are indexed by dividing the estimated bull harvest by the total elk count (uncorrected for sightability) of that year.

Year	Total Elk Count	Growth Rate	Elk Count Objective	Hunting Regulations <sup>1</sup>	Cow(calf) Harvest	Cow-calf Harvest Rate	Antlered Bull Harvest	Antlered Bull Harvest Rate	Calf:Cow Ratio (per 100 cows)	Bull:Cow Ratio (per 100 cows)
1980	612	NA	-	AB, EP	109(53)	26	137	22	52	9
1981	513	-0.16	-	AB, EP	65(14)	15	96	19	-	-
1982	534	0.04	-	AB, AP	50(6)	10	80	15	34	10
1983	608	0.14	-	AB, AP	74(12)	14	124	20	45	13
1984	726	0.19	-	AB, AP	79(7)	12	150	21	44	23
1985	739	0.02	-	AB, AP	83(19)	14	160	22	49	15
1986	780	0.06	-	AB, AP	78(10)	11	122	16	44	14
1987	994	0.27	-	AB, AP	62(9)	7	84	8	49	13
1988	969	-0.03	-	AB, AP	112(3)	12	188	19	33	8
1989	715	-0.26	-	AB, AP	52(8)	8	136	19	36	3
1990	844	0.18	-	AB, AP	35(3)	5	116	14	16	7
1991	817	-0.03	-	BB, AP	50(9)	7	76	9	27	5
1992	991	0.21	980-1062	BB, AP	49(7)	6	68	7	44	15
1993	950	-0.04	980-1062	BB, AP	42(3)	5	110	12	-	-
1994	1197	0.26	980-1062	BB, AP	60(4)	5	106	9	-	-
1995	1264	0.06	980-1062	BB, AP	43(4)	4	102	8	-	-
1996	1297	0.03	980-1062	BB, AP	-	-	-	-	-	-
1997	1081	-0.17	980-1062	BB, AP	-	-	-	-	-	-
1998	1277	0.18	980-1062	BB, AP	-	-	-	-	-	-
1999	1285	0.01	980-1062	BB, AP	50(5)	4	135	11	25	5
2000	1215	-0.05	980-1062	BB, AP	45(7)	4	124	10	21	12
2001	-	NA	980-1062	BB, AP	51(0)	-	149	-	-	-
2002	1576	NA	980-1062	BB, AP	49(12)	4	120	8	26	12
2003	1703	0.08	980-1062	BB, AP	84(7)	5	227	13	24	19
2004	1614	-0.05	980-1062	BB/ES	252(28)	17	380	24	35	10

<b>2005</b>	1914	0.19	1120-1680	BB/A	209(21)	12	357	19	37	18
<b>2006</b>	1462	-0.24	1600-2400	BB/AA	181(7)	13	279	19	24	21
<b>2007</b>	1373	-0.06	1600-2400	BB/AA	118(14)	10	233	17	15	11
<b>2008</b>	863	-0.37	1600-2400	BB, AP	65(9)	9	139	16	25	22
<b>2009</b>	744	-0.14	1600-2400	BB, AP	70(3)	10	122	16	9	7
<b>2010</b>	764	0.03	1600-2400	BB, AP	5	1	-	-	11	4

<sup>1</sup>Hunting Regulations: AB = antlered bull legal on the general elk license, EP = either-sex permits limited in number through a special drawing, AP = antlerless (cow-calf) permits or licenses limited in number through a special drawing, BB = branch-antlered or brow-tined bull on the general elk license, BB&A = antlerless elk also legal on the general elk license in the last 9 days of the hunting season, BB&AA = antlerless elk also legal on the general elk license in the last 23 days of the hunting season and antlerless hunting closes upon achieving a harvest quota.

Table 2. Estimated wolf-elk ratio for Bitterroot area hunting districts. The ratio is calculated as the minimum estimate of number of wolves per 1000 observed elk. The West Fork (Hunting District 250) has the highest wolf:elk ratio within the Upper Bitterroot Valley.

Hunting District	Year	Number Wolves	Number Elk	Wolves:1000 elk
204	2009	6	390	15.38
	2010	9	390	23.08
240	2009	12	645	18.60
	2010	11	694	15.85
250	2009	19	744	25.54
	2010	24	764	31.41
261	2009	0	444	0.00
	2010	4	745	5.37
270	2009	15	3527	4.25
	2010	13	3480	3.74

Table 3. Minimum estimate of the number of wolves in the West Fork, 1998-2009, prior to the pupping season.

Pack Name	Number of Wolves											
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Painted Rocks				5	5	4	6	4	4	2	9	7
Sula								7	7	10	5	5
Watchtower											2	6
Trapper Peak										2	3	6
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>6</b>	<b>11</b>	<b>11</b>	<b>14</b>	<b>19</b>	<b>24</b>

**DATE:** November 2, 2010

**TO:** Justin Gude, Montana Fish, Wildlife, and Parks (MTFWP)

**FROM:** Scott McCorquodale, Ph.D., Washington Dept. of Fish and Wildlife

**SUBJECT:** Review of MONTANA RULE 10(J) PROPOSAL, WEST FORK OF THE BITTERROOT

As per your request of October 8, 2010, I have reviewed a MTFWP management proposal (under Rule 10(j) of the Federal Endangered Species Act) to manipulate the wolf population in Montana Hunting District 250 (HD 250) to benefit an elk population in the West Fork of the Bitterroot that MTFWP believes is in decline. The document is pretty well-written, fairly concise, and follows a logical development of ideas.

In several places, the proposal references the statewide Elk Plan; but, for the reader, this does not provide sufficient documentation on some important details. For example, the proposal relies on aerial survey data to characterize the background issues with the West Fork Bitterroot elk population, and the proposal references the Elk Plan as supporting documentation. However, the Elk Plan acknowledges that MTFWP does both fixed-wing and helicopter aerial surveys for elk; which approach is used varies from context to context. I could not find anything in the proposal that clarifies which aerial survey platform is the basis for the West Fork Bitterroot data. This is important, in that some of the most important interpretations offered in the proposal relate to population ratios stemming from aerial classification. I'd like to assume that these data were collected from helicopters, but I could not find anything definitive in that regard. If the data referenced were actually from fixed-wing surveys, then I'm skeptical of the classifications. I've done quite a bit of elk aerial survey work, and I would have little confidence in fixed-wing data, regardless of the experience level of the observers. I think this issue needs to be clarified in the proposal.

Similarly, the Elk Plan discusses sightability biases associated with aerial survey data; it even discusses approaches to deal with imperfect detectability. The 10(j) proposal does not seem to clearly identify whether the West Fork Bitterroot data are raw data or somehow are corrected for sightability biases. I'm inclined to believe the data are simply the raw counts (and ratios). As such, it is highly likely that at least the bull:cow ratios presented are biased, probably strongly so. The literature provides pretty compelling evidence that adult bull elk have a substantial negative sighting bias in late winter surveys, relative to cow elk. So, the adult sex ratio data referenced in the

that. Table 2 presents wolf:elk ratios based on the assumption that the total elk count data from Table 1 are population estimates. Again, there is some uncertainty as to the nature of the elk data, but I am inclined to think these are raw counts. As such, the counts are not equivalent to population estimates, and the wolf:elk ratios are indices, not actually the real ratios. Lastly, you should also clarify that the elk data were consistently collected through time (i.e., that the aircraft, level and timing of effort, observers, etc. would not potentially explain changes in the data series).



JENNIFER M. GRANHOLM  
GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENT  
LANSING



REBECCA A. HUMPHRIES  
DIRECTOR

November 4, 2010

Mr. Justin Gude  
Wildlife Research & Technical Services Section Manager  
Montana Fish, Wildlife, and Parks  
1420 E. 6<sup>th</sup> Ave.  
Helena, MT 59620

Dear Mr. Gude:

Thank you for the opportunity to review Montana Fish, Wildlife, and Park's proposal for wolf take in the West Fork of the Bitterroot. Given the biological recovery of wolves in parts of the Lower 48, a number of states will eventually face managing wolf abundance with little to no management experience to draw upon. Unfortunately, insights from wolf management in Alaska and Canada are limited given their different biological and social environments. The recent harvests of wolves in Montana and Idaho represent the first experiences to consider and managers in the Great Lakes states followed these hunts closely. Montana's proposal for managing wolves in Elk Hunting District 250 represents another opportunity to learn about managing wolves along with other wildlife.

Predator-prey relationships are complex; the literature is quite clear on this point. In some instances, predators limit prey populations and in other cases, they do not. There does seem to be some agreement among scientists that limits to prey populations occur most often when there are multiple predators in the system. In addition, there is some evidence that predators can have important effects on the demographics of prey populations via predation of young-of-the-year. It also seems clear there can be important interactions among limiting factors, such as weather, habitat, predators, and human harvest. Considering these complex relationships and limited information, managers face much uncertainty when making management decisions.

Elk Hunting District 250 has multiple species of predators, calf recruitment is very low, and elk abundance is declining. Given what we know about predator-prey relationships, the proposed set of management actions is a reasonable response to reverse the trend in elk abundance. In general, I think additional analyses of the potential limiting factors and the interactions of these factors could strengthen the proposal.

I have assembled my specific comments using the basic structure of the proposal.

### **Proposed Action**

The proposed action is to integrate wolf harvest with population management of bears, lions and elk to increase elk calf recruitment to facilitate elk population growth. This integrated approach is a practical and reasonable set of management actions to

achieve the desired management objective. However, it is important to note this approach will also make it very difficult to understand which of the limiting factors is most important and what interactions among factors may be occurring. Thus, this approach will certainly limit what can be learned from the proposed action, but it appears to be the best route for increasing elk abundance.

The proposed wolf take is well structured and regulated (e.g., harvest reporting within 12 hours). Montana has a good record of managing limited quota harvests and the chance of an overharvest of wolves appears very low. I think it is important to keep the focus on using licensed hunters to harvest wolves.

## **Section 10(j) Removal Proposal Criteria**

### **1) Basis of ungulate population or herd objectives.**

Overall, it appears that Montana based the elk population objectives on a comprehensive planning process including external scoping and review. However, it would be beneficial to provide more detail on the population objectives for Elk Hunting District 250. In particular, it will be important to explain why the population objective of this unit increased after 2004. Given that the cow-calf harvest rate appeared relatively stable from 1993-2003, what factor(s) changed that allowed the elk population to increase? Is it possible these factors temporarily increased the carrying capacity of the area?

In general, the prescriptive harvest system appears to be a reasonable approach. What is not clear is whether this harvest system was in place before wolves began occupying the area. There is strong evidence that female harvests need to be reduced when wolves are present (for example, see Nilsen et al. 2005, Journal of Applied Ecology).

### **2) What data indicate the ungulate herd is below management objectives?**

The primary management objectives are the cow: calf ratios and the abundance estimates. The data shows that the West Fork elk management unit is well below the objectives. For the cow: calf ratios it would be helpful to include the sample size and confidence limits (e.g., Czaplewski et al. 1983, Wildlife Society Bulletin) to give the reader a sense of the variability associated with these estimates. Similarly, a brief description of how the abundance estimates are determined would be useful (e.g., are the counts corrected with a sight ability model). Additional rationale supporting the implication that the elk population is at the brink of a steep decline would be helpful. Is there alternative prey that would continue to support the predator populations if elk continue to decline?

### **3) What data indicate that wolves are a major cause of the unacceptable impact to the ungulate population?**

Wolves may very well be playing an important role in the elk decline. However, I do not think it is easy to dismiss other potential limiting factors and interactions. The association between calf recruitment and wolf numbers (Fig. 3) is relatively weak ( $R^2 < 0.20$ ) suggesting other factors are important. From 2004-2006 the cow-calf harvest rate was about three times higher than it had been in the last 14 years. From 2007-2009 the cow-calf harvest rate was about twice as high as the historical average. The removal of cows by hunters can have important effects on the population because hunters tend to remove animals with higher reproductive potential (e.g., Wright et al. 2006, Journal of Wildlife Management) than wolves, and harvest may be super-additive. These high harvest rates along with an increasing wolf population and perhaps increasing lion numbers and stable bear numbers may have acted together to reduce elk abundance.

I think the potential role of weather in the elk decline deserves more attention. For example, did the significantly low snowfall in two of the four years from 2006-2009 influence forage production or nutritional quality. As I recall, Vucetich et al. (2005, Oikos) suggested that elk harvest rate and climate (particularly drought) played important roles in the decline of Yellowstone elk. A more detailed analysis of weather conditions would strengthen the proposal.

### **4) Why wolf removal is a warranted solution to help restore the ungulate herd to management objectives.**

It is important to note the wolf removal is only part of an overall plan to manage all of the controllable factors to allow elk abundance to return to the desired level. This overall plan includes reducing harvest of female elk and reducing abundance of several predator species. This plan is a reasonable and practical approach given the uncertainties surrounding the relative importance of the potential limiting factors.

### **5) The level and duration of wolf removal being proposed.**

The level of wolf removal is reasonable given the lack of management experience available to draw upon and this removal will not affect the sustainability of a viable wolf population in Montana. The proposal did not specifically address the duration of wolf removal. Perhaps relating the duration of wolf removals back to the elk management objectives would be appropriate. I would encourage the agency to accomplish the wolf removals by means of fair chase hunting or trapping by the licensed public.

### **6) How ungulate population response to wolf removal will be measured and control actions adjusted for effectiveness.**

Given the multifaceted plan, it will be very difficult to determine which of the managed factors, singly or in combination (interactions) are responsible for any elk population response. I think the proposed elk research will be critical to gain a good understanding

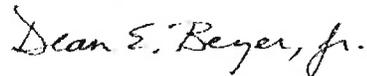
of the relative roles of habitat, weather, and predation on elk calf survival. Although difficult, additional work on estimating lion and bear abundance would be valuable.

**7) Demonstration that attempts were and are being made to address other identified major causes.**

In hindsight, it would have been beneficial to lower the cow-calf harvest as early as 2007. However, the current plan to virtually eliminate female elk harvest, implement liberal harvests of lions and bears, and cooperatively manage habitat is addressing the other potential limiting factors.

Justin, please call if you have any questions concerning these comments.

Sincerely,



Dean E. Beyer, Jr. Wildlife Research Biologist  
Wildlife Division

Cc: Mr. Douglas Reeves, Assistant Chief, Wildlife Division  
Dr. Patrick Lederle, Research Section Supervisor, Wildlife Division

# STATE OF ALASKA

SEAN PARNELL, GOVERNOR

## DEPARTMENT OF FISH AND GAME DIVISION OF WILDLIFE CONSERVATION

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8 November, 2010

Montana Fish, Wildlife, and Parks (MFWP) has proposed a 5 year wolf reduction within Elk Hunting District 250 (HD 250) and requested this review of that proposal consistent with Rule 10(j) requirements of the Endangered Species Act. The proposed action reduces wolf numbers 50% from 24 observed in 2009 to a year-end minimum of 12 wolves spatially represented by 2-3 packs. The purpose of the reduction is to arrest a decline in elk numbers and allow for sufficient recruitment of young elk into the population to meet management objectives. The objective is maintain the wolf population at numbers of wolves that previously allowed for sufficient elk recruitment (at least 25 calves per 100 cow elk) to maintain population and harvest objectives.

Among other objectives, MFWP Commission directs managers to reduce impacts of wolves on big game to maintain sustainable hunting opportunity for ungulates while maintaining a viable and connected wolf population capable of sustainable wolf hunting opportunity.

HD 250 is a small portion of a larger wolf management unit and a fraction of the area currently inhabited by wolves following the 1995-1996 reintroductions. Wolves have been reduced to much lower levels over much larger areas in Canada and Alaska without long-term effects on the size of the larger wolf population. Wolves have been shown to tolerate high levels of harvest and rebound quickly from local reductions (National Research Council, 1997).

Based on these observations, the proposed 50% reduction in HD 250 will have a negligible effect on the larger population and only short-term, low intensity, and local impacts on wolf numbers within the wolf management unit. Moreover, regulation of wolves at the proposed level will provide for sustainable hunting opportunity for wolves within HD 250 throughout the period of regulation of the wolf population. There will be no effect on connectivity of the wolf population as the wolf take will occur over a relatively short period allowing free movement of dispersing wolves during the remainder of the year. In addition, even at the reduced wolf numbers, HD 250 would still be expected to produce some dispersal of wolves into surrounding areas as well as experience substantial immigration.

There is no question that the proposed action will have negligible impacts on wolf population structure, function and size within the wolf management area. However, it remains unclear whether the proposed reduction will be adequate to realize population and harvest objectives for elk. The magnitude of the reduction is modest compared to effective reductions that resulted in increased recruitment of ungulates in Canada and Alaska.

Elk recruitment was sufficient during wolf expansion when an average of 12 wolves inhabited HD 250. The proposed action would likely result in more than 12 wolves in HD 250 during much of the year as immigration, reproduction and reduced dispersal rates will supplement wolf numbers immediately following the end of the wolf take. These mechanisms will more than offset other wolf

*D. Merck*

## **MONTANA RULE 10(J) PROPOSAL, WEST FORK OF THE BITTERROOT**

### **PROPOSED ACTION**

Montana Fish, Wildlife, and Parks (MFWP) proposes to obtain a permit from the U.S. Fish and Wildlife Service (USFWS) for wolf take under Section 10(j) of the Endangered Species Act. Wolf removal would occur in the West Fork of the Bitterroot (Elk Hunting District 250), beginning as soon as possible for a period of 5 years. Data presented herein demonstrate that the West Fork of the Bitterroot elk population is below population management objectives and wolf predation is a major cause of mortality preventing the elk population from reaching management objectives. In combination with ongoing elk, lion, bear and habitat management, the integration of wolf management to include wolf take is needed to restore recruitment rates of 10-month-old calves to pre-2007 level of at least 25 calves per 100 cows.

Wolf numbers in Elk Hunting District (HD) 250 would be reduced from the minimum of 24 counted in December 2009 to a year-end minimum of 12 wolves represented by 2 – 3 packs from 2010 through 2015. The level of removal would be dependent on pre-treatment wolf abundance in an adaptive fashion based on annual wolf and elk population monitoring data. MFWP would be accountable to the USFWS for maintaining a minimum year-end count of 12 wolves through 2015 unless MFWP proposes and the USFWS accepts a new or amended proposal prior to 2015 in response to new information, or wolves are delisted.

Levels of wolf removal, timing, authorization of involved persons and means of removal in all or parts of HD 250 would be set annually by the Montana Fish, Wildlife & Parks Commission under established public process. Means of removal may include fair chase hunting or trapping by the public, control actions by agency personnel or designees, or any combination approved by the Commission.

For year 1 of this proposal (2010-2011), MFWP proposes to remove no more than 12 wolves, or 50% of the 2009 minimum population. This would represent significant progress in a narrow timeframe toward achieving the wolf management objective of 12 wolves in the West Fork, and would be unlikely to reduce the population below 12 wolves. MFWP would end the removal action at any time prior to the removal of 12 wolves if data indicate that the wolf management objective has been achieved. Removals during subsequent years would be variable and depend on wolf abundance.

For year 1, the removal action would begin on December 15, 2010 or as soon thereafter as approvals are obtained, and would conclude no later than February 28, 2011. MFWP would randomly select 100 individuals from a list of applicants to each take one wolf in HD 250 until the quota of 12 is filled or the removal action ends. MFWP may designate additional individuals if needed to complete the prescribed removal. An Automated License System (ALS) number would be required for application. Nonresidents would not exceed 10% of the successful applicants. The take of a wolf must be reported to MFWP within 12 hours via a mandatory telephone reporting line and followed by a mandatory pelt and skull check by FWP staff within 48 hours for collection of biological data. Pelts and skulls will be retained by MFWP unless authorized individuals also purchase a valid wolf license prior to harvest. Pelts and skulls retained by MFWP may be dispersed for education purposes or destroyed at a later date. The removal action may be closed on 24 hours notice if the quota is reached or anticipated to be reached, or if the wolf management objective is otherwise achieved. Authorized take of wolves must take place from one half hour before sunrise to one half hour after sunset. Wolves may be taken with a firearm or bow and arrow. Wolves may not be taken by baiting, or with the aid of electronic recording/amplification of calling or howling.

## SUMMARY

The U.S. Fish and Wildlife Service (USFWS) reintroduced gray wolves to Yellowstone National Park and the wilderness areas of central Idaho in 1995 and 1996 as a Nonessential Experimental Population under Section 10(j) of the Endangered Species Act. The 10(j) rule was amended in 2005 and again in 2008 to allow states increased management flexibility to address wolf depredations on livestock and unacceptable impacts on wild ungulate populations. Wolf delisting and regulated public hunting is the preferred population management strategy identified in Montana's federally approved wolf conservation and management plan. Through regulated public harvest, MFWP intends to fine tune wolf numbers and distribution with respect to biological and social factors similar to the management approach taken for other wildlife species. However, MFWP has been prevented from fully implementing its management plan because of successful legal challenges that reversed delisting and resulted in renewed Endangered Species Act protections and federal regulations, even though the population is biologically recovered.

This proposal reflects an interim approach to relieve unacceptable impacts of wolf predation on an elk population, which would be ordinarily addressed through regulated, fair chase hunting of wolves had the species management been fully guided by Montana laws, administrative rules, and the state wolf management plan instead of federal regulations. MFWP is submitting this proposal consistent with Rule 10(j) to relieve unacceptable impacts of wolves on an elk population in the Montana portion of the central Idaho Recovery area that MFWP believes will continue to decline without intervention. Data presented herein demonstrate that the West Fork of the Bitterroot elk population is below population management objectives and wolf predation is a primary cause of mortality preventing the elk population from reaching management objectives.

MFWP proposes to reduce wolf numbers in HD 250 from the minimum of 24 counted in December 2009 to a year-end minimum of 12 wolves spatially represented by 2 – 3 packs from 2010 through 2015. For year 1 of this proposal (2010-2011), MFWP proposes to remove no more than 12 wolves, or 50% of the 2009 minimum population. This would provide significant progress towards the achievement of the wolf management objective of 12 wolves in the West Fork, and would be unlikely to reduce the population below 12 wolves. Annual adjustments to the number of wolves to be removed will be based on monitoring data and ultimately approved by the MFWP Commission each year.

The West Fork elk population is on the brink of a steep and unprecedented decline that can only be avoided by immediately and sharply elevating survival rates of calves through their first year of life. To improve elk numbers and recruitment in the West Fork, MFWP has already increased opportunities and harvest of mountain lions and black bears. Additionally, MFWP progressively implemented restrictions on elk hunting from 2008 through 2010 and eliminated antlerless harvest for the 2010 season. Working with cooperators, MFWP has worked to improve habitat and protect privately owned habitats from development. However, without the ability to manage the level of wolf predation by adjusting the number of wolves in the area, the West Fork elk population will continue to display poor recruitment and further decline. Montana expects wolf removal under the 10 (j) rule to be a short-lived and temporary measure in the interim before regaining full management authority for a delisted wolf population.

This removal effort is warranted due to unacceptable impacts of predation by a biologically recovered wolf population to elk numbers and specifically calf recruitment. Low calf recruitment is preventing the population from increasing to achieve management objectives. This localized removal action is

proposed for 1 of 44 elk management units in the state. FWP documented a minimum 37 breeding pairs of wolves in Montana by the end of 2009. Thirty-six of those 37 breeding pairs occur outside the proposed removal area.

Elk populations and wolf packs will be closely monitored through radio telemetry, aerial counts, and ground observations to assure that MFWP is meeting its management objective of maintaining 12 wolves in the project area and that elk population objectives are met.

## INTRODUCTION

Gray wolves (*Canis lupus*) increased in number and expanded their distribution in Montana because of natural emigration from Canada and a federal effort that reintroduced wolves into Yellowstone National Park (YNP) and the wilderness areas of central Idaho in 1995 and 1996. Reintroduced wolves are designated as a Nonessential Experimental Population under Section 10(j) of the Endangered Species Act (Figure 1). By December 2002, the experimental population and the naturally colonizing endangered population of northern MT and ID reached recovery levels of 30 breeding pairs in the northern Rocky Mountains of Montana, Idaho, and Wyoming and were well distributed among the three states for 3 consecutive years. The USFWS approved the Montana Gray Wolf Conservation and Management Plan in early 2004. However, permanent delisting of the biologically recovered wolf population has been delayed because of legal challenges in federal court.

Prior to delisting, Idaho and Montana developed management plans and enacted laws that provided adequate regulatory mechanisms to assure long-term survival of wolves. USFWS in cooperation with Idaho and Montana, developed a new rule under Section 10(j) that provided guidelines and allowed for management authorities to be transferred to states under a cooperative agreement with the USFWS or Memorandum of Agreement with Department of Interior to states with approved management plans. The 10(j) rule was adopted by the USFWS in February 2005 (*Endangered and Threatened Wildlife and Plants; Regulation for Nonessential Experimental Populations of the Western Distinct Population Segment of the Gray Wolf* [50 CFR Part 17.84]). The 10(j) rule was further modified in January 2008.

Under Section (v): *"If gray wolf predation is having an unacceptable impact on wild ungulate populations (deer, elk, moose, bighorn sheep, mountain goats, antelope, or bison) as determined by the respective State and Tribe (on reservations), the State or Tribe may lethally remove wolves in question."* Under the January 2008 rule, unacceptable impact is defined as *"Impact to a wild ungulate population or herd where a State or Tribe has determined that wolves are one of the major causes of the population or herd not meeting established State or Tribal population or herd management goals."* The 2008 10(j) rule listed the following elements that must be described in any removal proposal: 1) the basis of ungulate population or herd management objectives; 2) what data indicate that the ungulate herd is below management objectives; 3) what data indicate that wolves are a major cause of the unacceptable impact to the ungulate population; 4) why wolf removal is a warranted solution to help restore the ungulate herd to management objectives; 5) the level and duration of wolf removal being proposed; 6) how ungulate population response to wolf removal will be measured and control actions adjusted for effectiveness; and 7) demonstration that attempts were and are being made to address other identified major causes of ungulate herd or population declines or of State or Tribal government commitment to implement possible remedies or conservation measures in addition to wolf removal.

MFWP reviewed elk data in the Bitterroot Valley elk management units to determine if elk populations are below management objectives. The West Fork elk management unit is below objectives (Figure 2). This proposal reviews evidence that wolf predation is a major mortality cause preventing the West Fork

elk population from increasing and reaching MFWP management objectives. Additionally, this proposal identifies ongoing efforts to reduce adverse impacts of other factors influencing the West Fork elk population, and identifies approaches to monitor the effects of lethal wolf removal. This proposal provides a review of the available information and justification for wolf removal under Section 10(j) on an interim basis while the wolf remains listed. It represents the only wolf management tool available to MFWP since MFWP is unable to implement its management plan because of continuing ESA protections.

## **SECTION 10(j) REMOVAL PROPOSAL CRITERIA**

### **1) Basis of ungulate population or herd management objectives.**

Montana's elk management is currently guided by a statewide Elk Management Plan (Plan) that was formally adopted by the FWP Commission in December 2004. The Plan formalizes management objectives. Formal adoption by the FWP Commission culminated a public development process that included scoping and public review of a draft document. This effort included mailings sent to 1290 landowners, 2024 random elk hunters, 409 entities who submitted scoping comments, 204 entities on an "interested participant list" and public meetings attended by 364 people at 24 locations.

The Plan identifies specific elk populations throughout the state, which are assigned to one of 44 Elk Management Units (EMUs). Each EMU circumscribes a geographic area having unique habitats and landownership patterns, management challenges, population objectives, hunting season types, monitoring methods and management implementation criteria for each population. Population objectives are based upon habitat, historic population monitoring data and elk harvest and concerns/experience with game damage to private property.

Montana's Plan also outlines a range of harvest regulatory packages designed to manage elk numbers according to pre-determined objectives relative to the status of the population. Regulatory packages range from a set of liberal hunting opportunities if the elk population is above objective, standard if the population is meeting objectives, or restrictive if the population is below objectives. For the West Fork EMU, liberal hunting regulations when the elk population is above objective allow issuance of more than 350 licenses to harvest antlerless (cow-calf) elk and/or up to 5 weeks of opportunity for any general elk license-holder to harvest an antlerless elk. When the elk population is at objective, standard regulations allow an annual harvest of 100-175 antlerless elk by commensurate numbers of antlerless license-holders (no antlerless harvest by general license-holders). When the elk population is below objective, regulations allow the harvest of less than 100 antlerless elk by antlerless license-holders.

Within the context of Montana's Elk Management Plan, the West Fork EMU (Elk Hunting District 250) has a total population objective of 1600 – 2400 observed elk, with at least 10 bulls per 100 cows observed during aerial surveys. Additionally, 100% of annual bull harvest is prescribed to be brow-tined bulls (BTBs) with at least 15% having six points or more. These objectives reflect a population of elk in an area comprised largely of public lands with 5% of the EMU being private lands contributing 14% of critical wintering habitats. With 94% of elk habitat on National Forest lands primarily, the West Fork elk population contributes disproportionately to the public's enjoyment of elk in a state where only 45.3% of elk habitat is on the National Forests overall, and provides the enhanced opportunity by virtue of public land to manage elk habitat and achieve elk and carnivore harvests to meet Plan objectives.

In addition, a ratio of 25 calves per 100 cows is recognized in the Plan as a minimum standard for recruitment in the West Fork to maintain a stable elk population. Calf-cow ratios lower than 25 for two successive years when the elk population is below the midpoint of the objective range of 1600-2400 (i.e. 2000 total observed elk) trigger restrictive opportunities to harvest antlerless elk. This recognizes that a

recruitment rate lower than 25 calves per 100 cows generally does not produce a harvestable surplus of antlerless elk if the goal is to maintain or grow the population back to its objective. This recruitment standard for the West Fork was finalized in December 2004 when the FWP annual wolf count in the West Fork was 25% of its level in 2009, and should be revisited for its adequacy in managing an elk population subject to elevated predation pressure after adoption of the Plan.

## **2) What data indicate that the ungulate herd is below management objectives.**

Unprecedented low calf recruitment in the period 2007-2010, as indicated by the ratio of 10-month-old calves per 100 cows in spring aerial surveys, is the impetus for this proposal. MFWP obtains calf:cow ratios and other elk field data annually by conducting spring (April-May) aerial surveys for elk in Hunting District 250. The annual surveys cover all winter and early spring range, counting all elk observed within these ranges and classifying as many as possible to sex and age-class. All elk observed in the spring aerial surveys were successfully classified to sex and age-class in 2009 and 2010. In addition to the annual aerial surveys, FWP biologists keep field records of elk observed during normal ground operations or incidental observations of elk when flying other survey or telemetry duties. These classifications are used to supplement annual aerial survey observations and provide some insight into the timing and extent of calf production, recruitment and mortality.

Based on field data, FWP concluded that the West Fork EMU elk herd is below the calf:cow ratio objective for the last several years. Low overall recruitment also contributes to the total elk population size being below the objective identified in the elk plan. Furthermore, bull:cow ratios are also not meeting the West Fork elk population objective. Wolf predation is a factor contributing to all three metrics being below objective, and all three may be traced back to the unprecedented drop in calf:cow ratios.

In 2007-2010, ratios of 10-month-old calves per 100 cows in the West Fork elk population were lower than observed in any previous 4-year period in the West Fork since calf:cow ratios were first collected in 1971 (Table 1). The average of 15 calves per 100 cows in 2007-2010 was 40% below the statewide Elk Management Plan standard of 25 calves per 100 cows for the West Fork EMU. Calf:cow ratios of 9-11 in 2009-2010 were 56-64% below the same standard, and were the lowest ever documented in the West Fork elk population. In 2010, a ratio of only 6 calves per 100 cows was obtained across the segment of the population within the interior of the national forest, comprising 75% of the West Fork population.

In 2008-2010, elk counts of 744-863 were 46-54% below the minimum population objective of 1,600 elk for the West Fork EMU. Although the minimum population objective was increased in 2005 and again in 2006, elk counts in 2008-2010 also were 12-24% below the historic minimum population objective of 980, which was set in 1992 and met in all but 1 year prior to 2008 (Table 1). The observed sex ratios were 7 bulls per 100 cows in 2009 and 4 bulls per 100 cows in 2010. Both of these sex ratios are below the management objective of 10 bulls per 100 cows for the West Fork EMU.

The effect of a depressed calf:cow ratio persists for years and is multiplied in its effect on population production and growth beyond any single year's occurrence. The 2009 recruitment cohort of females entered the breeding population as 2.5-year-olds in September 2010, and the 2010 recruitment cohort will enter the breeding population in 2011. In September 2011 the largest numeric cohorts of the female breeding population (i.e., 2.5 and 3.5-year-olds) will be 60% lower-in-number than expected. The suppressing effect on overall population production will persist in succeeding years as these two cohorts move through the prime reproductive ages. If poor calf survival occurs again in 2011, its effect will be magnified upon the lower production contributed by the 2009 cohort, and if again in 2012 its effect will

be magnified upon the lower production across 2 breeding cohorts. In turn, poor calf survival and recruitment in 2011 and 2012 would form a block of 4 successive, severely underpopulated, reproductive cohorts. The West Fork population is poised on the brink of a steep and unprecedented decline that can only be avoided by immediately and sharply elevating survival rates of calves through their first year of life.

### **3) What data indicate that wolves are a major cause of the unacceptable impact to the ungulate population.**

The sharp decrease in the West Fork calf:cow ratio during 2009 and 2010 is most likely due to increases in predation from a growing wolf population (Kunkel and Pletscher 1999, Smith et al. 2004, Becker et al. 2009). Elk numbers and particularly calf recruitment have declined as wolf numbers increased (Figure 3). As described below, changes in black bear and lion population management, habitat conditions, and weather cannot explain the steep and sudden decrease in calf:cow ratios. The only factor affecting elk population dynamics that has changed significantly during this time period is an increasing trend in the total minimum wolf population and the wolf-elk ratio. Wolf-elk ratios, estimated as the number of wolves per 1000 elk, are higher in the West Fork than in adjacent elk populations and hunting districts (Table 2). At this wolf-elk ratio, the elk population is expected to be impacted by wolf predation through the effects of wolf predation on calf recruitment (Hamlin et al. 2009). Without the ability to manage the wolf population at levels that are compatible with maintaining the West Fork elk herd within objective, the West Fork elk herds will continue to decline further below objective.

Wolves first established in the West Fork in 2001 with the formation of the Painted Rocks pack. Three other packs were documented in 2005, 2007 and 2008 and the population has shown continuous growth (Table 3). These packs are believed to predominantly reside in Montana but may spend some time in Idaho. Likewise, packs that reside primarily in the Salmon and Selway Zones of Idaho may spend time in the West Fork. In 2010, one pack (Trapper Peak) was mostly removed due to livestock conflicts and status of this pack is unknown at this time. Also in 2010, a new pack was documented for the first time in the upper West Fork, adjacent to the Painted Rocks pack.

Elk harvest by hunters does not explain the sharp decline in calf:cow ratios in 2007-2010. Hunter harvests of calves in the fall prior to spring surveys varied from 3 to 7 in 2006-2009 and were negligible historically (Table 1). Conversely, hunter harvests of adult cow elk varied from 65 to 181 during the same period 2006-2009, which would elevate the calf:cow ratio post-harvest due to the harvest of cows. Calf:cow ratios declined in 2007-2010 as the elk population declined, demonstrating an independence of this calf recruitment decline from population density and carrying capacity.

Calf recruitment is essential to replace hunter harvest and other mortality across the elk population. Calf mortality due to causes other than hunting apparently has increased in the West Fork since 2005, which affects sustainable harvest rates. Cow-calf harvest rates of 9-13% of the spring total elk count, which were sustainable historically, have not been sustainable in the West Fork since 2005 (Table 1). Spring total elk counts declined from 1,914 in 2005 to 764 in 2010 at this harvest rate. Historically, spring total elk counts increased steadily from lower levels (513 elk) in 1981 to a count of 969 elk in 1988 under similar or slightly higher cow-calf harvest rates than those applied since 2005 (Table 1). Antlered bull harvest rates were similar in both periods, varying from 16 to 19% since 2005 and generally from 16 to 22% in 1981-1988. The coincidence of these data suggest that the recent decline in calf recruitment rate is a principal cause of the failure of the West Fork elk population to increase in response to reduced cow-calf harvests since 2005.

Cow-calf harvest rate was increased by instituting liberalized hunting regulations in 2004 to temper the population growth rate as West Fork elk numbers increased within population objective, and were on a trajectory to exceed objective. The West Fork elk population, by 2007, was incapable of sustaining the same population stabilizing cow-calf harvest rate that it had sustained in the 1980s. Lowered cow-calf harvests in 2008-2009 represented an effort by FWP to responsively implement conservative hunting regulations that would increase elk numbers, but instead resulted in consistent rates of harvest due to the sharply declining population and calf recruitment levels. By 2009 FWP concluded that the West Fork population no longer produced a harvestable surplus of cow-calf elk, and regulations for 2010 provide for negligible cow-calf hunting opportunity (<1% harvest rate allowed).

Lion predation alone does not explain the sharp decline in calf:cow ratios in 2007-2010. Although MFWP does not conduct annual surveys of lion populations, MFWP can attest to extremes in lion abundance that have occurred in the past 20 years, as reflected in lion harvest opportunities (Figure 4). Lion abundance across west-central Montana increased to peak levels in the 1990s, and while calf:cow ratios were not collected during 1993-1998, calf:cow ratios in 1991-1992 and 1999 met the recruitment standard for the West Fork EMU and the elk population steadily increased from 844 to 1,285 elk from 1990 to 1999 (Table 1). MFWP applied high lion harvest levels in the late 1990s and rapidly reduced lion numbers to a low relative density by the early 2000s (Figure 4), which produced little apparent response in calf:cow ratios before 2004. However, the elk population growth rate (i.e., the rate of change between successive spring elk counts) appeared to increase in the early 2000s at the lowest lion levels (Table 1). Lion numbers have increased to intermediate or higher levels in the mid-to-late 2000s (Figure 4). These data suggest that elk population dynamics responded to extreme swings in lion population levels in the absence of wolves or at low wolf densities. However, the magnitude of decline in elk recruitment in response to the addition of increasing and subsequent high wolf densities in 2007-2010 is unprecedented across 30 years of data (Table 1).

Black bear predation alone does not explain the sharp decline in calf:cow ratios in 2007-2010. Predation by black bears may be a primary cause of neonatal calf mortality (White et al. 2010). However, elk survey and classification data indicate that MFWP has historically managed black bear populations in the West Fork at levels that did not appreciably impact the elk population's ability to compensate for predator and hunter-caused mortality. Any hunter may purchase a license to harvest black bear, and bear seasons consistently have been open to all licensed hunters from April 15 to May 31 and September 15 to the end of November since 1985 (the spring season was lengthened by 2 weeks and an archery season added in the fall of 2010). Bear Management Unit (BMU) 240, which includes the West Fork, averaged 30 hunter-harvested black bears annually from 1994 to 2009. West Fork calf recruitment averaged 27 calves per 100 cows from 1990 through 2004. This calf recruitment average occurred prior to the 2007 increase in wolf numbers. This compares with a calf recruitment average of 15 calves/100 cows from 2007 to 2010.

Forest succession or vegetation changes do not explain the sharp decline in calf:cow ratios in 2007-2010. Elk select burned areas as habitat (Pearson et al. 1995, Singer and Harter 1996). Approximately one-third of the West Fork (150,000 acres) burned in the wildfires of 2000 and 2005 (Figure 5). The remaining two-thirds of the West Fork have not burned since the early 1900s, except for small acreages. As expected, calf:cow ratios in 2002-2006 were similar to or higher than calf:cow ratios observed in the 2 years preceding the fires of 2000-2005 (Table 1). While calf recruitment response to the landscape-scale wildfires was neutral or positive, there was no similarly large, abrupt habitat change to explain the sudden and sustained drop in recruitment in 2007-2010.

Habitat loss to human development does not explain the sharp decline in calf:cow ratios in 2007-2010. Forest Service land comprises 94% of the West Fork, where human development or comparable habitat losses did not occur (Figure 6). Private land comprises 14% of the elk winter habitat, and accounted for a minority (39%) of the annual elk observations on spring green-up in 2002 (MTFWP 2005) and 2010 (~25%). Although subdivision and development of elk habitat is an important issue in west-central Montana, it's realized pace and potential effect on elk calf recruitment in the West Fork in 2007-2010 was negligible.

Weather does not explain the sharp decline in calf:cow ratios in 2007-2010. Snowfall was slightly above or far below the 1948-2009 average of 45.1 inches at Missoula Airport in the winters of 2006-2007 through 2009-2010 (-25.2, +4.7, 0.0, -26.2). Annual precipitation was slightly above or below the 1948-2009 average of 13.82 inches in the June-May periods of 2006-2007, 2008-2009 and 2009-2010 (+0.3, -0.31, -1.71), with reduced winter precipitation replaced by growing season precipitation. Weather in June 2007-May 2008 would have been expected to offer the greatest nutritional challenge to elk calves, due to a shortage of 4.1 inches of annual precipitation (mostly in the growing season) coupled with 4.7 inches of snowfall above normal. However, the resulting ratio of 25 calves per 100 cows in May 2008 was the highest observed in the period 2007-2010, which further supports the independence of the steep decline in calf:cow ratios to any weather pattern or event.

#### **4) Why wolf removal is a warranted solution to help restore the ungulate herd to management objectives.**

Effective management of ungulate and large carnivore populations requires an approach that strives to integrate and balance the value and contribution of big game species like elk with the value and ecological contributions of large carnivores. Furthermore, the management of these populations is influenced by variable and dynamic environmental conditions that affect habitat quality and quantity for all species over time. Management of ungulate populations at objective levels provides highly-valued recreational opportunities to the public as well as providing a prey base that can support more robust carnivore populations. A multiple carnivore guild including black bear, mountain lion and wolf such as now found in the Bitterroot, adds additional management complexity to this scenario.

Managing adult female elk survival and annual calf recruitment rates is a prerequisite to successfully sustaining and meeting population objectives. MFWP currently has management authority to modify elk, bear and lion hunter harvest rates in order to attempt to meet population objectives. However, comprehensive overall management of all the wildlife resources and elk in particular has been compromised by the loss of authority and flexibility to manage wolf numbers in an integrated fashion across this same landscape. The West Fork elk population is substantially below State of Montana Elk Management Plan objectives for Hunting District 250. Given low calf survival rates, the number of adult cows is expected to further decline unless remedial and immediate action is taken. MFWP has implemented conservation measures to reduce antlerless harvest rates by hunters and to address bear and lion predation rates at current population levels. This proposed 10(j) action focuses on the wolf component which represents the major factor not currently addressed in attempting to restore elk recruitment (calf:cow ratios) to objective levels.

#### **5) The level and duration of wolf removal being proposed.**

Montana proposes to reduce wolf numbers in HD 250 from the minimum of 24 counted in December 2009 to a year-end minimum of 12 wolves represented by 2 – 3 packs from 2010 through 2015. The level of removal would be dependent on pre-treatment wolf abundance in an adaptive fashion based on annual wolf and elk population monitoring data. This level of removal follows specific direction given by

the Montana Fish, Wildlife & Parks Commission for the management of wolves to meet 10 fundamental objectives:

- 1) Maintain a viable and connected wolf population.
- 2) Gain and maintain authority for State of Montana to manage wolves.
- 3) Maintain positive and effective working relationships with livestock producers, hunters, and other stakeholders.
- 4) Reduce wolf impacts on livestock.
- 5) Reduce wolf impacts on big game populations.
- 6) Maintain sustainable hunter opportunity for wolves.
- 7) Maintain sustainable hunter opportunity for ungulates.
- 8) Increase broad public acceptance of sustainable harvest and hunter opportunity as part of wolf conservation.
- 9) Enhance open and effective communication to better inform decisions.
- 10) Learn and improve as we go.

The Commission's decision in July 2010 was the product of extensive public involvement and MFWP input. For the larger Wolf Management Unit (WMU) including the West Fork, the Commission approved a harvest quota of 34 wolves for 2010, with the intent that a harvest of 34 wolves was needed to meet the objectives stated. The need for reducing wolf numbers counted in 2009 by 50% in the West Fork was incorporated in the Commission's harvest prescription for the WMU as a whole. The proposed wolf removal to a level of 12 wolves under 10 (j) seeks to implement this direction in the West Fork where an imminent need exists and the consequences of delay will only exacerbate the current situation.

MFWP would maintain a minimum of 12 wolves in the West Fork over the 5-year duration of this proposed action (December 2010 through 2015). This level of wolf presence corresponds with the maximum range (11-14) of wolf numbers that most recently produced elk calf:cow ratios of at least 25 calves per 100 cows (Figure 3), and would represent a 50% reduction in wolf numbers documented in December 2009. A reduction to a level of 12 wolves would adjust West Fork wolf numbers to levels documented in 2005 and 2006, 3 and 4 years post-recovery (Table 3). A harvest of 12 wolves early in 2011 would adjust the population to the desired level of 12 wolves, based on the 2009 count. Removals during subsequent years would be adjusted in response to updated wolf counts and their relation to the objective of 12.

Levels of wolf removal and means of removal would be set annually by the Montana Fish, Wildlife & Parks Commission under established public process. Means of removal may include fair chase hunting or trapping by the public, control actions by agency personnel or designees, or any combination approved by the Commission.

**6) How ungulate population response to wolf removal will be measured and control actions adjusted for effectiveness.**

MFWP will monitor wolf and elk populations annually. The wolf population response to wolf removal will be measured by a December-January enumeration of packs and wolf numbers per pack, as in Table 3. The ungulate population response to wolf removal will be measured according to 2 metrics: total population size and calf recruitment rate. Wolf removals will be considered effective if the total elk

count increases toward a minimum objective level of 1,600 elk (the lower limit of the objective range), and if calf recruitment rates increase toward a minimum of 25 calves per 100 cows.

The need for a biologically meaningful correction in the elk calf:cow ratio is immediate if a more severe and lasting decline in the West Fork elk population is to be avoided. Therefore, Montana is beginning an investment in elk research in the West Fork to assess cause-specific mortality of elk calves in relation to habitat, nutrition, predation by wolf, lion and bear, and any other discernable factors. A principal management application of this research will be to adaptively refine harvest levels by species (i.e., lion, bear, wolf) for the purpose of achieving the most rapid and sustainable response in calf recruitment consistent with the long-term conservation of large carnivore populations. This intended management application of research results in real time will provide the information needed to prescribe and direct actions at magnitudes and scales that require specific supporting data obtained with intensified scientific rigor, and resulting management may focus more or less heavily on resources in addition to wolf harvest in succeeding years. Although this research is not essential to implementing this proposal, it represents an enhancement that Montana hopes to deliver, contingent on obtaining additional grants of supplemental funding.

**7) Demonstration that attempts were and are being made to address other identified major causes of ungulate herd or population declines or of State or Tribal government commitment to implement possible remedies or conservation measures in addition to wolf removal.**

Montana progressively implemented restrictions on elk hunting from 2008 through 2010 in response to sharply declining elk numbers and low calf:cow ratios. As a result, in 2010 elk hunting regulations in the West Fork are the most restrictive among the 25 hunting districts and across 10,000 square miles in west-central Montana where a general rifle season is offered. In 2008, the hunting of antlerless (cow-calf) elk was eliminated as an opportunity for an estimated 1,367 general elk license-holders who reported hunting elk in HD 250 (although low realized harvests by disabled hunters with a permit to hunt from a vehicle, youth ages 12-15, and archers in the archery-only season remained valid). In 2009 antlerless (cow-calf) permits were reduced from 25 to 5, and in 2010 Montana eliminated the opportunity for low harvests of cow-calf elk by disabled hunters with a permit to hunt from a vehicle, youth ages 11-15, and archers in the archery-only season in HD 250. In 2010, no more than 5 cows or calves may be legally harvested in HD 250. This represents an 86% decrease from the lowest realized harvest in the past 30 years (Table 1) and is the lowest since a harvest of only 1 cow and 1 calf occurred in 1979. Actual cow-calf harvests in 2008, 2009, and the maximum for 2010, were 56%, 55% and 4% of the 2007 harvest.

FWP also is considering whether the opportunity to hunt antlered bull elk on the general license can be sustained under calf recruitment levels observed in 2007-2010, and whether HD 250 should become the second general elk hunting district in Montana to restrict all elk hunting to low and limited numbers of permit-holders in response to unprecedented elk declines. If implemented, permit-only hunting for bull elk in the West Fork would represent a setback as measured against the Statewide Elk Recreation Objective to provide for a diverse elk hunting opportunity within, as much as possible, a 5-week general season and a 5 to 6-week archery season.

Montana increased hunting opportunities and harvest targets for mountain lion in the West Fork in response to sharply declining calf:cow ratios. In 2009, FWP more than doubled the number of lion special licenses from 4 in 2008 to 10. For 2010, FWP increased lion special licenses to 15, and increased the female subquota from 1 to 2. The lion license level for 2010 in the West Fork is the highest (alongside 2 other Bitterroot districts) for a single deer-elk hunting district in west-central Montana.

In combination with increased lion harvest targets, FWP lengthened the black bear spring hunting season in the West Fork by 2 weeks for 2010 and 2011. The spring bear season is now open through June 15<sup>th</sup>. In 2010 this extension increased the bear spring harvest in HD 250 from 2 to 5, and by 2 females. Spring bear seasons in the West Fork and adjacent HD 270 are the longest in west-central Montana (seasons elsewhere in west-central Montana still close on May 31). The fall bear season is standardized across west-central Montana; i.e., open to general bear license-holders for archery only during September 4-14 and for rifle from September 15 through November 28.

Although habitat is not limiting the West Fork elk population, FWP works closely with the Forest Service, Ravalli County, and private landowners to improve habitat and protect privately owned habitats from development. FWP is presently working with the West Fork and Sula Ranger Districts of the Bitterroot National Forest on prescribed fire projects totaling over 8,000 acres. A primary focus of these projects is to enhance winter range forage conditions for elk, mule deer and moose. FWP has also encouraged and supported several large-scale thinning and fuel reduction projects on USFS administered lands in HD 250 in 2009 and 2010. These projects have affected almost 22, 000 acres , over 80% of which occurred on big game winter range, in HD 250 since 2000. FWP routinely provides technical assistance to Ravalli County when reviewing subdivision regulations and development proposals, though only 5 minor (<63 acres) proposals of this type have come to FWP's attention in the West Fork since 1998. Similarly, FWP advises the Bitterroot Land Trust, Rocky Mountain Elk Foundation, other land trusts and Ravalli County in prioritizing private lands for soliciting and accepting grants of perpetual conservation easements, and for allocating the county's open space funds.

## REFERENCES AND LITERATURE CITED

- Atwood, T. C., E. M. Gese, and K. E. Kunkel. 2007. Comparative patterns of predation by cougars and recolonizing wolves in Montana's Madison Range. *Journal of Wildlife Management* 71: 1098-1106.
- Becker, M., R. Garrott, P. J. White, C. Gower, E. Bergman, and R. Jaffe. 2009. Wolf prey selection in an elk-bison system: choice or circumstance? *in* R. A. Garrott, P. J. White, and F. G. R. Watson, editors. *The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies*. Elsevier, Academic Press, San Diego, California, USA.
- Compton, B. 2009. Idaho Fish and Game Progress Report, June 30, 2009. Boise, Idaho, USA.
- Hamlin, K. L., R. A. Garrott, P. J. White, and J. A. Cunningham. 2009. Contrasting wolf-ungulate interactions in the Greater Yellowstone Ecosystem. Pages 541-577 *in* *The Ecology of Large Mammals in Central Yellowstone: Sixteen Years of Integrated Field Studies*. Academic Press.
- Husseman, J. S., D. L. Murray, G. Power, C. Mack, C. R. Wegner, and H. Quigley. 2003. Assessing differential prey selection patterns between two sympatric large carnivores. *Oikos* 101:591-601.
- Kunkel, K. E., and D. H. Pletscher. 1999. Species-specific population dynamics of cervids in a multipredator ecosystem. *Journal of Wildlife Management* 63:1082-1093.
- Myers, W. L., B. Lyndaker, P. E. Fowler, and W. Moore. 1996. Investigations of calf elk mortalities in southeastern Washington: Progress report. Washington Department of Wildlife, Olympia, USA.
- National Research Council. 1997. *Wolves, bears, and their prey in Alaska*. National Academy Press, Washington, D.C., USA.
- Pearson, S., M. Turner, L. Wallace, and W. Romme. 1995. Winter habitat use by large ungulates following fire in northern Yellowstone National Park. *Ecological Applications* 5:744-755.
- Raithel, J., M. Kauffman, and D. Pletscher. 2007. Impact of Spatial and Temporal Variation in Calf Survival on the Growth of Elk Populations. *Journal of Wildlife Management* 71:795-803.
- Singer, F. and M. Harter. 1996. Comparative effects of elk herbivory and 1988 fires on northern Yellowstone National Park grasslands. *Ecological Applications* 6:185-199.
- Sime, Carolyn A., V. Asher, L. Bradley, K. Laudon, N. Lance, M. Ross, and J. Steuber. 2010. Montana gray wolf conservation and management 2009 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 173 pp.
- Smith, B. L., R. L. Robbins, and S. H. Anderson. 1996. Patterns of neonatal mortality of elk in northwest Wyoming. *Canadian Journal of Zoology* 74:1229-1237.
- Smith, D. W., T. D. Drummer, K. M. Murphy, D. S. Guernsey, and S. B. Evans. 2004. Winter prey selection and estimation of wolf kill rates in Yellowstone National Park, 1995-2000. *Journal of Wildlife Management* 68:153-166.

White, C., P. Zager, and M. Gratson. 2010. Influence of predator harvest, biological factors, and landscape on elk calf survival in Idaho. *Journal of Wildlife Management* 74:355-369.

Zager, P., and C. White. 2003. Elk ecology: Factors influencing elk calf recruitment. Progress Report, Project W-160-R-30, Study IV. Idaho Department of Fish and Game, Boise, USA

Figure 1. Map of the federal wolf management areas in Montana showing the endangered area where the 1999 Interim Wolf Control Plan applied and the experimental area where the 10(j) regulations apply. The central Idaho and Greater Yellowstone experimental areas are shown as one since the approved status of Montana's state wolf plan allowed the special 10(j) regulations to apply equally in each area.

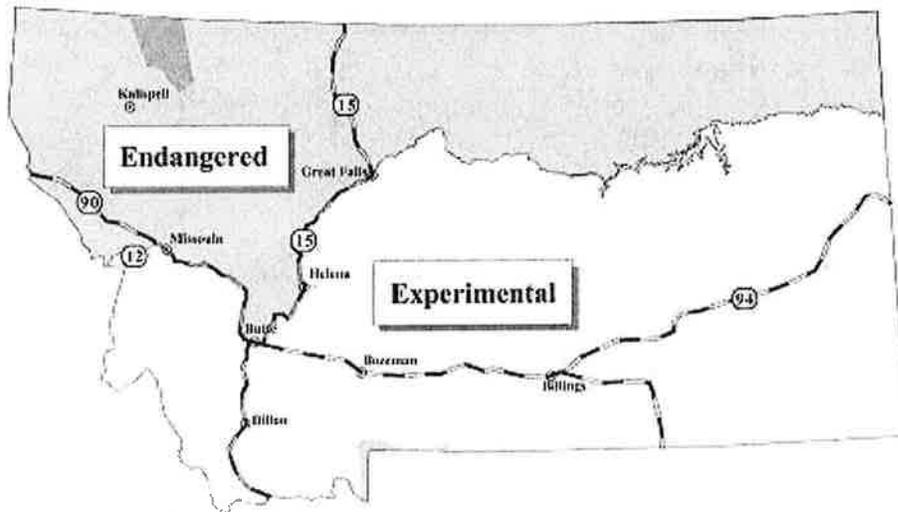


Figure 2. Map of the West Fork Elk Management Unit (EMU). The West Fork EMU is a 707-square-mile area encompassing the West Fork of the Bitterroot River drainage. The Idaho state line bounds the west and south sides. The USDA-Forest Service-Bitterroot National Forest administers 94% of this EMU and 5% of this EMU is private land.

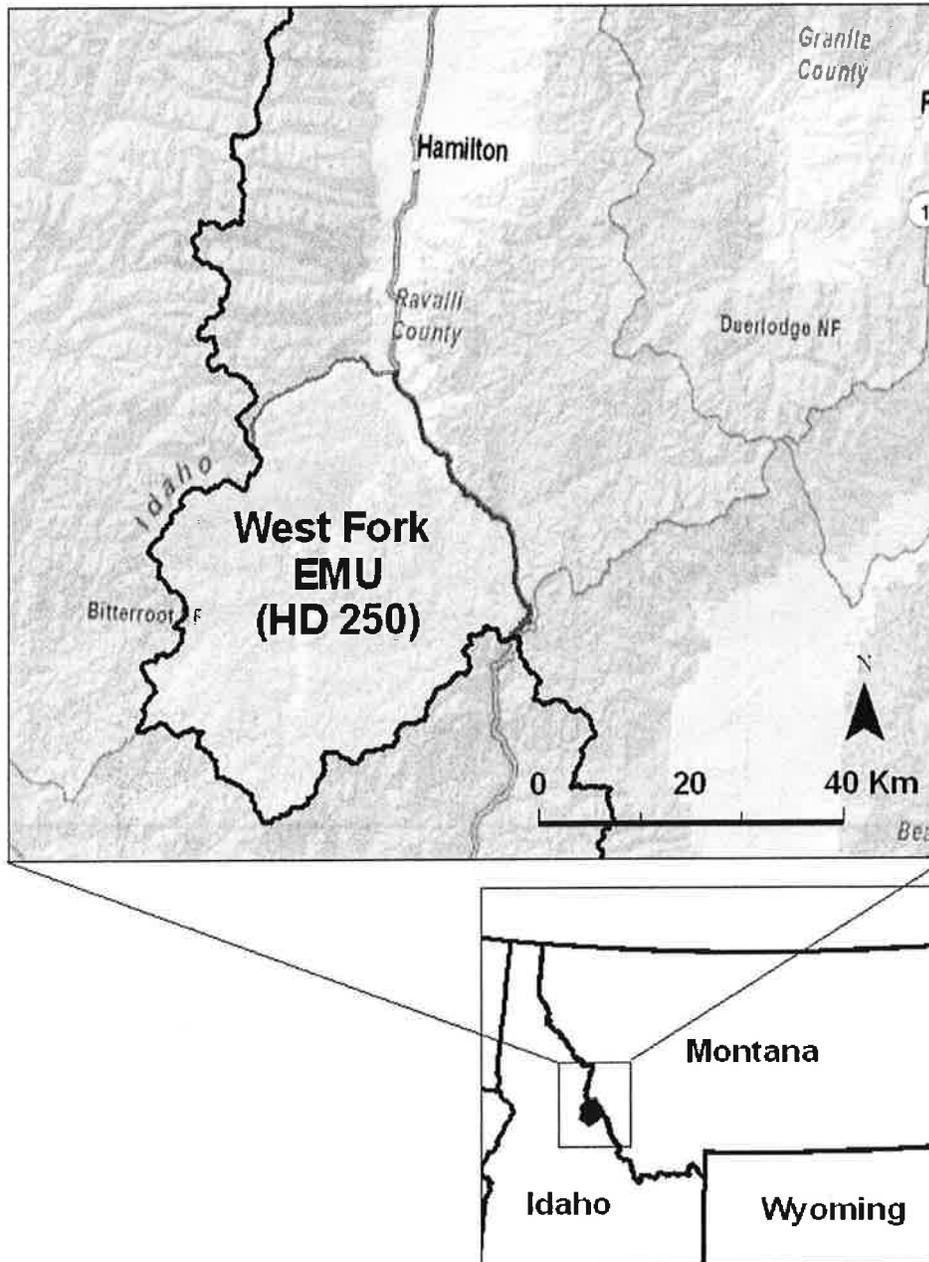


Figure 3. Relationship of December-January wolf numbers and late-winter calf:cow ratio in the West Fork, December 1998-April 2010.

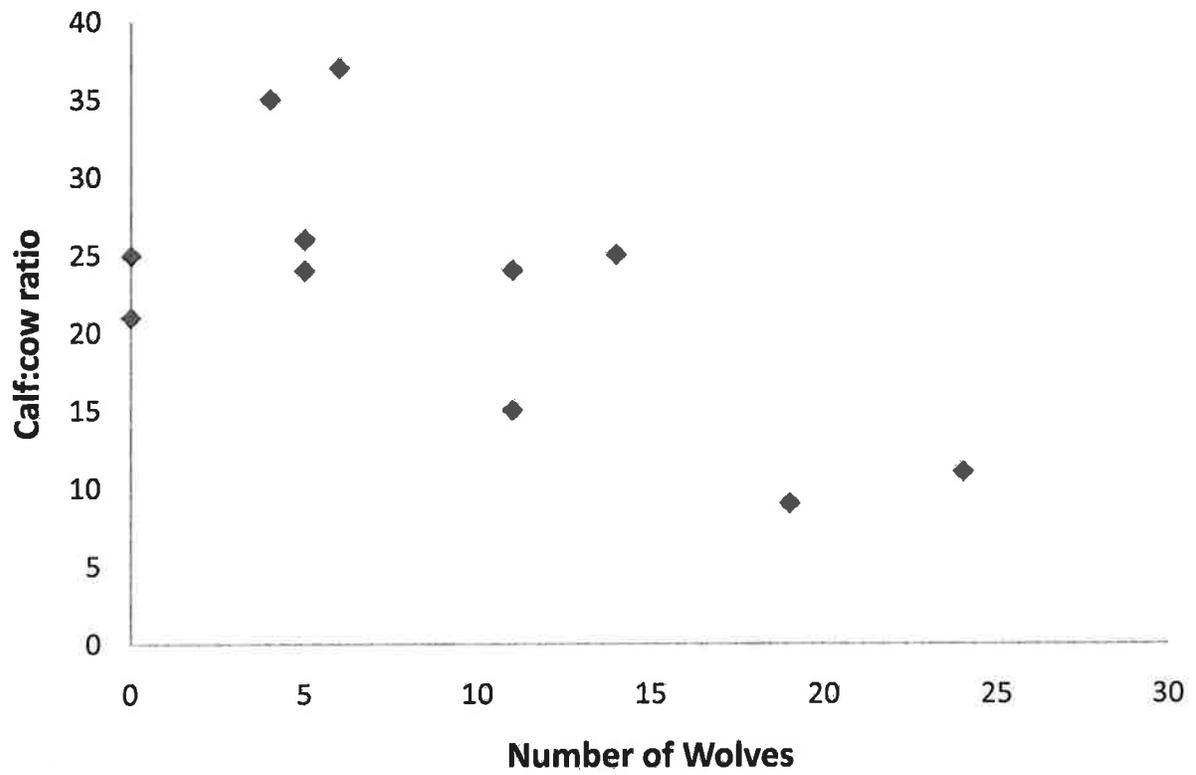


Figure 4. Lion hunting history in the West Fork (HD 250), 1980-2010. The winter harvest for 2010 is yet to begin. All harvests pertain only to HD 250. Harvest quotas from 1996 to 2010 pertain only to HD 250. Prior to 1996, quotas pertain to HD 250 and HD 270. Harvest was not limited by a quota prior to 1988.

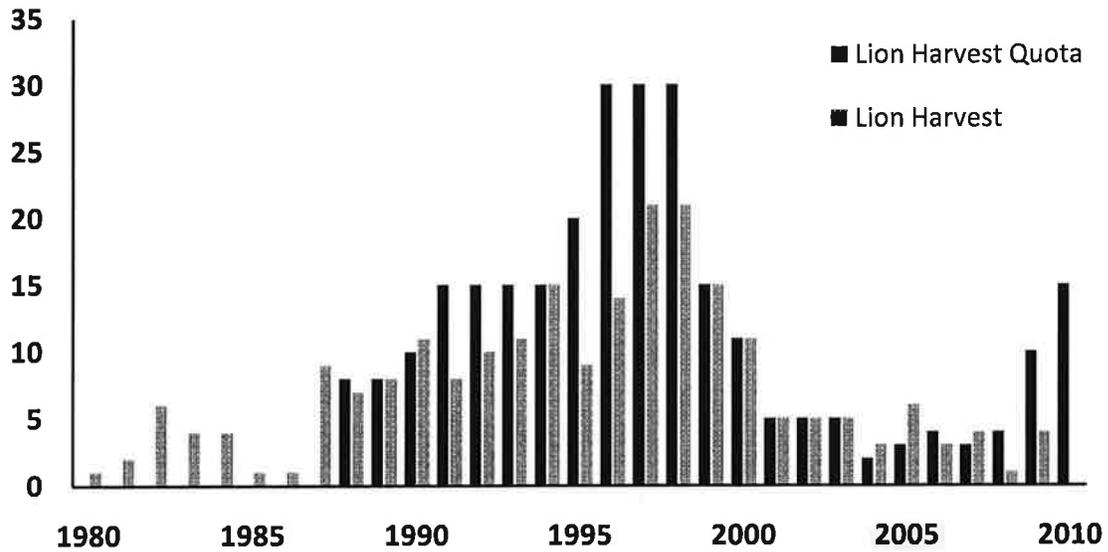


Figure 5. Fire perimeters by decade in the Bitterroot National Forest, 1870-2009. The approximate boundary of the West Fork EMU (Hunting District 250) is outlined in black.

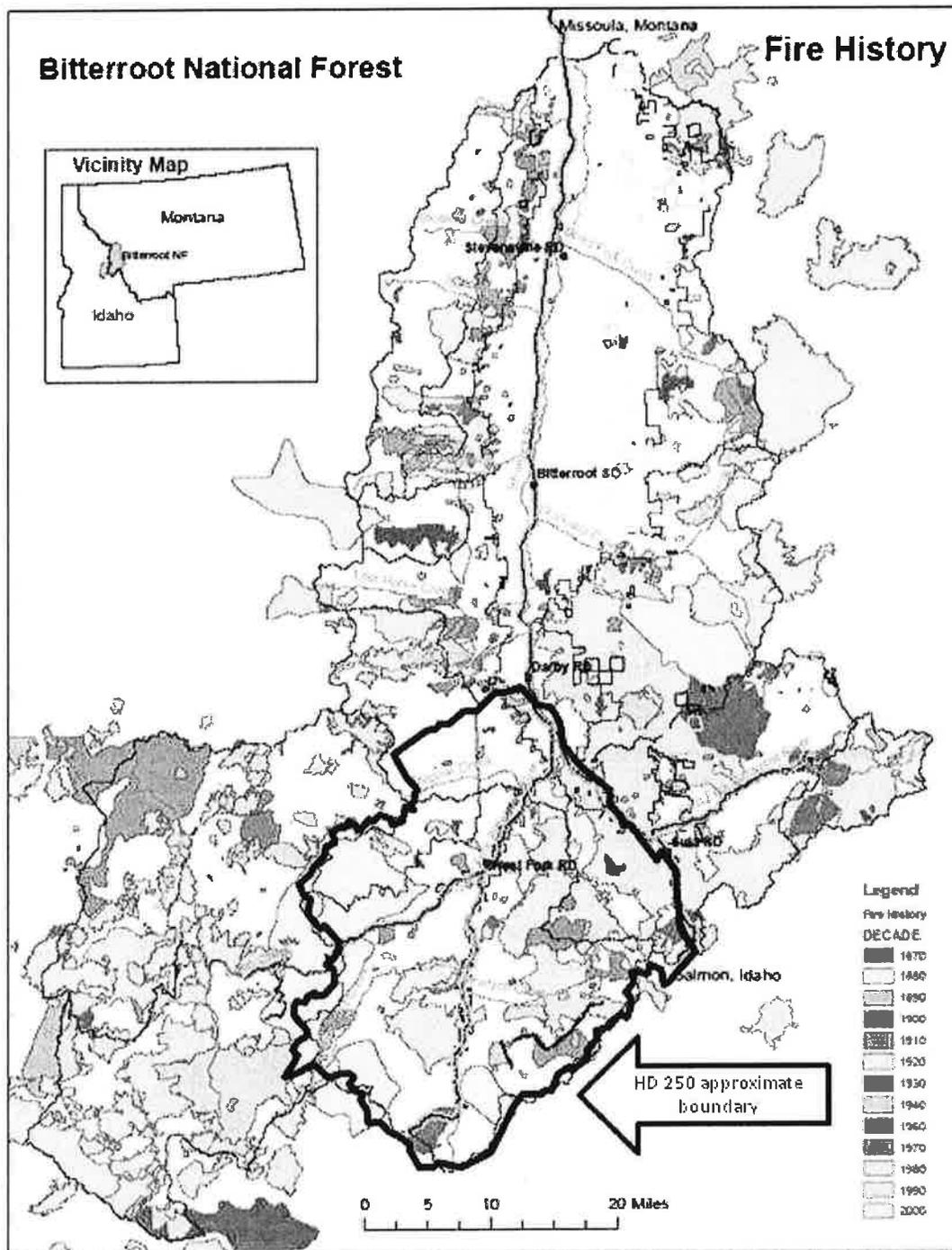


Figure 6. United States Forest Service and private land contributions to elk habitat in the West Fork, Hunting District 250.

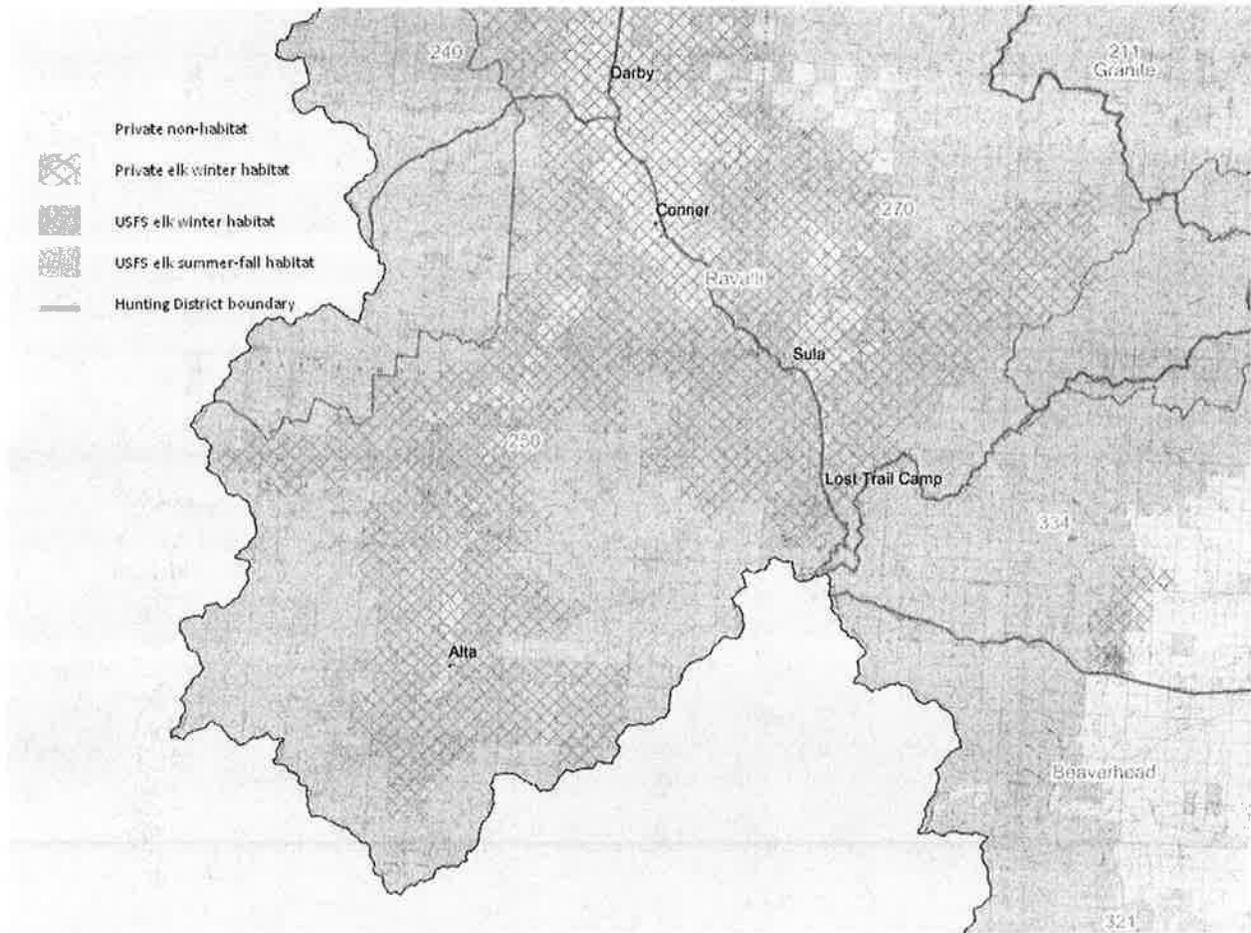


Table 1. West Fork elk trend count, population objective as defined by the Statewide Elk Management Plan, harvest regulations and statistics, calf per 100 cow ratio, and bull per 100 cow ratio data, 1980-2010. Calf recruitment is indexed by the number of calves per 100 cow determined during late-winter elk classification surveys. The number shown for cow-calf harvest and harvest rate in 2010 is the highest legal harvest allowable.

Year	Total Elk Count	Elk Count Objective	Hunting Regulations <sup>1</sup>	Cow(calf) Harvest	Cow-calf Harvest Rate	Antlered Bull Harvest	Antlered Bull Harvest Rate	Calf:Cow Ratio	Bull:Cow Ratio
1980	612	-	AB, EP	109(53)	26	137	22	52	9
1981	513	-	AB, EP	65(14)	15	96	19	-	-
1982	534	-	AB, AP	50(6)	10	80	15	34	10
1983	608	-	AB, AP	74(12)	14	124	20	45	13
1984	726	-	AB, AP	79(7)	12	150	21	44	23
1985	739	-	AB, AP	83(19)	14	160	22	49	15
1986	780	-	AB, AP	78(10)	11	122	16	44	14
1987	994	-	AB, AP	62(9)	7	84	8	49	13
1988	969	-	AB, AP	112(3)	12	188	19	33	8
1989	715	-	AB, AP	52(8)	8	136	19	36	3
1990	844	-	AB, AP	35(3)	5	116	14	16	7
1991	817	-	BB, AP	50(9)	7	76	9	27	5
1992	991	980-1062	BB, AP	49(7)	6	68	7	44	15
1993	950	980-1062	BB, AP	42(3)	5	110	12	-	-
1994	1197	980-1062	BB, AP	60(4)	5	106	9	-	-
1995	1264	980-1062	BB, AP	43(4)	4	102	8	-	-
1996	1297	980-1062	BB, AP	-	-	-	-	-	-
1997	1081	980-1062	BB, AP	-	-	-	-	-	-
1998	1277	980-1062	BB, AP	-	-	-	-	-	-
1999	1285	980-1062	BB, AP	50(5)	4	135	11	25	5
2000	1215	980-1062	BB, AP	45(7)	4	124	10	21	12
2001	-	980-1062	BB, AP	51(0)	-	149	-	-	-
2002	1576	980-1062	BB, AP	49(12)	4	120	8	26	12
2003	1703	980-1062	BB, AP	84(7)	5	227	13	24	19
2004	1614	980-1062	BB/ES	252(28)	17	380	24	35	10
2005	1914	1120-1680	BB/A	209(21)	12	357	19	37	18
2006	1462	1600-2400	BB/AA	181(7)	13	279	19	24	21

Total Elk Count	Elk Count Objective	Hunting Regulations <sup>1</sup>	Cow(calf)		Cow-calf		Antlered Bull		Calf:Cow		Bull:Cow	
			Harvest	Harvest Rate	Harvest	Harvest Rate	Harvest	Harvest Rate	Harvest	Ratio	Harvest	Ratio
2007	1373	1600-2400	BB/AA	118(14)	10	233	17	15	11			
2008	863	1600-2400	BB, AP	65(9)	9	139	16	25	22			
2009	744	1600-2400	BB, AP	70(3)	10	122	16	9	7			
2010	764	1600-2400	BB, AP	5	1	-	-	11	4			

<sup>1</sup>Hunting Regulations: AB = antlered bull legal on the general elk license, EP = either-sex permits limited in number through a special drawing, AP = antlerless (cow-calf) permits or licenses limited in number through a special drawing, BB = branch-antlered or brow-tined bull on the general elk license, BB&A = antlerless elk also legal on the general elk license in the last 9 days of the hunting season, BB&AA = antlerless elk also legal on the general elk license in the last 23 days of the hunting season and antlerless hunting closes upon achieving a harvest quota.

Table 2. Estimated wolf-elk ratio for Bitterroot area hunting districts. The ratio is calculated as the minimum estimate of number of wolves per 1000 elk. The West Fork (Hunting District 250) has the highest wolf:elk ratio within the Upper Bitterroot Valley.

Hunting District	Year	Number Wolves	Number Elk	Wolves:1000 elk
204	2009	6	390	15.38
	2010	9	390	23.08
240	2009	12	645	18.60
	2010	11	694	15.85
250	2009	19	744	25.54
	2010	24	764	31.41
261	2009	0	444	0.00
	2010	4	745	5.37
270	2009	15	3527	4.25
	2010	13	3480	3.74

Table 3. Minimum estimate of the number of wolves in the West Fork, 1998-2009, prior to the pupping season.

Pack Name	Number of Wolves											
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Painted Rocks				5	5	4	6	4	4	2	9	7
Sula								7	7	10	5	5
Watchtower											2	6
Trapper Peak										2	3	6
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>6</b>	<b>11</b>	<b>11</b>	<b>14</b>	<b>19</b>	<b>24</b>



IN REPLY REFER TO

## United States Department of the Interior

U.S. GEOLOGICAL SURVEY  
ALASKA SCIENCE CENTER  
4210 University Drive  
Anchorage, Alaska 99508

3 November 2010

Justin Gude  
Wildlife Research & Technical Services Section Manager  
Montana Fish, Wildlife, and Parks  
1420 East 6<sup>th</sup> Avenue  
Helena, MT 59620

Dear Justin,

As requested, I have reviewed the proposal for wolf reductions in the West Fork of the Bitterroot that you sent me in early October. I greatly appreciate that the proposal was concise and well-written. My comments are largely organized to address each of the elements required in a proposal under the 10(J) rule.

**1) Basis of ungulate population or herd management objectives:** The process for establishing population objectives by elk management unit (EMU) in Montana and the specific objectives for the West Fork EMU are clearly described.

**2) What data indicate that the ungulate herd is below management objectives:** Data from late winter elk counts clearly show that the West Fork elk population is below objectives for total population size, calf recruitment, and adult sex ratio. However, as stated in the plan, it would be timely to reassess the population objective for this EMU given that the population goals increased markedly during 2004-06 as the wolf population was becoming established.

**3) What data indicate that wolves are a major cause of the unacceptable impact to the ungulate population:** Based on the data provided, it is reasonable to conclude that wolves are a major cause of the reductions of calf recruitment observed in the population. The proposal focuses on declines in late-winter calf recruitment with increases in wolf numbers as evidence that wolves are having a major effect on the elk population. While decreasing calf:cow ratios are correlated with increasing wolf numbers, the elk population as a whole declined markedly before the reductions in recruitment were noted. With declines in total elk numbers of over 55% between 2002-05 and 2009-10, impacts of wolves, as well as other predators (i.e., black bears and lions), on calf recruitment would have likely increased as a result of substantially higher predator/elk ratios, even without any increase in wolf numbers. Thus declines in calf recruitment are probably driven by increased predation on calves by the entire large predator guild, as well as the noted increases in wolf numbers.

**4) Why wolf removal is a warranted solution to help restore the ungulate herd to management objectives:** The proposal describes how Montana Fish, Wildlife, and Parks is attempting to manage black bear and lion populations in the EMU to reduce predation impacts on elk and limiting harvests of elk while the population is below prescribed management objectives. Further, there is urgency to improve calf recruitment quickly before the elk population declines further. Reducing the wolf population, along with these other management actions, is a reasonable approach to attempt to improve calf recruitment and population numbers.

**5) The level and duration of wolf removal being proposed:** The plan clearly states that wolf numbers will be reduced to 12 wolves, or a 50% reduction, during each of 5 years.

**6) How ungulate population response to wolf removal will be measured and control actions adjusted for effectiveness:** The plan states that "Wolf removals will be considered effective if the total elk count increases toward a minimum objective level of 1,600 elk and if calf recruitment rates increase toward a minimum of 25 calves per 100 cows". As stated, even a small increase in either parameter would be evidence that the program was successful. However, such limited increases would do little to address the urgent need to increase elk numbers and would not be biologically meaningful. I would rather see specific numerical goals for the magnitude of increases in these population measures.

**7) Demonstration that attempts were and are being made to address other identified major causes of ungulate herd or population declines or of State and Tribal government commitment to implement possible remedies or conservation measures in addition to wolf removal:** The plan describes recent efforts to reduce harvests of antlerless elk in the EMU and consideration of restriction in bull harvests. However, antlerless elk harvests have averaged  $\geq 10\%$  of the observed cow population in 2006-2009 as the elk population decline was in full swing, and only in 2010 will antlerless harvests be essentially eliminated. Further, even in 2009 with bull:cow ratios in single digits, the bull harvest exceeded the number of bull observed by about three-fold. These harvests seem excessive given the concern over population trends and composition.

The plan also details liberalization of harvest regulations for mountain lions and black bears. However, it is unclear that liberalized regulations will actually result in reductions of lion and bear numbers in the area.

While the proposal for wolf reductions in the West Fork EMU appears to meet the requirements of the 10(J) rule, I suspect that the proposed 50% reduction in wolf numbers will not be sufficient to bring about marked increases in calf recruitment or the elk population. As described in the plan, that level of reduction was based on the numbers of wolves in the EMU during 2006-08 when calf recruitment last approached the 25 calves:100 cows target. However, elk numbers were declining during that period and have since dropped by an additional 40%. To reach wolf:elk ratios that are comparable to 2006-08, wolves would need to be reduced by about 70%; further reductions will be necessary to overcome ratio-dependent increases in predation effects of black bears and lions and to speed recovery of the elk population.

I hope my review will be helpful in addressing these complex issues surrounding management of wolves and their ungulate prey in Montana. If I can be of any additional service, don't hesitate to call.

Sincerely,



Layne G. Adams  
Research Wildlife Biologist