Scientific Peer Review Draft

DRAFT WOLF CONSERVATION AND MANAGEMENT PLAN FOR WASHINGTON

Washington Department of Fish and Wildlife
Wildlife Program
600 Capitol Way N
Olympia, Washington

August 2008

To Reviewers,

The Draft Wolf Conservation and Management Plan for Washington was written by the Washington Department of Fish and Wildlife with extensive input from the advisory Wolf Working Group, which was comprised of 17 citizens from a broad range of perspectives and values. Working Group participation and discussions were especially helpful in the preparation of Chapters III and IV, which establish conservation/recovery objectives for wolves in the state and management options to address wolf-livestock conflicts, respectively. The following letter from the group describes the many considerations that went into their negotiations to craft a balanced package of conservation and management recommendations that the Department could use in the plan.

Wolf Working Group Letter

June 30, 2008

To the citizens of Washington,

The Washington Wolf Working Group (WWG) consists of 17 citizens appointed by Washington Department of Fish and Wildlife (WDFW) Director Jeff Koenings to advise WDFW in developing a Washington Wolf Conservation and Management Plan. WWG members represent a broad range of perspectives, from those concerned that wolf recovery would negatively affect their livelihood or interests to those who believe that wolves are a valued part of Washington's natural heritage and play a role in healthy functioning ecosystems.

The WWG made every effort to understand the complex and diverse issues surrounding wolf recovery in depth, and to carefully craft management approaches that achieve plan objectives in a way that is balanced, fair, cost effective, and that has a high probability of success. Extensive discussion by WWG members focused on how to achieve two key strongly linked objectives (described in the plan as follows):

1. Implementing conservation strategies that will result in the reestablishment of a naturally reproducing and viable wolf population distributed in a significant portion of the species' former range in Washington, and
2. Managing wolf-livestock conflicts in a way that gives livestock owners who are experiencing losses tools to minimize future losses, while at the same time not negatively impacting the recovery or long-term perpetuation of sustainable wolf populations.

Efforts by the WWG to forge a consensus were shaped by shared points of understanding, including the need to assess the entire state in terms of the strengths and weaknesses to support wolf recovery. From the wolf recovery experience in the Northern Rockies, we recognize that large contiguous blocks of public land with abundant ungulate prey not only play an important role in sustaining a viable wolf population, but are also areas with comparatively lower levels of wolf/human conflicts. WWG members share the sentiment that one region or interest group should not unfairly bear the impacts of wolf recovery. WWG members support developing a compensation program to offset livestock losses with the understanding that a high degree of accountability and verification are

needed to avoid problems occurring in other state compensation programs. WWG members support taking proactive measures that would lead to faster recovery of wolves, thus allowing greater management flexibility and reducing costs over the long-term. WWG members understand that secure long-term funds will be required to implement this plan, achieve the objectives, and provide the responsiveness needed to maintain public support.

Following many hours of dedicated work and compromise, the WWG has achieved a consensus on all aspects of this draft plan, with the exception of the number of established breeding pairs needed to downlist and delist wolves in Washington. This draft plan was developed as a "package' and it is critical to recognize that many of the components are linked and have been carefully balanced to meet multiple objectives. As a result, WWG members were willing to pursue innovative proactive approaches (such as promoting "within state" translocation of wolves and defining restricted circumstances where lethal take of wolves would be allowed) to achieve the conservation and management objectives in a timely assured way. Eliminating an individual component would change the overall balance of the package, adversely affect the ability to meet plan objectives, and reduce the level of collective support by the WWG.

The WWG understands that this plan will be reviewed over time and that adaptive management will guide future changes in direction. Our work over the past year represents a "good faith" effort to anticipate where problems may occur in meeting plan objectives and to suggest reasonable approaches to mitigate potential problems. We recognize that public understanding of the issues surrounding wolf recovery can be hampered because of underlying misconceptions, partial truths, and fears. We have worked especially hard to accurately identify potential impacts, to frame issues within a clear and understandable context, and to be as specific as possible to conditions in Washington state.

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ACKNOWLEDGMENTS

Many people contributed to the preparation of the Washington Wolf Conservation and Management Plan. Foremost among these were the members of the Wolf Working Group: Daryl Asmussen, John Blankenship, Duane Cocking, Jeff Dawson, Jack Field, George Halekas, Kim Holt, Derrick Knowles, Colleen McShane, Ken Oliver, Tommy Petrie, Jr., Gerry Ring Erickson, John Stuhlmiller, Arthur Swannack, Bob Tuck, Greta Wiegand, and Georg Ziegltrum, and former member Paula Del Giudice. Their discussions, suggestions, edits, and long hours of involvement were crucial to the development of this draft plan. Paul De Morgan of RESOLVE was invaluable through his participation as facilitator of the Wolf Working Group. Turner Odell and Rob Williams of RESOLVE assisted with facilitation activities.

Carolyn Sime of Montana Fish, Wildlife & Parks and Steve Nadeau of the Idaho Department of Fish and Game kindly discussed background issues relating to wolves in their respective states. Carolyn Sime, Curt Mack of the Nez Perce tribe, Rick Williamson of USDA Wildlife Services, Carter Niemeyer formerly of U.S. Fish and Wildlife Service and USDA Wildlife Services, Mark Henjum of the U.S. Forest Service, Jerry Nelson of WDFW, Teresa Eturaspe of WDFW, Nate Pamplin of WDFW, Dave Brittell of WDFW, and Sheila Lynch of the Washington State Office of the Attorney General each gave presentations at Working Group meetings on topics related to wolves or other issues pertaining to the management of natural resources in Washington. Justin McCarron of WDFW provided data on WDFW license sales and revenue figures. Shelly Snyder of WDFW prepared many of the maps used in this plan. Ben Maletzky modeled potentially suitable habitat for wolves in Washington. George Ulin of the Washington Outfitters and Guides and Association provided background information on Washington's outfitting industry. Derek Stinson of WDFW gave advice on older literature and helped with other aspects of the preparation of this plan.

WDFW staff that helped with aspects of the plan included Jerry Nelson, Anthony Novack, Rena Henson, Steve Pozzanghera, Dave Brittell, John Pierce, Eric Fiedler, and Steve Zender, with other contributions from Scott Fitkin, Scott McCorquodale, Paul Wik, Dana Base, Dave Ware, Woody Myers, Cliff Rice, Pat Fowler, Jim Watson, Kevin Robinette, Ken Warheit, and Sue Wisner. WDFW administrative support staff also gave assistance: Katy Jones, Wendy Childs, Dolores Schmid, Susan Lasiter, Michael Day, and Cody Arocho.

Other useful information on wolves or related topics came from Jeff Allen, Carlos Carroll, Brad Compton, Jesse Timberlake, Patti Happe, Brian Harris, Mike Jimenez, Ed Bangs, Bob Kuntz, Russ Morgan, Bill Gaines, James Begley, John Pollinger, Garth Mowat, Roger Woodruff, Chad Heuser, Julie Callahan, Tom Buckley, Linda Simpson, Carol Chandler, John Ehrenreich, Bobbie Thorniley, Tom MacArthur, Don Youkey, and Darrell Reynolds.

Acknowledgment is also given to the authors of the wolf conservation and management plans for Montana and Oregon (MFWP 2003, ODFW 2005). These plans were the basis for much of the material appearing in this current document.

Thanks are extended to the following people who provided technical comments on preliminary drafts of the document:

EXECUTIVE SUMMARY

Gray wolves were formerly common throughout most of Washington, but declined rapidly from heavy persecution as ranching and farming by Euro-American settlers expanded between 1850 and 1900. Wolves were essentially eliminated as a breeding species from the state by the 1930s, although infrequent reports of animals continued in the following decades, suggesting that small numbers of individuals continued to disperse into Washington from neighboring states and British Columbia. Intensified survey work in the early to mid-1990s resulted in increased numbers of confirmed and probable wolf records, with two likely breeding records. Reliable reports of wolves have again increased since 2005, originating mostly from Pend Oreille and Stevens counties in the northeast, Okanogan County in north-central, and the Blue Mountains in the southeast. Most recent reports involve single animals, but a pack with pups was discovered in July 2008 in western Okanogan County and represents the first fully documented breeding by wolves in the state since the 1930s.

Wolves were classified as endangered in Washington at the federal and state levels in 1973 and 1980, respectively. Federal listing continues throughout the state, pending a final court decision on whether to delist the Northern Rocky Mountain population, which includes the eastern third of Washington. Human-related mortality, particularly illegal killing and legal control actions to resolve conflicts, poses the greatest threat to the species in the northwestern United States. A survey conducted in early 2008 shows high overall support for wolf recovery in Washington among the general public, with 75% either strongly or moderately in favor versus 17% in strong or moderate opposition.

Increased dispersal of wolves into Washington and the eventual reestablishment of a breeding population are expected as a result of the recent reestablishment of wolf populations in Idaho, Montana, and Wyoming. In response, and with the eventual return of wolf management to the state, the Washington Department of Fish and Wildlife (WDFW) has prepared a draft wolf conservation and management plan, with significant input provided by an advisory Wolf Working Group of 17 citizens from a broad range of perspectives and values.

The conservation and management plan addresses two major issues: 1) conservation objectives for downlisting and delisting wolves at the state level, and 2) management strategies to reduce and address wolf-livestock conflicts. Negotiations among members of the Working Group helped frame both of these issues for the plan. Target numbers and distributions for downlisting and delisting are:

- Reclassification from state endangered to state threatened status will occur when 6 successful breeding pairs are present for 3 consecutive years, with at least 2 successful breeding pairs in each of 3 designated recovery regions (the Northern Cascades, Eastern Washington, and Southern Cascades and Northwest Coast Regions).
- Reclassification from state threatened to state sensitive status will occur when 12 successful breeding pairs are present for 3 consecutive years, including at least 2 successful breeding pairs in both the Northern Cascades and Eastern Washington Recovery Regions and at least 5 successful breeding pairs in the Southern Cascades and Northwest Coast Recovery Region.
- Reclassification from state sensitive to game animal status will occur when 15 successful breeding pairs are present for 3 consecutive years, including at least 2 successful breeding pairs in both the Northern Cascades and Eastern Washington Recovery Regions and at least

5 successful breeding pairs in the Southern Cascades and Northwest Coast Recovery Region. If 18 successful breeding pairs of wolves are documented in any year during the 3-year period, then the process to delist will begin at that point.

Translocation is considered an important potential management tool if wolves fail to reach any of the three recovery regions through natural dispersal. Translocation was broadly supported among members of the Working Group.

To build public tolerance for wolves, this plan outlines a range of proactive (e.g., modified husbandry practices), non-lethal, and lethal management options to address wolf-livestock conflicts. Implementation of these will be based on the status of wolves to ensure that conservation/recovery objectives are met. Non-lethal management will be emphasized while the species is recolonizing and will transition to more flexible approaches as wolves progress toward a delisted status. WDFW will provide livestock producers with 1) technical assistance on proactive management activities designed to minimize conflicts and 2) financial compensation for depredations on livestock. Compensation for confirmed and probable losses will be paid through a two-tiered system based on size of the land being grazed to accommodate the greater likelihood of unverifiable losses on larger land parcels. Compensation will also be paid for unknown losses (i.e., where there is no direct evidence of depredation, but the livestock owner can demonstrate a loss ratio in excess of historic losses) in areas with wolves. A review board is proposed to maintain a high degree of accountability, validate claims, and oversee other aspects of the compensation program.

The effects that wolves have on elk, deer, and other ungulate populations and hunter harvest are difficult to predict. Observations from neighboring states suggest that wolves could have some localized impacts on ungulate abundance in Washington, but relatively little impact on a statewide level. Improved habitat management, changes in harvest strategies, and greater prevention of illegal hunting are recommended as measures for maintaining healthy ungulate populations that will support both wolves and desired levels of hunter harvest.

Wild wolves pose very little threat to human safety. This plan recommends that information and training about the low risk of wolf attacks and how to prevent and react to wolf attacks be provided to hunters, trappers, rural landowners, outdoor recreationists, outfitters and guides, forest workers and contractors, and others who might encounter wolves. Dog owners need to be educated on ways to reduce interactions between dogs and wolves. The public also should be made aware of the risks posed by wolf-dog hybrids and pet wolves.

Wolves are habitat generalists, thus restrictions on human development and other land use practices are not expected to be needed to recover wolves in Washington. Implementation of a public information and education program is a high priority for aiding reestablishment of the species.

This plan provides an analysis of the potential economic impacts that wolves could have in the state. At populations of 50 and 100 wolves, which roughly correspond with the upper levels of abundance during the state endangered and threatened phases, the vast majority of livestock producers will probably experience few if any annual costs, whereas a few individual producers could be more affected. As wolf populations become larger and more widely distributed, financial impacts are likely to accrue to more producers. Similarly, populations of 50 and 100 wolves should have few negative effects on big game hunting. Larger populations are expected to have somewhat greater

impacts on game abundance and hunting opportunity, but such impacts become increasingly difficult to predict. Washington could conceivably develop a sizable wolf-related tourist industry, depending on where wolves reestablish, at what numbers, and their detectability. Wolf recolonization is anticipated to have minimal impact on the state's forest products industry.

Adequate funding for implementing the activities described in this plan is vital to the long-term success of the overall plan.

I. INTRODUCTION

The gray wolf (*Canis lupus*) is an endangered species in Washington under both state (WAC 232-12-014, Appendix A) and federal law. Historically, wolves were found throughout most or all of the state. They were essentially extirpated from the state by the 1930s through persecution, including trapping, poisoning, and shooting. Although wolf populations have been absent from Washington for more than 70 years, small numbers of individuals have periodically dispersed into the state during that time to the present.

Increased dispersal of wolves into Washington and the eventual reestablishment of a breeding population is expected as a result of the reestablishment of wolf populations in Idaho, Montana, and Wyoming. Wolves are expected to disperse into northeastern Washington from Idaho, Montana, and possibly British Columbia; into southeastern Washington from Idaho and Oregon; and into the Cascades from northeastern Washington and British Columbia.

Wolves in the eastern third of Washington were removed from federal listing in March 2008, but were reinstated by court injunction in July 2008. A pending court decision will determine whether wolves in this portion of the state will continue to be federally listed. When delisted, they will return to state management.

In response to the anticipated dispersal of wolves into Washington and eventual return to state management, the Washington Department of Fish and Wildlife (WDFW) initiated development of a Wolf Conservation and Management Plan for Washington in 2006. In January 2007, WDFW Director Jeff Koenings, appointed 18 members to a Wolf Working Group (Appendix B) to advise WDFW in the development of the plan. The Working Group began meeting in February 2007. In giving direction to the group, Director Koenings noted that wolves are an important and valued component of a healthy ecosystem in Washington and that the establishment of a sustainable wolf population in Washington will only occur if there is a fair balance between conservation needs and the needs of the public. The expectation for the Working Group was that it would provide input to WDFW for key elements of the plan and critically review its content in light of biological, social, and political considerations. The 18 stakeholders selected represented a broad range of perspectives and were expected to present those values in the development of the plan. The Working Group was reduced to 17 members during the course of its meetings, when one person was no longer able to participate.

The Director specified two "sideboards" for the group to work within:

- First, the option of managing for no wolves in Washington was not a viable alternative, and
- Second, WDFW would not reintroduce wolves to Washington from another state.

He also noted that the plan would not attempt to recover wolves to historical population levels, which is an unattainable goal given the many changes to Washington's landscape during the past 150 years. The Working Group was asked to strive for consensus, as much as possible, to guide the plan. Working Group meetings were facilitated by a professional negotiator, Mr. Paul De Morgan of

RESOLVE. The group met six times during 2007 and twice in 2008; seven public scoping meetings were held throughout the state during August 2007. The scientific peer review of the draft plan was completed in xxxxxx 2008, and the plan then underwent a 90-day public review from xxxxx to xxxxx 2009, including xxx public meetings throughout the state during xxxx and xxxx. The Working Group met an additional time in xxxxxx 2008/2009 prior to completion of the final plan in xxxxx 2009.

WDFW's Listing and Delisting Procedures (WAC 232-12-297, Appendix A) require the development of recovery plans for species that are state listed as endangered or threatened and management plans for species listed as sensitive. These plans identify measurable recovery objectives and strategies to achieve those objectives so that the species can be downlisted and eventually delisted in the state. The Washington Wolf Conservation and Management Plan will meet the needs of a state recovery plan, and at the same time, will provide for management of the wolf as it is delisted from state endangered to threatened, and then to sensitive status. The purpose of the plan is to ensure a self-sustaining population of gray wolves in the state and to encourage social tolerance for the species by reducing and addressing conflicts.

To meet this goal, the plan includes such tasks as identifying and managing toward population objectives, engaging in public outreach and education, developing a response strategy for conflicts, and conducting ongoing monitoring and research. As specified in WAC 232-12-297, section 11.1, recovery or management plans are to include, but not be limited to: 1) target population objectives, 2) criteria for reclassification, 3) an implementation plan for reaching population objectives that will promote cooperative management and be sensitive to landowner needs and property rights, 4) public education needs, and 5) a species monitoring plan. The overall plan will specify resources needed from and impacts to WDFW, other agencies (including federal, state, and local), tribes, landowners, and other interest groups. The plan shall consider various approaches to meeting recovery objectives including, but not limited to regulation, mitigation, land acquisition, incentives, and compensation mechanisms.

In developing this plan, WDFW and the Working Group sought to establish a wolf conservation program that is achievable, realistic, fair, flexible, cost-effective, defensible, sustainable, fundable, engages the public, and provides incentives for meeting wolf conservation goals.

This plan was developed just as wolf packs were becoming reestablished in Washington. Significant changes to the landscape since the extirpation of wolves in the early 1900s have altered the suitability of lands where wolves historically ranged in the state. WDFW biologists have made assumptions and developed approaches about how wolves may recover in Washington based on professional knowledge of the state's unique landscapes and habitats, combined with a detailed review of the scientific literature addressing wolves, and incorporating the insights gained from extensive discussions with knowledgeable experts involved with wolf recovery efforts in the northern Rocky Mountain states.

Successful management of wolves will require that WDFW, which will implement the plan, be able to effectively and efficiently apply adaptive management principles. There are several aspects to the plan that are critical to its success:

1) Wolves need to be managed in concert with other species and resource plans. The way wolves are managed will affect and be affected by other species, particularly primary prey and other large carnivores. Many of these species (e.g., elk, deer, moose, cougars, lynx, grizzly and black bears, wolverines, and fishers) have their own management or recovery plans. None of these species can be managed in isolation.
2) An active information and education program must offer guidance and information about living with wolves and about rules and regulations related to the plan.
3) Sufficient funds must be available to implement the plan.

Individuals representing many interests were involved in developing the plan through the stakeholder Working Group. The public at large also had the opportunity to provide input through public meetings and review of the plan under the State Environmental Policy Act (SEPA) process. The plan is intended to balance the array of public interests in the conservation and management of wolves in Washington. As such, the plan is expected to serve the broad interests of the citizens of Washington, if implemented in its entirety.

Because human tolerance has been and remains the primary limiting factor for wolf survival, building tolerance for this species will require acceptance of the plan's approach to addressing wolf conservation and human conflicts. Non-lethal and lethal control activities actually may promote the long-term survival of wolves by enhancing tolerance and providing redress to citizens legitimately impacted by wolves. This also means recognizing the wolf as a native species of Washington, with legal, social, and biological value, and an important ecological role in maintaining native ecosystem functions and processes. Taking actions to minimize conflict and effective enforcement against illegal actions taken to harm wolves also are key parts of achieving conservation goals.

The purpose of this plan is to guide the conservation and management activities necessary for downlisting wolves from a status of state endangered to threatened to sensitive, and followed by delisting to a game animal. If the state's wolf population eventually grows large enough, some undetermined amount of closely managed licensed hunting could be considered. Reclassifying and managing the species as a game animal will require that wolves continue to be carefully managed to prevent the population from declining to a level requiring relisting. After delisting, WDFW will revise its management plan for wolves based on the latest information specific to Washington and the need to maintain sustainable wolf populations in balance with other species and human interests.

II. BACKGROUND

A. History of Wolves in Washington and Surrounding Areas

Fur Trading, Bounties, and Extermination in Washington

Gray wolves were common throughout most of Washington before 1800. Some authors have suggested that wolves did not occur in the Columbia Basin (Young and Goldman 1944, Booth 1947, Dalquest 1948), but this is seemingly contradicted by several reports. Douglas (1914) occasionally observed wolves while traveling in shrub-steppe areas between The Dalles, Oregon, and Walla Walla in March 1826, whereas Suckley and Cooper (1860) described them as abundant in this same area and habitat in the mid-1850s despite the absence of large ungulate prey. Records also exist of wolves in the vicinity of the Walla Walla Valley (Wilkes 1844) and in southern Grant County (Dalquest 1948; see Appendix C for a map of counties in Washington).

Trapping of wolves as a commercial source of fur began in earnest during the 1820s following the establishment of the Hudson's Bay Company in the Pacific Northwest. The company initiated an elaborate trading system with Native Americans across the region. Fur trading occurred at four forts located in Washington (Figure 1). From 1821 to 1859, a total of 14,810 wolf pelts were traded at the following locations: Fort Nez Perces, located at the junction of the Columbia and Walla Walla Rivers, 8,234 pelts; Fort Colville located along the Columbia River in present-day Stevens County, 5,911 pelts; Fort Vancouver located at present-day Vancouver, Clark County, 416 pelts; and Fort Nisqually in southern Puget Sound, 249 pelts (Hudson's Bay Archives 1988, Laufer and Jenkins

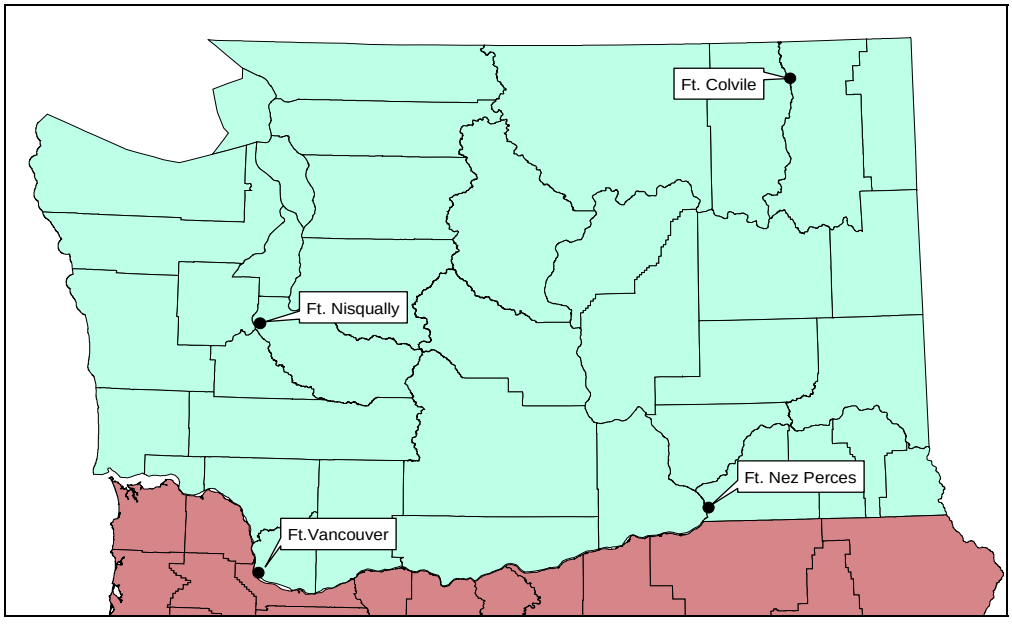


Figure 1. Map of the four main fur trading posts operated by the Hudson's Bay Company in Washington from 1827 to 1859.

1989). These totals include animals taken not only from Washington, but originating from parts of British Columbia, Idaho, Oregon, and perhaps western Montana as well.

Despite the fur trade, wolves remained common in many areas of Washington into at least the 1850s. In 1839, Elkanah Walker reported that wolves were "thick" at Tshimakain mission (near present-day Ford in Stevens County), making it necessary to corral horses at night for protection (Gibson 1985: 176). Wolves were also a problem at Cowlitz Farm (operated by the Hudson's Bay Company near present-day Toledo in Lewis County) in 1841 and required "large numbers of cattle …… [to be brought in each] night, which is a very necessary precaution …… in consequence of the numerous wolves that are prowling about; in some places it becomes necessary for the keeper to protect his beasts even in the daytime" (Wilkes 1844). Joseph Drayton of the Wilkes expedition remarked in 1841 that "wolves were very numerous … and exceedingly troublesome" between Fort Walla Walla (at its initial site along the Columbia River) and the Whitman mission in present-day Walla Walla County (Wilkes 1844). On the Nisqually Plains in present-day Pierce County, wolves were "very common" during the winter of 1844-1845 (Heath 1979:14-15). Suckley and Cooper (1860), who visited Oregon and Washington Territories from 1853 to 1857, described wolves as "exceedingly numerous …… from the Cascades to the Rocky Mountain Divide." They also reported that wolves were abundant in the headwaters of the rivers flowing into the Columbia River from the Cascades and the Blue Mountains, and stated that abundance had increased after the introduction of sheep into the region. As late as 1889, Linsley (1889) described the region near the Pend Oreille River as being "…… full of black and silver gray wolves……" He and his partner trapped or shot 40 wolves in the area during the winter of 1888-1889.

Euro-American settlement of the Pacific Northwest brought immediate efforts to control wolves. The Hudson's Bay Company used strychnine for poisoning wolves at its early farming operations in Washington and set high prices on wolf skins to encourage killing by Indians (Heath 1979: 32; Gibson 1985: 120). Residents of the Oregon country (which included Washington) convened their first "Wolf Meeting" in 1843 and established a $3.00 wolf bounty (Young 1946, Laufer and Jenkins 1989). During an 18-month period in 1841-1842, a shepherd at Nisqually Farm killed more than a hundred wolves (Gibson 1985: 120). By the mid-1850s, wolves had become "quite scarce" on the Nisqually Plains because of poisoning efforts to protect local sheep herds (Suckley and Cooper 1860).

Although poorly documented, wolves were heavily persecuted during the last half of the 1800s as ranching and farming became established in the state, and were eliminated from most areas by 1900 (Dalquest 1948). Poisoning, trapping, and shooting were common control techniques. Populations held out somewhat longer in a few more remote locations. One of these was on the Olympic Peninsula, where estimates of 115 wolves in 1910 and 40-60 wolves in 1919 were made (Scheffer 1995). However, this population declined rapidly thereafter and was nearly gone by the late 1930s (e.g., see Beebe no date). Adamire (1985) reported that bounties were paid on 46 wolves by the Clallam County auditor's office from 1906-1929. Wolves remained in the southern Cascades until at least 1915, but had disappeared as a resident population by 1941 (Young and Goldman 1944). A few animals also persisted in the vicinity of Mt. Rainier until the 1920s, but Taylor and Shaw (1929) considered them "rare and of irregular occurrence" in the national park. Dalquest (1948) reported that a few wolves might have survived in the northern Cascades between Lake Chelan and Mount Baker until at least the 1940s. A "band of a dozen wolves" was reported in the Aeneas Valley of

eastern Okanogan County in 1914 (Hansen 1986). Booth (1947) gave evidence that a few wolves remained in the Blue Mountains until 1915 or perhaps later. The U.S. Forest Service estimated that only about 10 wolves in total survived on all national forest lands in the state by 1939 (Young and Goldman 1944).

Illustrating the rarity of wolves in Washington by the 1910s and 1920s, extensive predator control work by federal hunters from the U.S. Biological Survey operating throughout the state resulted in the killing of only two wolves between 1915 and 1929 (United State Congress 1929). Scattered records of wild wolves killed and reliable sightings were made from various localities in the state during this period and into the 1950s. A sampling of these appears in Table 1. It seems likely that many of these individuals were dispersers from neighboring states and British Columbia rather than the survivors from remnant breeding populations. Johnson and Johnson (1952) remarked that sightings by experienced observers suggested that a few wolves may have continued to persist in the Queets River drainage and perhaps elsewhere in the Olympic Mountains until as late as the early 1950s.

Table 1. Miscellaneous records of wolves in Washington from 1917 to the 1950s.

Record	Location	Date	Source
Two killed	Near the former community of Wahluke, Grant Co.[1]	1917	Dalquest (1948)
Two killed	North fork of the Quinault River, Jefferson Co.	About 1920	Dalquest (1948)
Two sightings	Whatcom Co.	1922	Edson (1931)
One killed	Skamania Co.	1924	Guenther (1952)
Bounty paid for one killed	Skagit Co.	1927	Edson (1931)
Bounty paid for one killed	Snohomish Co.	1927	Edson (1931)
One trapped	Near Tonasket, Okanogan Co.	1930	Guenther (1952)
One reported	Near Prouty Mountain, Pend Oreille Co.	1932	Hansen (1986)
One killed	Twin Peaks, Snohomish Co.	1936	Booth (1947)
One killed	Taylor Ridge about 12 mi east of Republic, Ferry Co.	1950	Guenther (1952)
Two seen	Near Curlew, Ferry Co.	1951	Hansen (1986)
Four seen and heard	Sheep Creek drainage in northern Stevens Co.	Early 1950s	Hansen (1986)
One seen	North of Slate Creek, Pend Oreille Co.	1955	Layser (1970)

[1] Dalquest (1948) reported these as the last wolves killed in the Columbia Basin.

Probable reports of wolves continued to occur in Washington during the next few decades, with greater effort devoted to documentation of records during the 1970s and 1980s. Sixty-eight records of the species held in the WDFW Heritage database for 1970-1989 were largely restricted to the Cascade Mountains and parts of northeastern Washington. Hansen (1986) summarized 42 reports from northeastern Washington made from before 1960 to 1985. Records were compiled from a variety of sources, including unpublished accounts, reports from the public, and trapper questionnaires. Twenty-four records were judged as probably accurate and 18 were possibly accurate. Eighteen originated from before 1960 to 1973 and 24 were from 1974 to 1985. Five records involved three or more wolves, 10 were of two wolves, and 27 were of single animals; most reports of two or more wolves originated from 1973 or earlier. Two-thirds of the reports after 1973 came from the eastern half of the Colville National Forest, with most obtained from the Slate Creek/Sullivan Creek area on the east side of the Pend Oreille River. One wolf was killed near

Mansfield, Douglas County, in 1975. Hansen (1986) gave brief descriptive accounts of many of these records.

Laufer and Jenkins (1989) compiled a similar account of wolf records from the Cascades for 1946 to 1988. Reports from this area represented 70% of all reports from the state during this period. A total of 49 reports came from the Cascades during 1973-1988. Thirty-one of these were analyzed in greater detail, with 19 rated as probably accurate and 12 as possibly accurate. Two records involved three or more wolves, five were of two wolves, and 24 were of single animals. These records were concentrated in the Baker Lake and Ross Lake areas of the North Cascades and in the vicinity of Mount Rainier.

Almack and Fitkin (1998) reviewed 913 reports of gray wolves in Washington from 1834 to 1994. Of these reports, 78 were judged to be confirmed observations: 55 were primarily bounty records from 1834 to 1929 (e.g., see Adamire 1985), three were from 1944 to 1975, and 20 were sighting or howling reports from 1989 to 1994.

Native Americans and Wolves

Several summaries have appeared on the strong cultural and spiritual ties of Native American tribes in Washington to wolves (Laufer and Jenkins 1989, Ratti et al. 1999). Wolves are respected for their intelligence, hunting ability, and devotion to other pack members (Ratti et al. 1999). These and other values have been taught to generations of Native Americans through the telling of stories and legends. Wolves play an important role in the creation stories and other myths of many tribes, such as the Quinault, Quileute, Makah, and S'Klallam of the Olympic Peninsula (see Ratti et al. 1999). Wolves also have significant parts in the spiritual life of some tribes. For example, they serve as spirit guides for tribal members and provide spiritual power to warriors and hunters (see Ratti et al. 1999). Wolves are also featured in vision-quest stories, rituals, and ceremonial practices. Thus, for many tribes, there is a general regard that wolves "help" humans to prosper both physically and socially (Laufer and Jenkins 1989).

Although some tribes had taboos against killing wolves (Laufer and Jenkins 1989), others such as the Salish and Quinault are known to have hunted them (Ratti et al. 1999). The Sanpoil and Nespelem of northeastern Washington caught wolves and used their skins for robes or blankets (Ray 1933). Wolves were also sometimes kept as pets.

History of Wolves in Neighboring States and British Columbia

As in Washington, wolves were formerly common and widely distributed in Oregon, Idaho, Montana, and Wyoming, but experienced serious declines following the arrival of white settlers and the expansion of the livestock industry (Young and Goldman 1944). Bounties were enacted in the 1870s and 1880s in each of these states and helped reduce abundance. For example, 4,540 wolf hides were presented for payment in the first year of Montana's statewide bounty in 1884 (MFWP 2003). Prey scarcity caused by the elimination of bison and reductions of other ungulates also impacted wolves in Montana and Wyoming. Wolf numbers were severely reduced in these four states by the early 1900s and self-sustaining populations were virtually eliminated by 1930. One exception to this occurred on national forest lands in the Oregon Cascades, where an estimated 130 animals remained in 1939 (Young and Goldman 1944); these animals were gone too by the 1940s.

Scattered reports of sightings, tracks, and scat continued in these states (especially Montana and Idaho) into the 1970s and 1980s, with most animals thought to represent dispersers from Canada. In 1986, the first wolf den to be documented in Montana in more than 50 years was discovered in Glacier National Park (MFWP 2003).

Wolves originally occurred throughout British Columbia, but were sufficiently persecuted during the late 1800s and early 1900s to be eliminated from most of the southern portion of the province by 1930 and to become fairly uncommon in remaining areas (Tompa 1983, Boitani 2003). Province-wide populations fell to their lowest levels during the 1920s and 1930s (Tompa 1983, Hayes and Gunson 1995). Numbers generally began recovering thereafter (except during a period of resumed control during the 1950s) and most of British Columbia was again occupied by the early 1990s, with the exception of the southwest mainland (Hayes and Gunson 1995). However, even as late as 1968, wolves were considered "close to extinction" in the southeastern portion of the province (Tompa 1983).

B. Current Status of Wolves

Washington

Washington experienced a flurry of reported wolf activity during the early 1990s, primarily in the North Cascades, which presumably involved animals originating mostly from southern British Columbia. Wolves were documented for more than a month in the Hozomeen area of the Ross Lake National Recreational Area in the North Cascades in 1990 (Church 1996), with adults and pups recorded (Almack and Fitkin 1998). Wolves were again found in the area during 1991, 1992, and 1993. However, it was later learned that a pet wolf released at Hozomeen in the early 1990s (Martino 1997) was responsible for some of these sightings (S. Fitkin, pers. comm.). Howling surveys conducted in the Okanogan and Wenatchee National Forests from 1991 to 1993 resulted in two confirmed wolf responses in backcountry areas, but locations were not reported (Gaines et al. 1995). A sighting of a wolf with pups was also reported in the North Cascades in July 1996 (Church 1996), but this record probably should be considered as unconfirmed (W. L. Gaines, pers. comm.). Additionally, one wolf was found dead near Callispell Lake in southern Pend Oreille County in May 1994 (Palmquist 2002; WDFW, unpubl. data). This animal was radio-collared and had immigrated from northwestern Montana.

Overall, from 1991 to 1995, Almack and Fitkin (1998) reported 20 confirmed wolf sightings in Washington. Sixteen of these were made in the Cascades and four in Pend Oreille County, although these records were probably biased towards observations in the Cascades. Almack and Fitkin (1998) concluded that small numbers of wolves existed in Washington, mostly as individuals but with several family units present that had reproduced. No evidence of large packs or a recovering population was detected. Almack and Fitkin (1998) also confirmed the presence of free-ranging wolf-dog hybrids in the state and believed that a significant number of reported wolf observations probably represented hybrid animals.

Wolf reports in Washington declined after 1995, probably due mainly to a reduced emphasis on data collection. In February 2002, a radio-marked female spent several weeks in northern Pend Oreille County, including sites near Metaline Falls and the Salmo-Priest Wilderness (Palmquist 2002). This

individual had also immigrated from northwestern Montana and soon departed for British Columbia.

Reliable reports of wolves and tracks have continued since 2002 and have increased in the past several years (Appendix D), although this may reflect greater effort by WDFW biologists and others to obtain and follow-up on wolf reports and to place remote cameras in the field. In most cases, reports have involved single animals. Many have originated from Pend Oreille and Stevens counties, including several individuals photographed by remote cameras at different locations in 2007 (S. Zender, pers. comm.). In late August 2007, a calf depredation in northernmost Stevens County was attributed to one or more wolves by USDA Wildlife Services (R. Woodruff, pers. comm.). A highway-killed animal found near Tumtum, Stevens County, in June 2008 was found through genetic testing to be a pure wolf whose population of origin was in either northwestern Montana or southern Alberta (J. Pollinger, pers. comm.). There have also been multiple public reports of wolves in the Blue Mountains dating back to at least 2006 (P. Wik, pers. comm.; P. Fowler, pers. comm.), but these need further investigation to determine reliability. Single reports of groups of 3-5 wolves were made in Pend Oreille and Garfield/Asotin counties in 2007-2008.

Wolf reports from Okanogan County increased dramatically in 2008 (Appendix D), with subsequent investigation revealing that one or more locations have had suspected activity extending back a number of years (S. Fitkin, pers. comm.). A pack with at least three adults/yearlings and six pups was confirmed in the western part of the county in July 2008, when the alpha male and female were captured and radio-collared, and other pack members were photographed near a suspected rendezvous site. This represents the first fully documented breeding by a wolf pack in Washington since the 1930s. Another report involving 6-8 animals in northern Chelan County in September 2007 was not confirmed during a follow-up search, but was in an area of past suspected activity (R. Kuntz, pers. comm.).

In summary, Washington currently holds at least a few solitary wolves in scattered locations and one pack confirmed to have bred, with possibly one or several additional packs present. Wolves occurring in northern Washington probably represent animals that have dispersed from areas of northern Idaho and northwestern Montana that were naturally repopulated by wolves, or from British Columbia. By contrast, wolves present in the Blue Mountains probably originate from central Idaho (via Oregon), where a population was reestablished through reintroductions in 1995 and 1996.

Continued presence of hybrid wolves in the wild in Washington has also been confirmed (Appendix D; Palmquist 2002).

Neighboring States and British Columbia

Wolf numbers in Montana, Idaho, and Wyoming have rapidly grown during the past 22 years and totaled at least 1,513 animals in 192 recognized packs in 2007 (USFWS et al. 2008). Recolonization of these states began in 1979, when wolves reentered the area near Glacier National Park in northwestern Montana from Alberta. Breeding in this population was first detected in 1986. Dispersers from the park and neighboring areas of Canada gradually recolonized other parts of northwestern Montana over the next decade. Reintroductions into Yellowstone National Park and central Idaho were conducted by the USFWS in 1995 and 1996, and have also contributed to

steadily expanding populations in the three states (Bangs et al. 1998). This growth allowed the wolf population in the northern Rocky Mountain states to meet the biological recovery levels set by the USFWS by the end of 2002 (MFWP 2003). At the close of 2007, wolf numbers totaled 732 in Idaho, 422 in Montana, and 359 in Wyoming (USFWS et al. 2008). Wolves are currently distributed primarily in western Montana, central and northern Idaho, and western Wyoming. One pack in northern Idaho exists just a few miles from the Washington border (J. Hayden, pers. comm.) and several others in the state occur to within about 30 miles of Washington. Additionally, four sightings involving multiple wolves in northern Idaho were reported within 10 miles of Washington in 2007 (USFWS et al. 2008).

Between 1999 to early 2008, verified reports of wolves in Oregon totaled five solitary animals and one pair, all of which occurred in the northeastern corner of the state (ODFW 2005, Jacoby 2007, Cockle 2008). At least four of these animals were immigrants from Idaho and either died from human-related causes or were caught and returned to their original source. In July 2008, biologists heard a pack with pups during a howling survey on the Umatilla National Forest in northern Union County about 12 miles south of the Washington border (R. Morgan, pers. comm.). This represents the first confirmed record of breeding in Oregon since the 1940s. There have also been reports of tracks, howling, and sightings of one or more wolves in Wallowa County close to the activity reported in Washington's Asotin and Garfield counties from 2006 to 2008; preliminary evidence suggests these animals are not associated with the pack in Union County (R. Morgan, pers. comm.). In addition to these records, unconfirmed reports of wolves are regularly made in Oregon (e.g., 120 were received by the Oregon Department of Fish and Wildlife in 2007) and come primarily from several northeastern counties. This information combined suggests that a breeding population is in the early stages of forming in the state, but is very small and restricted to the northeast.

Population estimates of wolves are not available for southern British Columbia, but anecdotal evidence suggests that much of the southwestern mainland has experienced a recent increase in wolf abundance (Pynn 2008; D. Reynolds, pers. comm.). Wolves in this region occur south to the Washington border, with some breeding known in or near Skagit Valley Provincial Park. Wolves remain largely absent in the zone along the Washington border from Manning Provincial Park eastward to Grand Forks, although a few animals are sporadically detected (B. Harris, pers. comm.). Numbers appear to be growing north of Kelowna (B. Harris, pers. comm.). Wolf recovery has continued in southeastern British Columbia, with harvest numbers suggesting increased abundance since the mid-1990s (G. Mowat, in prep.). However, wolves remain scarce in the Nelson-Salmo-Grand Forks area along the northeastern Washington border, although one pack is known to reside near the boundary (G. Mowat, pers. comm.). Wolves are considered common on Vancouver Island (D. Reynolds, per. comm.).

Current wolf management in southern British Columbia allows a 9-month hunting season in much of the Kootenay region (including along the borders of Stevens and Pend Oreille counties of Washington) and no closed season in the East Kootenay Trench, with bag limits of two animals. There is also a 5.5-month trapping season with no bag limit. Wolves are currently protected from hunting and trapping in the Okanagan region, but a hunting season may be proposed (B. Harris, pers. comm.). Wolves are also protected from both types of harvest in the southern portion of the region covering the southwestern mainland.

C. Biology

Physical Characteristics

In Montana, male gray wolves weigh 90-110 pounds and females weigh 80-90 pounds. Wolves in the greater Yellowstone area (GYA) are slightly heavier, with winter-captured adult females averaging 108 pounds, immature females averaging 96 pounds, and immature males averaging 107 pounds (Smith et al. 2000). About half of the wolves in Montana are black, most of the remainder are gray, and a few are white. Both black and gray color phases may be found in a pack or in one litter of pups. Animals with dark pelage sometimes progressively change to white over time, perhaps due to old age, physiological stress, or genetic factors (Gipson et al. 2002).

Observers sometimes confuse coyotes for wolves, but a number of physical features separate the two (Figure 2). Wolf tracks are typically 4.0-4.5 to 5.0-5.5 inches long (Harris and Ream 1983) and are noticeably larger than those of coyotes.

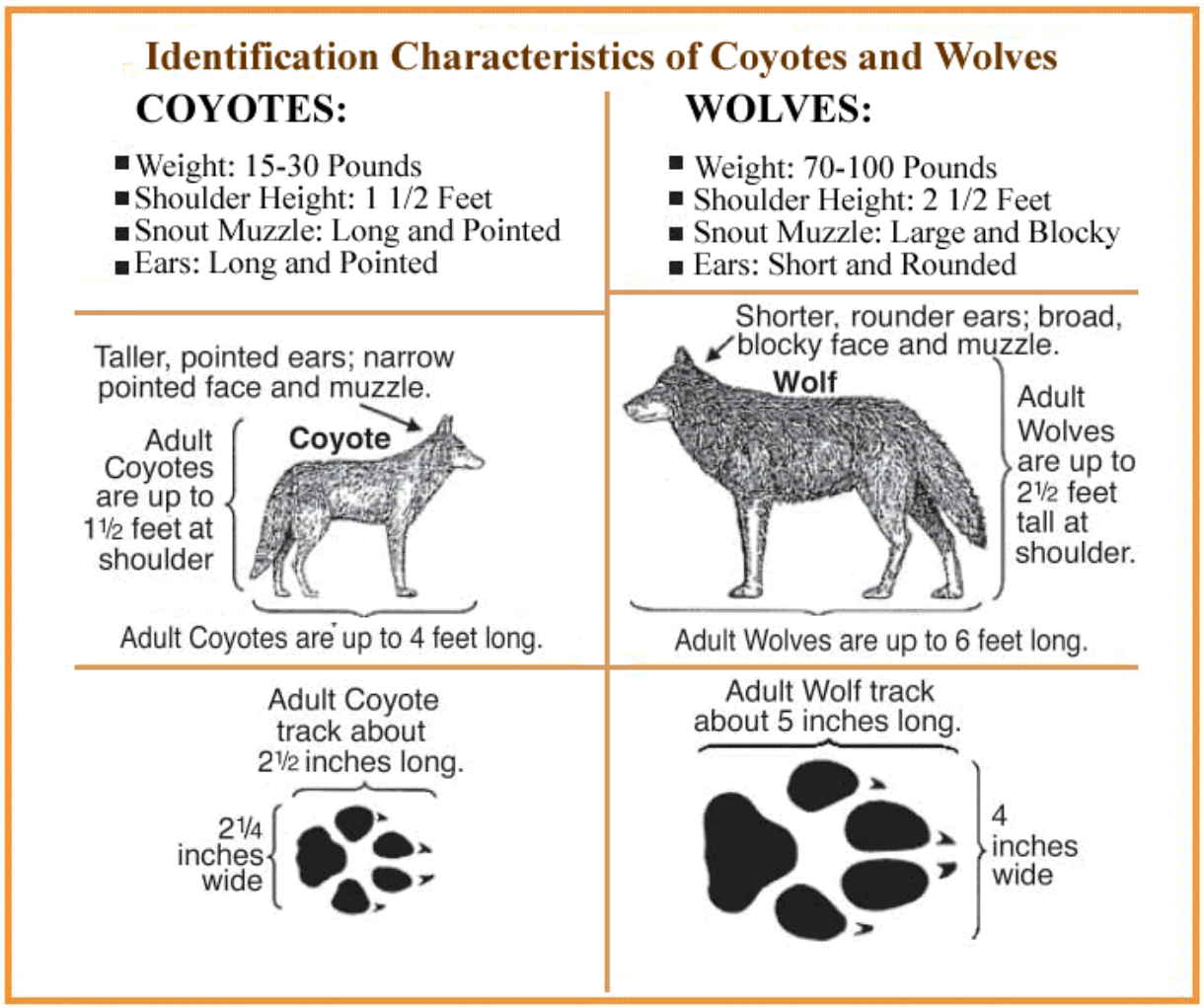


Figure 2. Identification characteristics used to distinguish wolves from coyotes (from ODFW 2008).

Wolves also may be confused with some large domestic dog breeds. Wolves are distinguished from dogs by their longer legs, larger feet, wider head and snout, narrow body, and straight tail. Other distinguishing characteristics require closer examination than is possible in field settings with live animals. In many instances, behavior distinguishes wild wolves from wolf-dog hybrids and domestic dogs (Boyd et al. 2001, Duman 2001).

Behavior

Gray wolves are a highly social species and live in packs (Mech and Boitani 2003a). Packs are formed when male and female wolves develop a pair bond, breed, and produce pups. The pack typically consists of a socially dominant breeding pair (alphas), their offspring from the previous year, and new pups. Other breeding-aged adults may be present, but they may or may not be related to the others (Mech and Boitani 2003a). The pack hunts, feeds, travels, and rests together. The pack also shares pup-rearing responsibilities, including hunting and tending pups at the den or at a series of rendezvous sites. Pack size is highly variable (Mech and Boitani 2003a). Populations that are rapidly growing and expanding often feature smaller pack sizes, whereas those that are well established and have slow growth rates tend to have larger pack sizes if adequate food is available (Mitchell et al. 2008). In six regions of Idaho, Montana, and Wyoming, average pack size ranged from 5.1 $\pm$ 1.1 (SD) wolves in southwestern Montana-central Idaho to 9.9 $\pm$ 2.6 wolves in Yellowstone National Park (YNP) through 2005 (Mitchell et al. 2008). Smith et al. (2000) reported a maximum pack size of 27 animals at YNP.

Pack membership typifies the predominant manner in which wolves exist in the wild. The pack is the mechanism by which wolves reproduce and populations grow. However, in most wolf populations, some lone nomadic individuals exist as dispersers. These animals spend time looking for vacant habitat, waiting to be found by a member of the opposite sex within a new home range, or searching for an existing pack to join. Lone wolves typically comprise up to 10-15% of a population (Fuller et al. 2003). This is a temporary transition. Lone animals in northwestern Montana usually found other wolves in an average of 66 days (range 2-202 days) (Boyd and Pletscher 1999). For a wolf to make a contribution to the population, it must affiliate with other wolves.

Reproduction

Wolves normally do not breed until at least two years of age (Fuller et al. 2003). Breeding usually occurs only between the dominant male and female in a pack. In the northern Rockies, the breeding season peaks in mid- to late February (Boyd et al. 1993). Wolves localize their movements around a den site and give birth in late April after a 63-day gestation period. Dens are usually underground burrows, but can occur in a variety of other situations, including abandoned beaver lodges, hollow trees, and shallow rock caves. Dens are often located near water. Wolves may be sensitive to human disturbance during the denning season. Pups are moved to a series of rendezvous sites after reaching about eight weeks of age.

Litters usually average four to six pups (Fuller et al. 2003, USFWS et al. 2008). Average litter sizes of 5.3 (range 1-9) pups and 5.1 pups were reported from northwestern Montana in 1982-1994

(Pletscher et al. 1997) and from central Idaho in 1996-1998 (Mack and Laudon 1998), respectively. In 2007, litter size averaged 5.8 pups in YNP, 4.5 pups in Wyoming outside of YNP, and at least 4.1 pups in Idaho (USFWS et al. 2008).

Most packs produce only one litter annually, but occasionally, more than one female in a pack may breed, resulting in multiple litters (Fuller et al. 2003). This phenomenon has been documented in YNP, where for example 13 packs had 16 litters in 2000 (USFWS et al. 2001). Presence of more than one litter can occasionally lead to the formation of new packs (Boyd et al. 1995).

Pup survival is highly variable and is largely influenced by disease, predation, and nutrition (Mech and Goyal 1993, Johnson et al. 1994, Fuller et al. 2003). In northwestern Montana from 1982 to 1994, 85% of pups survived on average until December, though survival varied year to year (Pletscher et al. 1997). In YNP, pup survival varied between 73 and 81% from 1996 to 1998, then declined to 45% in 1999 because of a likely outbreak of canine distemper (Smith et al. 2000, Smith and Almberg 2007). However, pup survival rebounded to 77% in 2000.

Pack size is another important factor in determining whether or not a pack is successful in breeding and raising pups. Recent analyses by Mitchell et al. (2008) reveal that larger packs of 10 or more wolves in Idaho, Montana, and Wyoming have a 90% or greater chance of successfully rearing two or more pups through December of a given year, whereas smaller packs are much less likely to do so. For example, depending on location within these states, packs of 4-5 animals had only a 20-73% chance of successfully raising at least two pups to year's end. Reduced reproductive output in wolf populations can therefore result as a consequence of high levels of human mortality causing smaller pack sizes (Mitchell et al. 2008).

Food Habits

Gray wolves are opportunistic carnivores that are keenly adapted to hunt large prey species, such as deer, elk, and moose. Ungulate species comprise different proportions of wolf diets, depending on their relative abundance and distribution within territories. In the central and northern Rocky Mountains of the United States and Canada, elk are often the primary prey of wolves, but deer and even moose are more important in some areas (Table 2).

Wolves also prey on smaller animals, scavenge carrion, and even eat vegetation. Wolf scat collected in YNP in 1998 contained the remains of voles, ground squirrels, snowshoe hares, coyotes, bears, insects, and plant matter (Smith 1998). Work in northwestern Montana has also documented non-ungulate prey such as tree squirrels, other small mammals, ruffed grouse, ravens, striped skunks, beavers, coyotes, porcupines, and golden eagles (Boyd et al. 1994, Arjo et al. 2002).

Wolves scavenge opportunistically on vehicle- and train-killed ungulates, winterkill, and on kills made by other carnivores, particularly cougars. Wolves in northwestern Montana scavenge the butchered remains of domestic livestock at rural bone yards and big game animals at carcass disposal sites. Wolves also kill and feed on domestic livestock such as cattle, sheep, llamas, horses, and goats. They also kill domestic dogs.

Territories

A pack establishes an annual home range or territory and defends it from trespassing wolves. From late April until September, pack activity is centered at or near the den or rendezvous sites, as adults hunt and bring food back to the pups. One or more rendezvous sites are used after pups emerge from the den. These sites are often in meadows or forest openings near the den, but sometimes are several miles away. Adults will carry small pups to a rendezvous site. Pups travel and hunt with the pack by September. The pack hunts throughout its territory until the following spring.

Table 2. Prey selection by wolves at various locations in the central and northern Rocky Mountains of the United States and Canada and other areas of British Columbia.

		Prey species (% of total)								
Location	Season[1]	Elk	White-tailed deer	Mule deer	Black-tailed deer	Moose	Bison	Bighorn sheep	Other [2]	Source[3]
Glacier Natl Park	w	30	60	3	-	7	-	-	-	1
Glacier Natl Park area (Camas pack)	w	14	83	-	-	3	-	-	-	2
Glacier Natl Park area (Spruce pack)	w	35	4	-	-	61	-	-	-	2
Northwest Montana	y	23	49[4]	-	-	12	-	-	15	3
Madison Range, sw Montana	w, sp	70	26	4	-	-	-	-	-	4
Idaho	su	53	42[4]	-[4]	-	-	-	-	5	5
Yellowstone Natl Park	w	92	2[4]	-[4]	-	3	3	-	-	6
Yellowstone Natl Park	y	81	1[4]	-[4]	-	<1	11	<1	5	7
Yellowstone Natl Park	y	88	1[4]	-[4]	-	1	4	-	6	8
Banff Natl Park	w, su	78	7[4]	-[4]	-	10	-	2	3	9
Vancouver Island	y	28	-	-	71	-	-	-	1	10
Vancouver Island	w, su	38	-	-	56	-	-	-	7	11

[1] Season: w, winter; y, year-round; sp, spring; su, summer.
[2] Includes other wildlife, such as mountain goats, beaver, pronghorn, smaller mammals, birds, and unknown species.
[3] Source: 1, Boyd et al. (1994); 2, Kunkel et al. (2004); 3, Arjo et al. (2002); 4, Atwood et al. (2007); 5, Mack and Laudon (1998); 6, Smith et al. (2004); 7, USFWS et al. (2007); 8, USFWS et al. (2008); 9, Huggard (1993); 10, Scott and Shackleton (1980); 11, Milne et al. (1989).
[4] Use of white-tailed deer and mule deer combined.

Pack boundaries and territory sizes may vary from year to year. Similarly, a wolf pack may travel in its territory differently from one year to the next because of changes in prey availability or distribution, conflicts with neighboring packs, or the establishment of a new neighboring pack. Other attributes such as elevation, land use, land ownership patterns, prey species present, and relative prey abundance make each pack's territory unique. Pack size also affects territory size. Thus, it is difficult to generalize about wolf territories and movements.

During the mid- to late 1980s, the earliest colonizing wolf packs in northwestern Montana had territories averaging 382 square miles in size (Ream et al. 1991). Average territory size in this region fell to 185 square miles (range = 24-614 square miles) by the late 1990s (USFWS et al. 2000), probably as new territories filled in suitable unoccupied habitat. Throughout Montana, territory size currently averages about 200 square miles per pack but can reach 300 square miles or larger (USFWS

et al. 2007). In 1999, Idaho wolf packs had average territory sizes of 360 square miles (n = 13 packs), with individual pack territories ranging from 141 to 703 square miles (USFWS et al. 2000).

After recolonizing the GNP area in 1979, individual wolves dispersed and established new packs and territories elsewhere in western Montana. Wolves demonstrated a greater tolerance of human presence and disturbance than previously thought characteristic of the species. It previously was believed that higher elevation public lands would comprise the primary occupied habitats (Fritts et al. 1994). While some packs have established territories in backcountry areas, most prefer lower elevations and gentle terrain where prey are more abundant, particularly in winter (Boyd-Heger 1997, USFWS 2007a).

Use of public and private land by wolves has differed in Montana and Idaho. Of the 83 documented packs in Idaho that survived during 2007, all territories were wholly or predominantly on U.S. Forest Service (USFS) public lands (USFWS et al. 2008). In contrast, packs in northwestern Montana have negotiated a wide spectrum of property owners and land uses since settling outside the GNP area in the early 1990s. These packs move through a complex matrix of public, private, and corporate-owned lands. Landowner acceptance of wolf presence and the use of private lands is highly variable in space and time. Given the mobility of the species and the extent to which these lands are intermingled, it is not unusual for wolves to traverse each of these ownerships in a single day. Land uses range from dispersed outdoor recreation, timber production, or livestock grazing to home sites within the rural-wildland interface, hobby farming/livestock, or full-scale resort developments with golf courses.

Private lands may offer habitat features that are attractive to wolves, so some packs may use those lands disproportionately more than other parts of their territories. In some settings, geography dictates that wolf packs use or travel through private lands and co-exist in close proximity with people and livestock. Land uses may predispose a pack to conflict with people or livestock, although the presence of livestock does not make it a forgone conclusion that a pack will routinely depredate (Bangs and Shivik 2001, Sime et al. in press).

Dispersal

Upon reaching sexual maturity, most wolves leave their natal pack, looking for a mate to start a new pack of their own (Mech and Boitani 2003a). Dispersal may be to unoccupied habitat near their natal pack's territory or it may entail traveling much longer distances before locating vacant habitat, a mate, or joining another pack. Wolves appear to disperse preferentially to areas occupied by other wolves, using scent marking and howling to locate other animals (Ray et al. 1991). Boyd and Pletscher (1999) indicated that dispersers in their study moved toward areas with higher wolf densities than found in their natal areas.

In northwestern Montana from 1985 to 1997, 53% of tagged wolves dispersed from their natal territories to establish new territories or join other existing packs (Boyd and Pletscher 1999). Males dispersed at an average age of 28.7 months and traveled an average of 70 miles, whereas females averaged 38.4 months old at dispersal and moved an average of 48 miles. Males and females, combined, traveled an average of 60 miles (range 10-158 miles), with 17% of dispersing individuals moving more than 100 miles. At YNP from 1995 to 1999, dispersal distances averaged 54 miles in males and 40 miles in females (Smith et al. 2000). Dispersals can occur in any month, but are

somewhat more frequent in January-February (courtship and breeding season) and May-June (Boyd and Pletscher 1999). Maximum dispersal distances of more than 500 miles have been recorded (USFWS et al. 2008). Wolves are capable of traveling such distances in fairly short periods of time.

Dispersal has been regularly documented among and between populations in Montana, Idaho, Wyoming, and bordering areas of British Columbia, thereby increasing genetic exchange across the region (Bangs et al. 1998, Mack and Laudon 1998, Smith et al. 2000). Dispersal paths crossed international boundaries, state boundaries, public and private land boundaries, different land uses, and agency jurisdictions.

Mortality

Wolves die from a variety of causes, which are usually classified as either natural or human-caused. Natural deaths result from territorial conflicts between packs, injuries while hunting prey, old age, disease, starvation, or accidents. In populations protected from human-caused mortality, most wolves die from starvation or from being killed by other wolves that are usually from neighboring packs (Mech et al. 1998, Peterson et al. 1998, USFWS et al. 2008). However, in Idaho, Montana, and Wyoming, natural mortality probably does not regulate populations (USFWS 2000). Humans are the largest cause of wolf mortality in this region as a whole (Mitchell et al. 2008) and are the only cause that can significantly affect populations at recovery levels (USFWS 2000). Mitchell et al. (2008) reported that humans were responsible for 71-87% of wolf deaths in five of six regions of Idaho, Montana, and Wyoming through 2005, whereas only 23% of mortalities in YNP were human-related. Human-caused mortality includes control actions to resolve conflicts, legal and illegal killings, and car or train collisions (e.g., see USFWS et al. 2008).

Pletscher et al. (1997) studied survival and mortality patterns of wolves in the GNP area from 1982 to 1994. Total annual survival for this semi-protected population was a relatively high 80%. The survival rate for resident wolves was even higher (84%), whereas dispersers had a 64% chance for survival. Eighty-five percent of pups survived on average until December each year, though survival varied year to year.

Wolves are susceptible to a number of viral and bacterial diseases, including rabies, canine parvovirus, canine distemper, canine adenovirus (canine hepatitis), and leptospirosis (Kreeger 2003, USFWS et al. 2007, Smith and Almberg 2007). None of these appear to have produced significant mortality within Montana's wolves in recent decades (USFWS et al. 2007). However, serological testing of wolves at YNP has linked years with high prevalence of canine distemper to poor pup survival and population growth (Smith and Almberg 2007). Wolves at the park have shown high and relatively constant levels of exposure to canine parvovirus and canine adenovirus since their reintroduction in 1995, but it is unclear what effects these diseases have had on the population (Smith and Almberg 2007). Canine parvovirus is suspected to have caused declines in wolf populations at Isle Royale National Park (Kreeger 2003) and in northern Minnesota (Mech and Goyal 1995), and rabies may limit population growth in some situations (Kreeger 2003). Sarcoptic mange has been documented in many of the wolf packs outside of YNP, but wasn't detected in the park until 2007 (USFWS et al. 2006, Smith and Almberg 2007). Mange outbreaks can be severe and persistent, and can occasionally produce mortalities (USFWS et al. 2006).

Rates of Population Change

In the absence of human-caused mortality, wolf populations increase or decrease through the combination and interaction of wolf densities and prey densities (Keith 1983, Fuller 1989). Actual rates of change depend on whether the wolf population is pioneering vacant habitat (as recently occurred in YNP and central Idaho) or whether the population is well established (as in northwestern Montana). Degree and type of legal protection, agency control actions, and regulated harvest also influence population trends. Once established, wolf populations can withstand high mortality rates provided that reproductive rates are also high and immigration continues (Fuller et al. 2003). In most locations, sustainable mortality rates range from about 32% to more than 50% (Fuller et al. 2003).

Low-density wolf populations can increase rapidly if protected and prey is abundant. For example, Fuller et al. (2003) cited one example from Michigan where annual population growth increased as much as 90%. Wolf populations in the GYA and Idaho areas exceeded all expectations for reproduction and survival after their initial reintroductions (Bangs et al. 1998). Populations became established in both areas within two years, rather than the predicted three to five years, and pup production and survival were high. However, once densities become high enough, social interactions among packs intensify, causing intraspecific conflict and increased competition for food. These factors eventually cause populations to level off or decline (Keith 1983, Fuller 1989).

Wolf populations in six regions of Idaho, Montana, and Wyoming increased at mean annual rates of 16-56% through 2005 (Mitchell et al. 2008). At GNP, wolf numbers increased an average of 23% annually from 1986 to 1993 (Fritts et al. 1995), but then leveled off (Pletscher et al. 1997). Dispersing individuals from packs in this area eventually recolonized vacant habitats in northwestern Montana (USFWS unpubl. data). Some of the packs that formed in this region persisted, but others did not due to illegal mortality, control actions where livestock depredation was chronic, and unknown reasons.

Over a 25-year period, total wolf numbers in Montana increased from 8 in 1982 to 422 in 73 packs in 2007 for an average annual rate of increase of about 25% (USFWS et al. 2007, 2008). The population remained fairly small (fewer than 20) for about 7 years, and then began a rapid increase that has continued to the present. Numbers have grown in 12 of 18 years since 1989. Prey abundance has influenced wolf population dynamics in northwestern Montana. Expanding white-tailed deer populations during the late 1970s through the mid-1990s were partly responsible for increasing wolf numbers and distribution. Smaller prey populations after the severe winter of 1996-1997 likely caused decreased wolf pup survival in 1997 and 1998 (C. Sime, unpubl. data).

Idaho's wolf population grew from fewer than 20 animals in 1995, when reintroductions first occurred, to an estimated 732 wolves in 2007 (USFWS et al. 2007, 2008), which corresponds to a mean annual growth rate of about 40%. Eighty-three packs were documented in 2007 and had expanded across much of the state from the Canadian border, south to the fringes of the Snake River plain, and east to the Montana and Wyoming borders.

The population at YNP has shown annual increases in numbers in all but three years since its reintroduction in 1995. Abundance peaked at 174 wolves in 2003, then fell 31% to 118 animals in

2005 (USFWS et al. 2006). Numbers grew 15% to 136 wolves in 2006 and another 26% to 171 wolves in 2007 (USFWS et al. 2007, 2008).

It is likely that population growth rates have slowed for YNP and will do so for other areas as the availability of suitable vacant habitat declines. However, these populations will be a source of founders for new packs outside the region currently occupied. Thus, wolf numbers and distribution outside current core areas are expected to increase rapidly in the next decade as wolves born in the initial pulse mature and disperse to recolonize vacant habitats elsewhere.

D. Legal Status

In Washington, gray wolves are subject to both the federal Endangered Species Act (ESA) and Washington state law (RCW 77.15.120, WAC 232-12-014). These laws are independent but somewhat parallel. So long as the wolf remains federally listed in Washington, both federal and state law must be consulted to understand the protections that pertain to wolves in the state.

Federal

Wolves were listed as endangered in 1973 under the federal ESA. In 1980, the USFWS completed the Northern Rocky Mountain Wolf Recovery Plan, which was revised in 1987 (USFWS 1987). The plan specified a recovery criterion of 10 successful breeding pairs of wolves for three consecutive years in each of three distinct recovery areas: 1) northwestern Montana, 2) central Idaho, and 3) the Yellowstone National Park area. The plan stated that if two recovery areas maintained 10 successful breeding pairs for three successive years, the population could be reclassified to threatened; and if all three recovery areas maintained 10 successful breeding pairs for three consecutive years, the wolf population could be considered fully recovered and considered for delisting. This latter requirement was met in 2002. Washington is not included in the Northern Rocky Mountain recovery plan.

Based on scientific reviews and updated information, the USFWS began using entire states, in addition to recovery areas, to measure progress toward recovery goals. Wolves reintroduced into Yellowstone National Park and central Idaho in 1995 and 1996 were designated as "non-essential experimental populations" under the federal ESA within a combined zone covering all of Idaho south of Interstate 90, southwestern Montana, and all of Wyoming. Elsewhere (i.e., northwestern Montana and northernmost Idaho), wolves remained listed as endangered. In addition to population objectives in the three states, the USFWS required approved state management plans to ensure the conservation of the species into the future as a condition of delisting the wolf in Idaho, Montana, and Wyoming. No such state plan was required of Washington because it was not part of the Northern Rocky Mountain recovery plan. State wolf management plans were approved by the USFWS for Montana and Idaho in 2004 and Wyoming in 2007.

In 2007, the USFWS proposed formation of a Northern Rocky Mountain distinct population segment (DPS) of the gray wolf and delisting of the DPS (USFWS 2007a). This proposal encompassed all of Montana, Idaho, and Wyoming, as well as the eastern one-thirds of Washington and Oregon and a small part of north-central Utah (Figure 3). A final delisting decision was published in the *Federal Register* on February 27, 2008, and became effective March 28, 2008 (USFWS 2008). Under this rule, wolves became federally delisted east of Highways 97/17/395 in Washington, but remained federally listed in the state west of these highways (Figure 3). However,

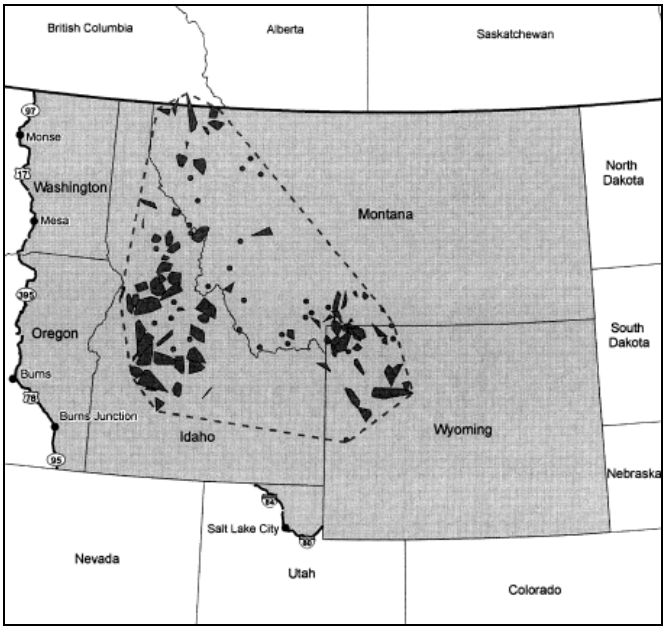


Figure 3. Map of the area (light gray shading) designated as the Northern Rocky Mountain distinct population segment of gray wolves (from USFWS 2008). Existing wolf pack territories as of 2006 are depicted in dark gray.

12 conservation groups challenged this determination by suing the USFWS to prevent delisting. On July 18, 2008, a U.S. district judge granted a preliminary injunction restoring federal protection to wolves in the DPS until the court case challenging the population's delisting is decided.

State of Washington

Wolves were first listed as endangered by the Washington Department of Game in 1980 because of their historical occurrence in the state and subsequent near extirpation from the state, and because of their existing status as endangered under the federal Endangered Species Act. State law RCW 77.15.120 protects endangered species from hunting, possession, malicious harassment, and killing, with penalties described therein (Appendix A). State listing and delisting procedures for endangered, threatened, and sensitive species in Washington are specified in WAC 232-12-297 (Appendix A). As wolves attain the conservation/recovery objectives identified in this plan, they will first be downlisted from endangered to threatened status and then from threatened to sensitive status. When delisted from sensitive status, wolves may be reclassified to a game animal that could be hunted at some point.

Tribal

In the mid-1800s, eight treaties (known as the "Stevens Treaties") were negotiated with tribes in what would become Washington State. The treaties established reservations for the exclusive use of the tribes. Federally recognized tribes with reservations generally have authority to manage fish and wildlife within their reservation. Not all of the state's tribes signed treaties with the federal government. Several of these tribes have reservations designated by executive order. These include

the Colville, Spokane, and Kalispel reservations in eastern Washington, and the Chehalis and Shoalwater reservations in western Washington.

Wolf Management

Wolf management may vary among tribes in Washington. WDFW has established a Wolf Interagency Committee composed of WDFW, tribes, federal and state land managers, and the USFWS to foster coordination and collaboration on wolf management in the state. Individual tribes in Washington may choose to develop their own wolf management plans. While wolves are federally listed as endangered, all tribes in the state are subject to federal Endangered Species Act regulations. If federal delisting of wolves occurs in all or part of Washington, there is the potential for some tribes to develop their own management plans and regulations regarding wolves. These may or may not be consistent with the state wolf plan. If issues were to arise over inconsistencies, they would be discussed in government-to-government consultations between WDFW and the tribes. With regard to hunting, treaties generally preempt state regulation of tribal treaty hunting. However, the courts have created a narrow exception to the general rule, which applies to situations where the state is regulating the hunting of a particular species in order to conserve that species. Below is some additional detail describing off-reservation hunting rights in Washington.

Off-Reservation Hunting

In addition to authorities to manage on reservation lands, the Stevens Treaty tribes reserved their right to continue traditional activities on lands beyond these reserved areas. The treaties all contain substantially similar language reserving the right to hunt, fish, and conduct other traditional activities on lands off reservations. There are 24 tribes with off-reservation hunting rights in Washington. Two of the tribes, the Confederated Tribes of the Umatilla Indian Reservation and the Nez Perce Tribe, are located outside of the state, but have reserved hunting rights within Washington.

Tribal hunting rights for non-treaty tribes are typically limited to areas on the reservation, although the Colville Confederated Tribes' hunting rights extend to an area that was formerly part of the reservation known as the "North Half." The Colvilles' hunting rights to the North Half were upheld by the U.S. Supreme Court's decision in *Antoine v. Washington* in 1975.

There are additional tribes that are recognized by the federal government, but have no specific reservation or tribal hunting rights. Members of those tribes are subject to state hunting regulations.

As federal law, treaties preempt inconsistent state law under the Supremacy Clause of the Federal Constitution. The courts have ruled that state regulation of tribal exercise of off-reservation hunting rights on open and unclaimed land is preempted by the Stevens Treaties, except where state regulation is necessary for conservation purposes.

The treaties do not expressly specify the geographical extent of the hunting right. In *State v. Buchanan* (1999), the Washington State Supreme Court ruled that this right extends to 1) the lands formally ceded by the tribes to the United States as those lands are described in the Treaties; and 2) may include other areas where it can be shown that those areas were "actually used for hunting and occupied [by the tribe] over an extended period of time." The court did not provide a formal mechanism to evaluate and determine traditional hunting areas.

Federal and state courts have ruled that public land is "open and unclaimed" unless it is being put to a use that is inconsistent with tribal hunting. For example, in *U.S. v. Hicks*, a federal district court ruled that the Olympic National Park was not "open and unclaimed" because one of its purposes is the preservation of native wildlife and because hunting is generally prohibited in the park. In contrast, national forests have been held to be "open and unclaimed." In *State v. Chambers* (1973), the Washington Supreme Court stated that private property is not "open and unclaimed," but such private property must have outward indications of private ownership recognizable by a reasonable person.

E. Social, Cultural, and Economic Values

Wolves arouse a diversity of emotions in people, ranging from reverence as a symbol of wilderness and ecological harmony by some, to ambivalence by many, to outright hatred and fear in others (Ratti et al. 1999, Fritts et al. 2003). Many aspects of the wolf-human relationship are based on long-held cultural perceptions. Modern viewpoints on wolves also illustrate the fundamental differences in the ways that urban and rural people view nature (Wicker 1996). As noted in the Montana Gray Wolf Conservation and Management Plan Draft EIS (MFWP 2003), "the differences in attitudes towards wolves might be summed up as the perceived chance of personal benefit or loss resulting from the presence of wolves. Those who feel they will benefit either directly or vicariously tend to favor wolf recovery and those who perceive the threat of personal loss oppose recovery" (MFWP 2003).

Decidedly negative views of wolves prevailed during the period of eradication in the United States and continue today among some portions of the population, especially those who may be economically impacted by wolf restoration (Wilmot and Clark 2005). Hunter groups also worry that wolves may reduce harvestable game populations. Additionally, some citizens view wolves as highly problematic in the greater context of preserving private property rights and achieving broader uses of public lands.

By contrast, many studies of human attitudes towards wolves in the United States have documented strong public support for wolves in recent decades, even in the West (Fritts et al. 2003). These attitudes are fostered by the fear of extinction and a desire to restore natural ecosystems to their former function. Urban people and members of environmental organizations tend to hold the most positive and protectionist views toward wolves (Fritts et al. 2003). Favorable attitudes towards wolves also increase with geographic distance from occupied wolf range (Karlsson and Sjöström 2007). Wolf-related tourism has become an economic benefit in some areas, especially at Yellowstone National Park.

Attitudes in Washington

Two recent studies conducted by Responsive Management, a professional public opinion and attitude survey research firm specializing in natural resource and outdoor recreation issues, provide information on citizen attitudes statewide on a variety of questions pertaining to hunting and wildlife management in Washington, including wolves. The first of these (Duda et al. 2008a) examined overall public opinion and entailed a telephone survey of 805 Washington residents 18 years old and older in January 2008 (see Appendix E for greater detail on survey methods). The survey asked six

questions about wolves and related issues. Each question and the public's responses to the question appear in Appendix E. The following summary of results is reprinted from the survey's final report:

- "The large majority of Washington residents (75%) support allowing wolves to recover in Washington; meanwhile, 17% oppose.

- "A cross tabulation found that those who live in urban and suburban areas are more likely to support wolf recovery; while those residing in small city/town or rural area are more likely to oppose. Note that those living on ranches or farms are the most likely to *strongly* oppose.

- "When the stipulation is put on wolf recovery that it could result in localized declines in elk and deer populations, support declines slightly: 61% support wolf recovery if it will result in some localized declines in elk and deer populations, and 28% oppose.

- "Most Washington residents (61%) support some level of lethal wolf control to protect at-risk livestock; however, 31% oppose. Additionally, a majority of residents (56%) support having the state pay compensation out of the General Fund to ranchers who have documented losses to livestock from wolves, but 35% oppose.

- "When asked how worried, while recreating outdoors, they would be about wolves, respondents most commonly say that they would not be worried at all (39%), and 26% would be only a little worried; in sum, 65% would be only a little worried or not worried at all. On the other hand, 33% would be very or moderately worried, with 11% *very* worried.

- "In a question tangentially related to wolf management, the survey found that wildlife viewing specifically of wild wolves would appear to be popular, as 54% of residents say that they would travel to see or hear wild wolves in Washington. (Note that 2% of respondents say that they would not need to travel, as they have wild wolves nearby already.)"

The second survey (Duda et al. 2008b) assessed hunter opinions only and entailed telephone interviews with 931 Washington hunters 12 years old and older from December 2007 to February 2008 (see Appendix F for greater detail on survey methods). Interviewees in this study were exclusive from those contacted by Duda et al. (2008a). The survey asked three questions about wolves and related issues. Each question and hunters' responses to the question appear in Appendix F. The following summary of results is reprinted from the survey's final report:

- "After being informed that wolves are highly likely to re-colonize Washington over the next 10 years, hunters were asked if they support or oppose having the Department manage wolves to be a self-sustaining population. Support exceeds opposition among every type of hunter except [those in a category combined for] sheep/moose/goat hunters.

- "Common reasons for supporting include that the hunter likes wolves/that all wildlife deserves a chance to flourish, that wolves should be managed and controlled anyway, or that wolves should be managed so that they do not overpopulate.

- "Common reasons for opposing include concerns about potential damage to livestock and/or game and wildlife, that the respondent does not want wolves in the area, or that wolves are not manageable."

III. WOLF CONSERVATION

The conservation portion of this plan presents the strategies needed to reestablish a naturally reproducing and viable population of gray wolves distributed in a significant portion of the species' former range in Washington. WAC 232.12.297 (Endangered, threatened, and sensitive wildlife species classification; Appendix A) defines the process by which "listing, management, recovery, and delisting of a species can be achieved." The process requires the preparation of a recovery plan for species listed as endangered or threatened. At a minimum, recovery plans are to include target population objectives, criteria for reclassification, and an implementation plan for reaching population objectives. The Washington Wolf Conservation and Management Plan will satisfy the requirements for a state gray wolf recovery plan.

The first section (Section A) of this chapter provides the scientific basis for conservation planning principles and genetic/population viability issues as related to the reestablishment of sustainable populations. The second section (B) presents the conservation/recovery objectives, as negotiated by the Wolf Working Group for the plan. It includes discussions of numbers and distribution for wolf conservation/recovery objectives and the evolution of negotiated population objective targets for Washington, as well as important tools such as translocation, relocation, and relisting. A third section (C) briefly discusses issues related to the management of wolves after delisting. The last section (D) summarizes the Working Group discussion related to these topics.

A. Summary of Conservation Planning Science

Conservation/recovery objectives for downlisting and delisting a species need to be set at sufficient numbers of individuals and levels of geographic distribution to ensure that a permanently viable population is established. For the purposes of this document, a "viable" population is one that is able to maintain its size, distribution, and genetic variation over time without significant intervention requiring human conservation actions. Such populations must also be able to withstand fluctuations in abundance and recruitment associated with annual variation in food supplies, predation, disease, and habitat quality. A key assumption in current conservation biology theory is that source habitats play a pivotal role in maintaining viable populations. Source habitats are those higher quality habitats that support growing populations and produce dispersing young (source populations), in contrast to lesser quality sink habitat areas where resident populations have difficulty sustaining themselves without continual immigration (sink populations).

Conservation/recovery objectives are needed for this plan, and until data specific to wolves occupying the state can be obtained, objectives have been developed for meeting the requirements of downlisting and delisting. These are based on current knowledge and principles and negotiations among the Working Group (and in the future versions, scientific peer review and public review). As wolves recolonize Washington, the population will be monitored to determine trends in abundance, demographic parameters, habitat use, dietary relationships, outcomes of interactions with humans, and other appropriate data reflecting population viability. This information could be used to refine conservation/recovery objectives in the future. At that time, the plan can be updated and objectives revised, if needed.

Numbers

At present, the number of individuals needed to ensure that wolves are no longer in danger of extirpation from Washington is difficult to determine on a scientific basis because of the absence of species specific data on population dynamics, pack densities, predator-prey relationships, and other relevant biological factors for the state. Such data exist for wolves in other states (e.g., Montana, Idaho, Wisconsin), but may not be adequate for establishing objectives for Washington because of differences in habitat quality, prey availability, human densities, and perhaps other important parameters.

In 1994, the U.S. Fish and Wildlife Service's assessment of a self-sustaining population of wolves concluded that "Thirty or more breeding pairs comprising some 300+ wolves in a metapopulation (a population that exists as partially isolated sets of subpopulations) with genetic exchange between subpopulations should have a high probability of long-term persistence because such a population would contain enough individuals in successfully reproducing packs distributed over distinct but somewhat connected large areas to be viable for the long-term (USFWS 1994). A population at or above this size would contain at least 30 successfully reproducing packs and ample individuals to ensure long-term population viability. In addition, the metapopulation configuration and distribution throughout secure suitable habitat would ensure that each core recovery area would include a recovered population distributed over a large enough area to provide resilience to natural or human-caused events that may temporarily affect one core recovery area. No wolf population of this size and distribution has gone extinct in recent history unless it was deliberately eradicated by humans (Boitani 2003)" (USFWS 2008). The agency stated that "While experts strongly (78%) supported our 1994 conclusions that a metapopulation of at least 30 breeding pairs and at least 300 wolves would provide for a viable wolf population, they also concluded that wolf population viability was enhanced by higher (500 or more wolves) rather than lower population levels (300) and longer (more than 3 years) rather than shorter (3 years) demonstrated time frames. The more numerous and widely distributed a species is, the higher its probability of population viability will be" (USFWS 2008).

Persistence of a wolf population in Washington over time will depend on a variety of factors, including prey abundance, proximity and connectivity to source populations (outside and potentially within the state), competing carnivore populations, and the extent of conflicts with livestock production. Proximity to wolf populations in Idaho and Montana, which numbered a combined 1,154 animals in 2007 (USFWS et al. 2008), provides a high probability that dispersing wolves will periodically enter Washington as long as populations in these states remains large. Over time, a better knowledge of dispersal and immigration rates into Washington will emerge. A significant reduction in wolf numbers in Idaho and Montana will likely hurt the long-term potential for dispersal into Washington. However, large-scale control activities in Idaho could temporarily result in increased emigration of wolves into Washington through disruption of pack structure and cohesion. Establishment of a source population of wolves within Washington will reduce the dependence on dispersal from outside the state.

Different approaches for setting population objectives for wolves were considered during the preparation of this plan (Section D). Wisconsin determined that its population objectives needed to 1) represent a population level that could be supported by the available habitat, 2) be compatible with existing information on wolf population viability analysis, and 3) be socially tolerated to avoid

development of strong negative attitudes toward wolves (WDNR 1999). In contrast, Oregon's wolf advisory group established population objectives based on a compromise between perceived conservation and management needs (ODFW 2005).

Distribution

A second criterion for removing a species from state listed status is that it must occupy a significant portion of its original geographic range. A "significant portion of the species' historical range" is defined under WAC 232-12-297, section 2.9, as that portion of a species' range likely to be essential to the long-term survival of the population in Washington.

Historically, wolf distribution in Washington included much of the state. During the 70 or so years that wolves have been essentially absent from Washington, humans have significantly altered the landscape throughout the state. Habitat once occupied by wolves has been reduced by development and land conversion, with many areas now existing as fragments rather than as large contiguous blocks. Road densities have increased dramatically and the human population has grown to more than six million people.

Although these changes have reduced the amount of habitat now available to wolves, the species is a habitat generalist, meaning it can occupy a variety of habitats given adequate prey and sufficient human tolerance. As a generalist, wolves are theoretically capable of inhabiting a wide range of Washington ecosystems, including some that might be considered marginal. Based on radio-tracking data from Idaho, Montana, and Wyoming, researchers have found that suitable wolf habitat and the probability of occupancy (e.g., high, medium, low) are best defined by the availability of natural prey, levels of human density and livestock activity, and amount of forest cover. Probability of occupancy in these states is highest in forested landscapes with abundant prey (especially elk), lower human densities, and reduced presence of sheep allotments (Oakleaf et al. 2006).

Wolves are expected to persist in habitats with similar characteristics in Washington. Areas with abundant deer, elk, and moose, reduced livestock use, and few potential human conflicts offer the best chance for recovery success. These include national forests, national parks, wilderness areas, national recreation areas, designated roadless areas on public lands, and areas with low densities of open roads. An initial analysis for Washington using the parameters found most important in Idaho, Montana, and Wyoming (i.e., prey density, forest cover, human density, and sheep allotments; Oakleaf et al. 2006) suggests that potentially suitable habitat for wolves occurs throughout the state with the exception of the Columbia Basin and most Puget Trough lowlands (B. Maletzky, unpubl. data; Figure 4).

Model predictions by Oakleaf et al. (2006) and Carroll et al. (2003, 2006) and observations from Idaho, Montana, and Wyoming during the past 20 years (Bangs et al. 2004, USFWS et al. 2008) indicate that non-forested rangeland and croplands associated with intensive agricultural use preclude wolf pack persistence. This unsuitability is due to high rates of wolf mortality, high densities of livestock compared to wild ungulates, chronic conflict with livestock and pets, local cultural intolerance of large predators, and wolf behavioral characteristics that make them vulnerable to human-caused mortality in open landscapes (USFWS 2008). Consequently, although a few wolves could potentially occupy the Columbia Basin, it is much less suitable overall for supporting

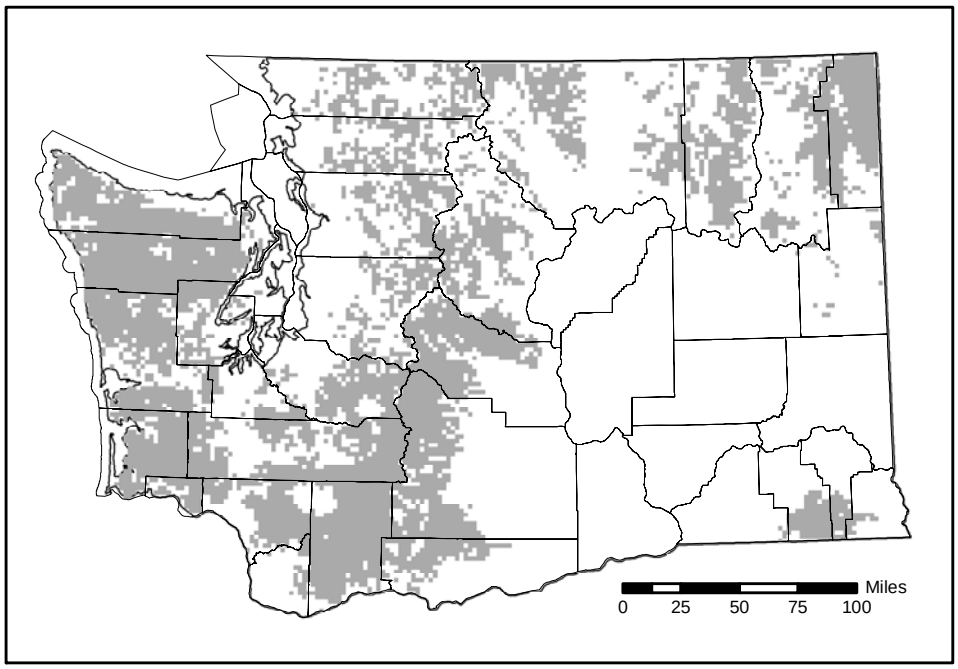


Figure 4. Estimated suitable wolf habitat in Washington (gray shading represents a probability of occurrence of ≥75%; adapted from Oakleaf et al. [2006] by B. Maletzky).

wolf populations. In addition, lowland areas of the Puget Trough are not expected to support wolves because of the high human densities found there.

It is not possible at this time to predict the future distribution or carrying capacity of landscapes in Washington for wolves. However, radio-tracking of wolves reoccupying the state will make it possible to measure a variety of important biological parameters, including habitat selection and territory sizes. This information can be used to estimate the carrying capacity and will help establish a range of wolf numbers that different regions of Washington may be able to support based on prey abundance, human population densities, livestock allotments, elk and deer winter ranges, and extent of forested habitat.

Genetic Diversity and Population Viability

An underlying tenet of endangered species recovery is that populations need to be functionally connected so that genetic material can be exchanged. In isolation, no population is expected to maintain its genetic viability (USFWS 1994, Fritts and Carbyn 1995). Loss of genetic variation can lead to decreased reproductive rates, reduced disease resistance, and other problems, resulting in the eventual extinction of populations. For example, inbreeding depression has been suggested as a possible cause of the reproductive problems noted in small wolf populations occurring in Sweden and at Isle Royale (Wayne and Vilà 2003). Lack of genetic health can therefore preclude long-term recovery, regardless of other factors such as habitat and prey availability.

For this reason, reestablished wolf populations in Washington must remain connected to populations in Idaho, Montana, and British Columbia so that genetic exchange can occur. Fortunately, existing wolf populations in the northern Rocky Mountain states are characterized by

high levels of genetic variability despite the small size of founding populations in northwestern Montana, central Idaho, and Yellowstone National Park (Forbes and Boyd 1996, 1997, Vonholdt et al. 2008). This, combined with ongoing natural dispersal within the region and Canada (Ream et al. 1991, Boyd et al. 1995, Boyd and Pletscher 1999), should be adequate to ensure long-term population viability as long as genetic exchange continues.

B. Plan Conservation/Recovery Objectives

Numbers and Distribution

For purposes of this plan, four phases of management designations for wolves are identified:

1. State Endangered
2. State Threatened
3. State Sensitive
4. Game Animal

As recommended by the Working Group, the number and distribution objectives for wolves are expressed in terms of occupancy within three defined recovery regions of the state. These regions are: the Eastern Washington Region, Northern Cascades Region, and Southern Cascades and Northwest Coast Region (Figure 5).

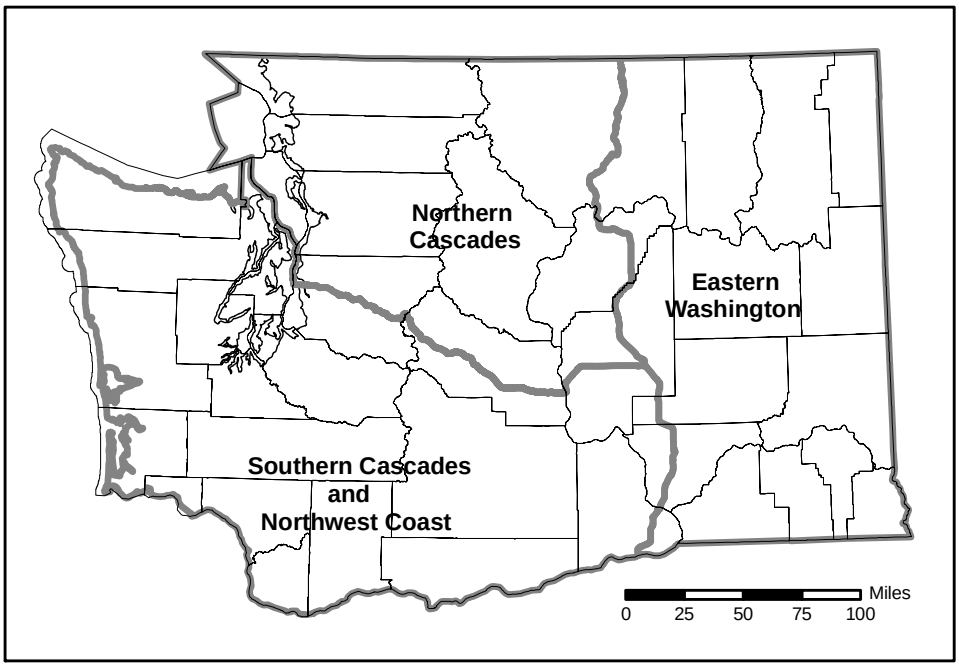


Figure 5. Three gray wolf recovery regions in Washington: Eastern Washington Region, Northern Cascades Region, and Southern Cascades and Northwest Coast Region.

The following conservation/recovery objectives have been identified to transition from one designation to the next:

1. The gray wolf will be considered for downlisting from state endangered to threatened in Washington when 6 successful breeding pairs are present for 3 consecutive years, distributed as follows:

- 2 successful breeding pairs in the Northern Cascades Region,
- 2 successful breeding pairs in the Eastern Washington Region, and
- 2 successful breeding pairs in the Southern Cascades and Northwest Coast Region.

2. The gray wolf will be considered for downlisting from state threatened to sensitive in Washington when 12 successful breeding pairs are present for 3 consecutive years, distributed as follows:

- 2 successful breeding pairs in the Northern Cascades Region,
- 2 successful breeding pairs in the Eastern Washington Region,
- 5 successful breeding pairs in the Southern Cascades and Northwest Coast Region, and
- 3 successful breeding pairs anywhere in the state.

3. The gray wolf will be considered for delisting from state sensitive to game animal status in Washington when 15 successful breeding pairs are present for 3 consecutive years, distributed as follows:

- 2 successful breeding pairs in the Northern Cascades,
- 2 successful breeding pairs in the Eastern Washington Region,
- 5 successful breeding pairs in the Southern Cascades and Northwest Coast Region, and
- 6 successful breeding pairs anywhere in the state.

If 18 successful breeding pairs of wolves are documented in any year during the 3-year period, then WDFW will begin the process to delist at that point rather than wait for the 3-year period to conclude.

The 15 successful breeding pairs needed to achieve delisting should not be interpreted as a population "cap" at which the population will be limited. This plan does not attempt to set a limit on the numbers of wolves that will be allowed to live in Washington.

With wolves, conservation/recovery objectives for numbers are typically based on successful breeding pairs rather than wolf packs or individuals. Successful breeding pairs are used as the unit of measurement because the term provides a higher level of certainty in assessing population status and documenting reproduction. A successful breeding pair of wolves is defined as an adult male and an adult female with at least two pups surviving to December 31 in a given year. The U.S. Fish and Wildlife Service used successful breeding pairs as their measure for wolf recovery "because wolf populations are maintained by packs that successfully raise pups" (USFWS 1994, Mitchell et al. 2008). Success of breeding pairs is measured in winter because most wolf mortality occurs from spring through fall, and winter is the beginning of the annual courtship and breeding season

(USFWS 2008). Larger packs are more likely to contain a successful breeding pair than smaller packs (Mitchell et al. 2008).

There is no requirement that wolves must go through each listed stage before downlisting or delisting if they meet the conservation/recovery objectives. If wolf populations were to increase rapidly, then timelines for more restrictive conservation statuses would be reduced or eliminated as long as all recovery criteria have been met. For example, if 12 or more successful breeding pairs became established in the state in the first year of management plan implementation and met distribution objectives, then WDFW could skip efforts to downlist to threatened status and move ahead with downlisting to sensitive status in the fourth year of the plan.

As the Washington wolf population approaches the delisting objectives, WDFW will begin the process of proposing delisting of the species. This process, described in WAC 232-12-297 (Appendix A), requires the preparation of a status review that examines all pertinent information on the achievement of recovery objectives, abundance of a species, and ongoing threats. Public review and a review under the State Environmental Policy Act (SEPA) are also required as part of the delisting process. Delisting is based on the biological status of the species in Washington. This information is then presented to the Washington Fish and Wildlife Commission to make the final determination on delisting.

It should be noted that the Working Group did not reach consensus on the numbers of successful breeding pairs needed to downlist and delist wolves in Washington (see Appendix G). Six members proposed that the numbers instead be set at 3 successful breeding pairs to downlist from endangered to threatened, 6 successful breeding pairs to downlist from threatened to sensitive, and 8 successful breeding pairs to delist from sensitive to game animal status. They proposed that there be no 3-year time requirement and did not address regional distribution (see Section D of this chapter and Appendix G for more detail).

Conservation Tools

There are a number of management tools that will be used to meet conservation objectives while wolves remain state listed in Washington. These include translocation, relocation, and relisting, as described below.

Translocation of Wolves

Natural dispersal is expected to be the primary means for wolves to disperse across Washington and recolonize new areas of the state. Unless high levels of conflict occur, wolves will be allowed to expand into unoccupied suitable habitat across ownerships and administrative designations in the state. However, it is recognized that there may be bottlenecks preventing successful natural dispersal and establishment of wolf packs, particularly for wolves attempting to disperse from northeastern Washington across the existing mix of private and public lands to reach the northern Cascades. The overall timeframe for wolves to disperse into Washington and reestablish a population in a significant portion of their historic range is difficult to predict, but it could take one to several decades to reach population and distribution objectives for downlisting and delisting.

Translocation, defined in this plan as the moving of wolves by wildlife biologists to unoccupied areas within the state, is a management tool that could be used to help achieve conservation/recovery and management objectives. If translocation is determined necessary, it will be implemented only for areas that wolves have failed to reach through natural dispersal. Translocation will only be used following a public review process through SEPA or the National Environmental Policy Act (NEPA), and will not consider wolves known or suspected to have depredated on livestock. State wildlife biologists would coordinate and implement the action. It is recognized that if wolves are still federally listed in Washington when translocation is proposed, there will need to be collaborative discussions with the U.S. Fish and Wildlife Service to implement translocations (E. E. Bangs, pers. comm.).

Translocation of wolves within Washington could have the following potential benefits:

- Address impediments to natural dispersal such as extensive areas of private lands and unsuitable habitat, or excessive mortality from illegal killing, lethal control, vehicle collisions, or other human-related causes.
- Relieve pressure in some regions if wolves reach carrying capacity, but don't expand and establish into new regions.
- Hasten establishment of successful breeding pairs in areas that potentially are capable of supporting a source population, thereby helping to ensure and maintain viable populations in a significant portion of the state's historic range as required to meet state recovery objectives.
- Help lower the overall costs of recovery by achieving population target levels more quickly, thereby allowing downlisting and delisting to begin earlier. Costs would be reduced by replacing the more expensive monitoring of successful breeding pairs that is needed while wolves are listed with the less expensive monitoring of packs following delisting.
- Facilitate achieving recovery goals more quickly, thereby leading to greater management flexibility in addressing conflicts.

Based on the current proximity of wolf packs in neighboring states and British Columbia, the northeastern and southeastern corners of Washington and the northern Cascades and Pasayten Wilderness will likely be the first areas occupied by wolves. It will likely take considerably more time to recolonize the southern Cascades and western Washington due to distance, illegal and accidental mortality, or other potential bottlenecks to natural dispersal.

Relocation of Wolves

Relocation is another management tool for possible use with wolves. It differs from translocation in that it allows wolf managers to immediately resolve a localized conflict, potential conflict, or other situation. Relocation does not require a public review process and is not used to facilitate dispersal. Examples of when relocation might occur include when a wolf or wolves become inadvertently involved in a situation or are present in an area that could result in conflict with humans or harm to the wolf (e.g., a wolf caught in a trap set for another species, or a wolf found living in or near a community and causing human safety concerns or killing pets). For purposes of relocation only, wolves would be transported and released into the nearest suitable remote habitat on public land, in consultation with appropriate land managers.

Relisting

After delisting occurs, it is in the best interest of wolves and the citizens of Washington that the state takes whatever management steps are necessary to safeguard the species from a population decline that would necessitate relisting. Upon delisting, wolves will continue to be affected by natural and human-caused factors (perhaps including legal hunting), and the population may continue to increase, become stable, or decline below 15 successful breeding pairs. It is the intent of WDFW to manage the wolf population at a level above the delisting population objective to provide a cushion against relisting and to give greater management flexibility. If a decrease approaches 15 successful breeding pairs, WDFW will assess the population's size, distribution, health, reproductive status, and causal factors involved. The assessment will take into account natural fluctuations in wildlife populations, but will also consider the severity and the basis for the decline.

If poaching, lethal control actions, or legal harvest are determined to be the primary cause, reductions in lethal control or harvest or the use of methods to halt illegal take (e.g., increased public education and law enforcement efforts, imposition of higher penalties) will be initiated. A decline based on legal and illegal take, changing habitat conditions, low prey numbers, or disease could all constitute underlying warning signs of a more serious situation that could warrant relisting.

In the event of a rapid decline below the minimum population objective of 15 successful breeding pairs, WDFW may immediately initiate a status review. WDFW's listing procedures (WAC 232-12-297) also provide for emergency listing. However, if the decline is gradual, WDFW will increase monitoring efforts to determine the cause. A one-year monitoring effort that finds the population has continued to decline would initiate a status review to determine whether relisting is appropriate. Conversely, if a one-year monitoring effort showed a population increase at or above the delisting level, no action would be taken. Intensive monitoring would continue for the next two years specifically for the purpose of following the population's trend.

C. Management After Delisting

This plan calls for Washington's wolf population to transition from state sensitive status to "game animal" status after the conservation/recovery objectives for delisting are met. Reclassification to a game species will require the approval of the Washington Fish and Wildlife Commission. Upon reclassification, the WDFW Game Division would manage wolf populations. A chapter would be added to the agency's Game Management Plan (WDFW 2003) to address wolf management. As with cougars and black bears, statewide management goals would be established to preserve, protect, perpetuate, and manage wolves and their habitats to ensure a healthy, productive population (D. Ware, pers. comm.). This is ideally the population level that is viable and sustainable while also allowing hunting, and is not a population "cap" intended to keep numbers beneath a specific level.

Based on population estimates, harvest strategies would be proposed as to where and when wolves would be hunted, at what levels, and through what types of hunting (e.g., limited permit, general season, etc.). Several harvest options exist while wolf numbers remain relatively low, including no harvest and allowing harvest on a limited permit-only basis, as is done for moose, bighorn sheep, and mountain goats. As wolf numbers increase, harvest management could transition to a general season on wolves. This plan recommends that hunting be focused in areas of highest conflict to reduce the need for agency management and compensation. Additionally, it may be appropriate not

to hunt wolves in some core habitat areas (e.g., in large blocks of public lands) to maintain pack size and structure, thereby potentially retaining successful breeding pairs and reproductive output (Mitchell et al. 2008). Any proposal to hunt wolves would have to be approved by the Washington Fish and Wildlife Commission and would therefore be open to public review and comment. This review process would be separate from that associated with delisting.

D. Wolf Working Group Discussions

This chapter summarizes the Working Group's discussions related to conservation objectives.

Numbers of Successful Breeding Pairs

Throughout the Working Group deliberations, the issue of numbers of successful breeding pairs, as triggers for moving from one listing designation to another, was a point of significant discussion. Originally, WDFW suggested that specific numbers be excluded from the plan until after some wolf packs had settled in the state. Modeling of the habitat use and demographics of these animals could then be used to derive scientifically based estimates of the wolf numbers needed for recovery, which would then be placed in a future version of the plan. All Working Group members rejected this approach and preferred the inclusion of specific numbers in the current plan, as done by other states and as needed to meet the criteria for Washington state recovery plans. Furthermore, specific numbers would give Working Group members a starting place for their deliberations. WDFW researched other state wolf plans and applied their understanding of wildlife biology to the question. It then proposed the numbers of 8 successful breeding pairs for transitioning from endangered to threatened and 15 successful breeding pairs for transitioning from threatened to sensitive as a starting point for the Working Group's consideration.

Eventually, the Working Group collectively settled on an approach that called for 6 successful breeding pairs for transitioning from endangered to threatened, 12 successful breeding pairs for transitioning from threatened to sensitive, and 15 successful breeding pairs for delisting from sensitive. [NOTE: the transition from one listing designation to another also requires that the minimum number of successful breeding pairs be in place for 3 years (though there are exceptions; see Section B of this chapter) and distribution across three regions as laid out in Section B.]

The deliberation around numbers was a negotiation where each participant attempted to balance his or her own interests with everyone else's in the group. The final numbers included in this plan were not viewed as "ideal" by anyone on the Working Group; however, these numbers represented the balance point among the different interests around the table. It should be emphasized that these numbers represent only the triggers for downlisting and delisting, and do not represent a population cap or ceiling at which wolves will ultimately be managed.

For the conservation community, the numbers were viewed as being close to ecologically defensible, though lower than they would have set if they were the only ones writing the plan. For the livestock community, wolves represent a threat to their livelihood, and the numbers were higher than they would have recommended if they were the only ones writing the plan. Working Group members ultimately recognized that having certainty around a set of numbers they could live with, along with the other specific components of the package that each party viewed as desirable, made more sense than deferring the decision to others. The group further understood that to obtain the necessary

external support (e.g., legislative) for funding and operation of the plan, their final product needed support by a cross section of interests.

Throughout the process, some Working Group members representing the livestock/hunting community indicated they would be hard pressed to agree to the 6/12/15 numbers. At the end of the deliberations, while they were able to live with the rest of the package, these individuals indicated they needed to submit a minority report on the numbers and proposed an alternative set of 3/6/8 (see Appendix G for more detail). However, the package agreed to by the group is based on the 6/12/15 numbers and if those numbers are changed as a result of the peer review, public review, and other agency processes, then agreement around other components of the plan will not necessarily remain.

Recovery Regions

During the Working Group discussions, there was an evolution in the design and agreement of wolf recovery regions for the state. As one possibility, WDFW initially suggested that Washington's nine "ecoregions" (Figure 6) be considered for recovery regions. WDFW and other conservation organizations have adopted an ecoregional approach for landscape-level conservation planning in Washington, as described in the state's Comprehensive Wildlife Conservation Strategy (WDFW 2005a). Ecoregions are relatively large areas of land and water that contain geographically discrete assemblages of natural plant and animal communities and have distinctive environmental conditions. Each ecoregion has unique strengths and weaknesses affecting wolf recovery, such as differing amounts of large contiguous forested public land blocks, varying abundance of ungulate prey and locations of winter range, human population density and distribution, distance from colonizing sources, and challenges to successful natural dispersal. Some ecoregions (or groupings of ecoregions) contain an abundance of higher quality habitats that could potentially support a growing

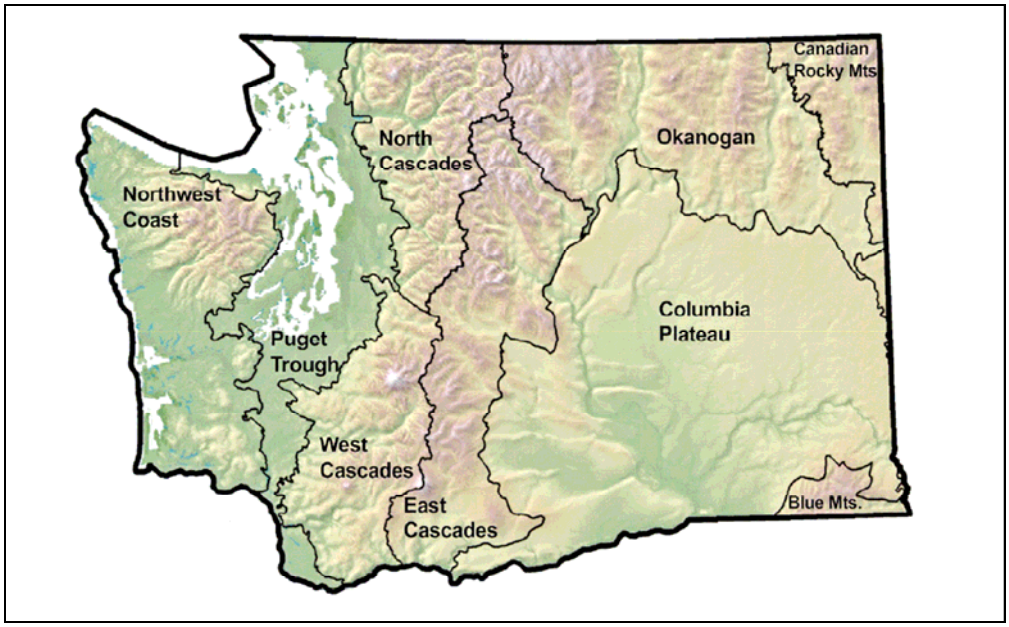


Figure 6. Nine ecoregions recognized in Washington.

wolf population with dispersing young (source populations), while others have lower habitat quality where resident packs would have difficulty sustaining themselves without immigration (sink populations).

Some members of the Working Group felt that nine ecoregions were too many and too complex for addressing wolf distribution needs in the state. The group considered a number of variations on the ecoregional approach (including combinations of ecoregions, modifications of ecoregions, and an eastside-westside division of the state) and other factors before arriving at the three consolidated regions (Figure 5) chosen for use in the conservation/recovery objectives.

Like the nine ecoregions, the three consolidated wolf recovery regions (Figure 5) also have unique strengths and weaknesses affecting wolf recovery. For example, when comparing wolf recovery regions, the Southern Cascades and Northwest Coast recovery region is the most distant from colonizing sources with greater hurdles to successful natural dispersal, yet the region contains nearly 80% of the state's elk population.

Translocation

Translocation was discussed extensively by the Working Group and was largely supported for a variety of reasons. Translocation was proposed as a tool if wolves were not naturally dispersing into regions needed for recovery, or if it was desired to move wolves from regions that had already achieved conservation/recovery objectives to other regions that had not yet met their objectives. Conservation groups supported the concept to achieve conservation/recovery objectives and establish source populations within the state. County, hunting, and livestock interests also supported the concept, which would enable moving wolves out of areas after sufficient numbers of breeding pairs were established to achieve recovery objectives, thereby speeding up the delisting process and access to more flexible management tools. Overall, there was broad support and recognition within the Working Group that translocation is a key management tool to ensure that both conservation and management goals are achieved. Translocation is considered an essential part of the "negotiated package" developed by the Working Group.

The primary area suggested and discussed for translocation by the Working Group was the southern Cascade Mountains based on insights gained from the experiences of wolf recovery in the northern Rocky Mountain states (USFWS 2008). These included the strong correlation between large contiguous blocks of public land and wolf recovery. This is due to large areas of public land generally experiencing lower levels of conflict between wolves and livestock, as well as supporting larger populations of elk.

Discussions on translocation focused on the southern Cascades for the following reasons:

- The southern Cascades have the potential to support a source population of wolves, a factor of importance for maintaining a sustainable viable population in Washington.
- The southern Cascades contain about half of Washington's elk population and large contiguous blocks of public land. Consequently, there is abundant natural prey for wolves combined with potentially lower levels of conflict with livestock when compared to areas with extensive private landholdings.

- The southern Cascades are distant from colonizing areas in Idaho and British Columbia, and there are more potential barriers to overcome for successful natural dispersal. However, once wolves are reestablished in the southern Cascades, extensive contiguous forested public lands will facilitate natural dispersal within this area.
- Elk populations fluctuate in response to a number of environmental conditions, including forest succession. Portions of the Mount St. Helens elk herd, which is the largest herd in the state, are currently experiencing problems due to advanced forest succession. Wolf recovery in the southern Cascades could help restore and contribute to ecological balance and integrity in these types of situations.

To date there have not been any discussions of translocations to other areas; the primary focus has been the southern Cascades.

This package contains carefully balanced strategies and management tools to achieve key objectives. There are strong concerns among Working Group members that if translocation is precluded for any reason, then:

- The carefully crafted "negotiated package" would become unbalanced in ways that adversely affect achieving primary goals.
- Barriers to the natural dispersal of wolves into the southern Cascades may result in increasing conflict with livestock in eastern Washington and delayed recovery.
- Eastern and northern Washington would unfairly bear the costs and challenges of wolf recovery.

The Working Group therefore recommends that if translocation is removed from the management tools available to WDFW, the Fish and Wildlife Commission or WDFW shall immediately reconvene the Working Group (to the extent possible with the original membership) to advise WDFW on how to manage wolves without this critical tool to address these concerns.

IV. WOLF-LIVESTOCK CONFLICTS

Based on experiences in other states, the return of gray wolves to Washington is expected to result in conflicts with livestock. Addressing these conflicts is an essential part of this plan. The ranching and farming industry is a vital component of the Washington economy and provides important open space and habitats that support a wide variety of wildlife, including deer and elk. In some areas of the state, concerns have been raised regarding the effect that wolves will have on this industry and in August 2007, a number of comments received at the initial public scoping meetings involved concerns about conflicts with livestock. As in other western states with wolf populations, some livestock producers will be affected financially due to losses of livestock from wolf depredation and/or by changes in husbandry or management methods. Where and when such depredations occur will depend on different factors, including the number and distribution of wolves and the locations of livestock and husbandry practices in areas occupied by wolves.

Meeting the delisting criteria outlined in this plan will necessitate tolerance for wolves on both public and private lands. Therefore, to achieve conservation of wolves in Washington, this plan outlines a range of options to address conflicts between wolves and livestock.

A. Wolf Depredation on Ranch Animals

The reestablishment of wolves in other states has resulted in depredations on cattle, sheep, other livestock, and domestic dogs. However, despite significant increases in wolf populations, confirmed losses to wolves have remained infrequent to date relative to livestock numbers (Bangs et al. 2005b, USFWS 2008). Many factors influence depredation rates on livestock, including the proximity of livestock to wolf home ranges, dens, and rendezvous sites; pack size; abundance of natural prey and livestock; amount and type of vegetative cover; time of year; livestock husbandry practices in both the area of concern and adjacent areas; the use of harassment tools and lethal take; pasture size; and proximity to roads, dwellings, and other human presence (Mech et al. 2000, Fritts et al. 2003, Treves et al. 2004, Bradley and Pletscher 2005). These factors make it difficult to predict where and when depredations by wolves will occur. Wolves don't necessarily attack livestock whenever livestock are encountered, but it is evident that wolf packs that regularly encounter livestock will depredate sporadically (Bangs and Shivik 2001).

In the northern United States, wolf attacks take place more frequently from March to October when livestock spend more time on open range, calving takes place, and wolf litters are being raised (Fritts et al. 2003, Musiani et al. 2005, Sime et al. in press). Untended livestock, particularly young calves, appear to be more vulnerable, and the presence of livestock carcasses on a property may increase risk as well (Fritts et al. 2003). Depredations occur on both open range and inside fenced pastures. Sime et al. (in press) reported that among the 162 livestock producers suffering confirmed wolf depredation in Montana between 1987 and 2006, 62% of producers experienced a single incident, 20% experienced two incidents, and 17% experienced three or more incidents.

Calves are more commonly killed than adult cattle because of their greater vulnerability (Fritts et al. 2003; Bangs et al. 2005a; Unsworth et al. 2005; Sime et al. in press; J. Timberlake, pers. comm.). Oakleaf et al. (2003) found that wolves tend to choose the smallest calves and there is evidence that

some depredated calves are in poorer physical condition (Bradley and Pletscher 2005). In contrast, adult sheep appear to be taken more frequently than lambs (Fritts et al. 2003). Attacks on sheep commonly involve multiple individuals, whereas those on cattle usually involve single animals.

The numbers of livestock and dogs confirmed as killed by wolves in Idaho, Montana, and Wyoming through 2007 are listed in Table 3. These show that livestock killings have generally increased over time as wolf numbers have grown. However, wolf losses remain small in comparison to the losses caused by coyotes, cougars, bobcats, dogs, bears, foxes, eagles, and other predators in these states (Table 4). Significant variation in the numbers of cattle and sheep killed by wolves occurs among states and sometimes exists between years. Only minor losses of other livestock species and odgs have occurred.

It is important to note that the figures presented in Table 3 represent minimum estimates of the livestock actually killed by wolves. Probable losses, in which a wildlife agent is unable to verify the cause of death, are not included. Additionally, ranchers sometimes fail to locate carcasses or are unable to notify authorities soon enough to obtain confirmation because of the rugged and vast terrain where livestock graze, the extent of carcass consumption by predators and scavengers, or carcass decomposition. In some instances, ranchers may not bother to report their losses. Determination of the ratio of estimated total losses to confirmed kills continues to be debated (Kroeger et al. 2005) and some wolf experts believe it is premature to set such ratios (C. Sime, pers. comm.). Loss ratios probably vary considerably according to the characteristics of each grazing site, extent of rancher supervision, and type and age of livestock. For example, Oakleaf et al. (2003) reported a loss ratio of 8:1 for cattle in their study, which was conducted on an allotment with densely forested and mountainous terrain, no use of range riders, and poor rancher access. However, Oakleaf et al. (2003) suggested that a ratio of about 2:1 was more realistic under less timbered or rugged conditions. Loss ratios closer to 1:1 probably occur for many smaller operations using private lands, where livestock are more closely supervised. On sheep operations with shepherds, most depredations are likely to be found because of the group herding behavior of sheep (C. Mack, pers. comm.). For cattle, turnout of older and consequently larger calves onto grazing sites may result in lower loss ratios.

There is evidence that wolves may reduce other predators (see Chapter VI) that also prey on livestock, such as coyotes and cougars. This could lead to fewer depredations by these predators and therefore could potentially benefit some ranchers.

B. Management Tools for Reducing Wolf Depredation

Proactive Measures

A variety of proactive management measures exist to help livestock producers reduce conflicts between wolves and livestock, and offer a partial alternative to lethal control of wolves (Musiani et al. 2003, Bangs et al. 2005a, 2006, Shivik 2006). Implementation of such measures may be costly to producers, but can be especially important when wolf numbers and distribution are small and

Table 3. Confirmed livestock and dog losses from wolf predation in Idaho, Montana, and Wyoming, 1987-2007 (USFWS et al. 2007, 2008)[a].

	87-90	91-94	95	96	97	98	99	00	01	02	03	04	05	06	07	Total
Idaho																
Cattle			0	1	1	9	11	15	10	9	6	19	20	29	53	183
Sheep			0	24	29	5	64	48	54	15	118	161	184	205	170	1,077
Other[b]			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dogs			0	1	4	1	7	0	2	4	5	3	9	4	8	48
Total wolves[c]			14	42	71	114	156	187	251	263	345	422	512	673	732	-
Wolves killed[d]			0	1	1	0	3	11	7	14	7	17	27	45	43	176
Montana																
Cattle	14	9	3	10	19	10	20	14	12	20	24	36	23	32	75	321
Sheep	10	2	0	13	41	0	25	7	50	84	86	92	33	4	27	474
Other[b]	0	0	0	0	0	0	0	0	4	5	0	3	2	2	14	30
Dogs	1	0	4	1	0	1	2	5	2	5	1	4	1	4	3	34
Total wolves[c]	10-33	29-55	66	70	56	49	74	97	123	183	182	152	256	316	422	-
Wolves killed[d]	6	0	0	5	18	4	19	7	8	26	34	40	35	53	73	255
Wyoming																
Cattle			0	0	2	2	2	3	18	23	34	75	54	123	55	391
Sheep			0	0	56	7	0	25	34	0	7	17	27	38	16	227
Other[b]			0	0	0	0	1	0	0	0	10	2	0	1	0	14
Dogs			0	0	0	3	6	6	2	0	0	2	1	0	2	22
Total wolves[c]			21	40	86	112	107	153	189	217	234	272	252	311	359	-
Wolves killed[d]			0	0	2	3	1	2	4	6	18	29	41	44	63	213
Totals																
Cattle	14	9	3	11	22	21	33	32	40	52	64	130	97	184	183	895
Sheep	10	2	0	37	126	12	89	80	138	99	211	270	244	247	213	1,778
Other[b]	0	0	0	0	0	0	1	0	4	5	10	5	2	3	14	44
Dogs	1	0	4	2	4	5	15	11	6	9	6	9	11	8	13	104
Total wolves[c]	10-33	29-55	101	152	213	275	337	437	563	663	761	846	1,020	1,300	1,513	-
Wolves killed[d]	6	0	0	6	21	7	23	20	19	46	59	86	103	142	179	717

[a] Confirmed losses are defined as those losses verified through physical evidence to have been caused by wolves, as determined by USDA Wildlife Services or the U.S. Fish and Wildlife Service.

[b] Includes livestock other than cattle and sheep. Losses from 1987-2007 totaled 24 goats, 13 llamas, and 7 horses.

[c] Minimum number of wolves living in the state(s) during autumn.

[d] Includes wolves killed by government control actions and those legally killed by ranchers.

Table 4. Annual numbers and percent of death losses of cattle and sheep by different predators in Idaho, Montana, and Wyoming (adapted from NASS 2005, 2006)[a].

	Cattle		Sheep	
Species	No. of losses	%	No. of losses	%
Coyotes	4,100	50.0	27,400	70.8
Cougars and bobcats	900	11.0	1,900	4.9
Dogs	300	3.7	2,300	5.9
Bears	-	-	2,700	7.0
Foxes	-	-	1,100	2.8
Eagles	-	-	1,100	2.8
Wolves	150	1.8	250	0.6
Other species[b]	2,750	33.5	1,950	5.0
Total	8,200	100.0	38,700	99.8

[a] Data come primarily from 2004 for sheep and from 2005 for cattle (NASS 2005, 2006). Specific data on wolf depredations were not listed, but were generated using the mean annual confirmed losses in each of the three states combined during 2004-2007 (Table 3). These numbers were then separated out from the losses reported in the "other species" category. Cattle losses from unknown predators are not considered.

[b] Species in this category were not identified for cattle (NASS 2006), but presumably include bears. For sheep, they include ravens, vultures, and other animals (NASS 2005).

recovery objectives have not yet been achieved. Modified husbandry practices that may be useful in avoiding some wolf depredation include:

- Using range riders to help keep cattle more concentrated on public grazing allotments.
- Having herders with dogs present with sheep at night when most sheep depredation occurs.
- Burying livestock carcasses rather than dumping them in traditional bone yards. Wolves readily scavenge livestock carcasses, thus carcass removal may reduce wolf presence.
- Removing sick or injured livestock, which may be more vulnerable to wolves, from public grazing allotments.
- Delaying turnout of cattle on public grazing allotments until calving is finished.
- Delaying turnout of calves on public grazing allotments until they weigh at least 200 pounds. Older and consequently larger calves may be less vulnerable to wolf predation than younger calves.
- Delaying turnout of cattle on public grazing allotments until young wild ungulates are born.
- Avoiding wolf territory core areas, especially dens and rendezvous sites, during the earlier portion of the grazing season to reduce risk.

Non-lethal deterrents are also available for discouraging wolf predation and include the use of guarding animals, light and noise scare devices, hazing with non-lethal munitions (e.g., cracker shells, rubber bullets, and bean bags), predator-resistant or electric fencing, and fladry.

Together, these tools often temporarily succeed in reducing the vulnerability of livestock to wolf depredation, but are usually not considered permanent solutions by themselves. However, when combined with a fair and effective compensation program, they offer the best solution for both limiting livestock losses and compensating producers for any unavoidable losses. Some producers in Washington already use proactive deterrents to protect their livestock from predators. Among

Table 5. Percent use of different proactive methods among ranchers and farmers employing such techniques to prevent predation losses of livestock in Washington (NASS 2005, 2006).

Method	Cattle and calves (% of use)[a]	Sheep and lambs (% of use)[a]
Exclusion fencing	48.1	68.5
Guard animals	43.8	25.0
Frequent checks	43.1	2.5
Culling	14.1	4.0
Livestock carcass removal	13.6	1.0
Fright tactics	4.2	2.0
Night penning	0.2	36.6
Lamb shed	-	35.4
Llamas	-	16.4
Donkeys	-	6.7
Herding	-	2.4
Change bedding	-	0.1
Other methods	13.7	2.0

[a] Data for cattle and calves are for 2005, data for sheep and lambs are for 2004.

producers using such measures in 2004-2005, the most frequently employed tools were exclusion fencing, guarding animals, frequent checking of stock, night penning, and use of lamb sheds (Table 5).

One type of proactive program that has been developed and tested in Montana is the Range Riders Project. This program is a collaborative effort between ranchers, government agencies, and conservationists (including the Montana Fish, Wildlife & Parks, Madison Valley Ranchlands Group, Boulder Watershed Association, Turner Endangered Species Fund, USDA Forest Service, Predator Conservation Alliance, the Sun Ranch, USDA Wildlife Services, USDA Natural Resources and Conservation Service, Sweet Grass County Conservation District, and Montana State University Extension Service). The main goal of the project is to reduce livestock/predator interactions. Secondary goals are to 1) detect injured or dead livestock more rapidly, 2) preserve the evidence at potential depredation sites so that investigators can better determine whether or not predation was involved and which species was responsible, 3) improve livestock management and range conditions, 4) increase knowledge about livestock/predator interactions in space and time, and 5) build relationships among project partners. All project collaborators provide funding and in-kind contributions. In particular, significant funding has come through the USDA Natural Resources and Conservation Service's Environmental Quality Incentives Program.

Cowhands are trained in methods to keep wolves and livestock apart. Riders stay with livestock throughout the grazing season (generally June–October) and chase away any wolves that come near the cattle. Projects were implemented beginning in 2004 on both public grazing allotments and private lands in two valleys in Montana. Protocols varied from place to place, but the underlying premise was continual human presence and immediate response to wolves interacting with livestock. The use of horses and vehicles (where applicable) allowed riders to cover as much ground as possible while checking on livestock. In 2006, areas with riders experienced no confirmed or

probable depredations, although wolves were present and were seen and/or chased off. Due to high variability among sites, there is no clear evidence that these efforts have actually prevented depredations. However, when surveyed, many participating producers believed the project was helpful and indicated an interest to continue their participation.

Lethal Removal

Lethal control of wolves may be necessary to resolve chronic wolf-livestock conflicts and is performed to remove problem animals that jeopardize public tolerance for overall wolf recovery. Lethal removal of wolves has been used extensively in Idaho, Montana, and Wyoming, with nearly 540 wolves killed in control actions during the past two decades (Table 3). Decisions to lethally remove wolves in these states are made on a case-by-case basis, taking into account specific factors such as a pack's size and conflict history, status and distribution of natural prey in the area, season, age and class of livestock, success or failure of non-lethal tools, and potential for future losses (Sime et al. in press). Where lethal removal is deemed necessary, incremental control is usually attempted, with one or two offending animals removed initially. If depredations continue, additional animals may be killed. Stepwise incremental control can result in the eventual elimination of entire packs if wolves repeatedly depredate livestock (Sime et al. in press). Nearly all lethal control in the three states is conducted by wildlife agency staff, although private citizens can do so when finding wolves "in the act" of chasing or attacking livestock or when issued a special permit issued by federal or state authorities.

C. Compensation Programs for Wolf-Related Losses and Deterrence in Other States

Some livestock producers will experience financial losses due to wolves, particularly through depredations on livestock. Other financial hardships may result from livestock becoming stressed or injured, trampling of newborn young, or by changes in husbandry or management practices to reduce risk of depredation. Some of these losses can be documented reliably but others cannot.

Several compensation programs currently exist or are under consideration in the western United States to help producers recover some of the costs associated with wolf predation. The Bailey Wildlife Foundation Wolf Compensation Trust, which is operated by the Defenders of Wildlife, has compensated ranchers for wolf losses since 1987 (DOW 2008). Confirmed losses of livestock and herding/guarding dogs are reimbursed at 100% of their current or projected market value up to $3,000 per animal, whereas probable losses are reimbursed at 50% of their current or projected market value up to $1,500 per animal. Appropriate documentation, such as a contract, previous sale record, or current market reports, is required. Most claims are processed in less than six weeks. To expedite processing and help clarify the eligibility guidelines for compensation, a standard investigation report form is available. To remain eligible for compensation, livestock owners must demonstrate reasonable use of non-lethal control methods and animal husbandry practices that do not unnecessarily attract wolves. A total of $980,000 has been paid to producers in Idaho, Montana, and Wyoming through June 2008.

This program is available to livestock producers in areas where wolves are federally listed, including Washington, but the program will eventually need to be replaced by state-funded compensation programs in areas where the species is delisted. Defenders of Wildlife also operates the Bailey Wildlife Foundation Proactive Carnivore Conservation Fund, which encourages greater use of

preventative non-lethal deterrents and best management practices through cost-sharing grants to ranchers. This program is expected to expand if federal delisting occurs in the northern Rocky Mountain states (J. Timberlake, Defenders of Wildlife, pers. comm.).

The Idaho Wolf Depredation Compensation Fund reimburses producers for livestock losses in wolf-occupied areas of Idaho that are not covered by Defenders of Wildlife (OSC 2007). This includes above-normal mortality as well as lower-than-expected weight gains by livestock. This program also provides partial reimbursement for the proactive efforts that some ranchers make to avoid wolf depredations on their livestock. Funding limitations currently prevent the program from reimbursing all applicants seeking compensation.

Montana has recently created its own Livestock Loss Reduction and Mitigation Board, which will take over the compensation of losses in the state when federal delisting occurs. The board will initially cover confirmed and probable losses, but may eventually expand into indirect losses (Backus 2008).

D. Management of Wolf-Livestock Conflicts in Washington

Any wolf-livestock management program should manage conflicts in a way that gives livestock owners experiencing losses the tools to minimize future losses, while at the same time not harming the recovery or long-term perpetuation of sustainable wolf populations. Strategies to address wolf-livestock conflicts in Washington are identified in Chapter XII. Management approaches will be based on the status of wolves, while ensuring that conservation/recovery population objectives are met. Non-lethal management techniques will be emphasized while wolves are recolonizing and will transition to more flexible approaches as wolves progress toward a delisted status. Depending on circumstances and pack history, management options may include providing non-lethal abatement measures and recommendations, or lethal removal by WDFW or its agents. Emphasis will be placed on non-lethal, low-cost management techniques whenever possible. Actively informing and equipping landowners, livestock producers, and the public with tools to implement non-lethal and proactive wolf management techniques will be an important aspect of the management approach. WDFW will be the lead agency to respond to reports of wolf depredation, with potential assistance from USDA Wildlife Services and other entities. Providing compensation for losses will also be considered in accordance with administrative code and legislative approval of funding.

Wolf-livestock conflicts will be managed using a range of options to prevent depredation, as presented in Table 6. Descriptions of these options are as follows:

Wolf location information: Wolf location information will be provided to livestock owners in all management phases, on both private and public land. WDFW will provide producers with locations of radio-collared wolves living near active livestock operations, so that additional precautions (e.g., extra herders) can be taken to reduce the likelihood of depredation by wolves. Prior to releasing location data, WDFW will develop protocols for data distribution and appropriate safeguards for any "sensitive" data.

Non-injurious harassment: Livestock owners are allowed to harass wolves with non-injurious techniques when wolves are in close proximity to livestock or livestock grazing areas on both private and public land in all phases. These techniques may include, for example, scaring off an animal(s) by

Table 6. Management options to address wolf-livestock depredation during wolf recovery phases in Washington[a].

Management Option	Endangered Phase I	Threatened Phase II	Sensitive Phase III	Game Animal Phase IV
Wolf location information to livestock owners	Allowed	Allowed	Allowed	Allowed
Non-injurious harassment	Allowed	Allowed	Allowed	Allowed
Non-lethal injurious harassment	Allowed with a permit from WDFW	Allowed with a permit from WDFW	Allowed with a permit from WDFW	Allowed with a permit from WDFW
Lethal take of wolves involved in chronic depredation (≥ 2 incidents on one or more properties in a 12-month period)	Allowed anywhere by state/federal agents	Allowed anywhere by state/federal agents and on private lands by livestock owners with a permit	Allowed anywhere by state/ federal agents, and on private lands and public grazing allotments by livestock owners with a permit	Allowed anywhere by state/federal agents and livestock owners with a permit
Lethal take of wolves in the act of attacking (rescind if used inappropriately or > 2 incidents occur annually statewide)	Allowed by landowners, family members, or authorized employees within 150 yards of residence (defined as the house where the landowner lives)	Allowed by landowners, family members, or authorized employees within 150 yards of residence (defined as the house where the landowner lives)	Allowed by livestock owners on private land	Allowed by livestock owners anywhere
Hunting	Not Allowed	Not Allowed	Not Allowed	Limited (special permit)
Funding/assistance for the development of proactive non-lethal management tools	Yes	Yes	Yes	Yes

[a] This plan is intended to direct management while wolves are listed as state endangered, threatened, or sensitive in Washington. After delisting, it is assumed that a new management plan will be developed that may include more liberal tools for livestock producers to control wolves. Game animal status (i.e., Phase IV) does not imply a general hunt immediately upon delisting (see Chapter III, Section C).

firing shots into the air, making loud noises, or otherwise confronting the animal(s) without doing bodily harm.

Non-lethal injurious harassment: Non-lethal injurious harassment of wolves is allowed in all phases through a WDFW permit to livestock owners or their designated agents on their own land or to grazing allotment holders using public land. Non-lethal injurious harassment may include techniques such as rubber bullets or beanbag projectiles. A permit and training in the use of rubber bullets is required by WDFW prior to the use of non-lethal injurious harassment.

Lethal take for chronic depredation: Wolves may be lethally removed to stop chronic depredation. In general, lethal removal may be used if a wolf or wolf pack has been documented depredating on livestock on two or more occasions on one or more properties during a 12-month period, and no unreasonable conditions exist that are attracting wolf-livestock conflict. Situations will, however, be evaluated on a case-by-case basis. Any lethal removal of wolves will be in accordance with established guidelines, which are linked to recovery phase, as described below:

- Lethal take by state or federal agents: Wolves involved in chronic depredation on private or public land may be trapped and euthanized by WDFW or USDA Wildlife Services, or shot under all recovery phases.

- Lethal take by livestock owners: Livestock owners and lessees of public land would be allowed to obtain a permit from WDFW to control a limited number of wolves using lethal force during a specific time period on land they owned or leased if they have suffered chronic wolf depredation, as follows:
    - On private lands when wolves are listed as threatened.
    - On private land and public grazing allotments, when wolves are listed as sensitive.
    - Anywhere after wolves are delisted.

Lethal take in the act of attacking: This provision would allow lethal take of wolves "in the act" of attacking (defined as actively biting, wounding, or killing) livestock or family pets within 150 yards of a residence (defined as the actual house where a landowner/family lives) while the species is listed as state endangered or threatened. This provision applies to family members or authorized employees who are within 150 yards of the landowner's residence during the time of an attack. It is critical to understand that wolves passing near or stalking domestic animals are not considered to be in the act of attacking. Wolves passing near or stalking domestic animals can and should be deterred with non-lethal methods.

During the state sensitive phase, wolves could be killed in the act of attacking livestock or pets by landowners, family members, and authorized employees anywhere on private land. After state delisting to game animal status, wolves could be killed in the act of attacking livestock or pets by a person anywhere.

Public education is necessary for this provision to be used appropriately and to not adversely affect wolf recovery. This management tool may be temporarily rescinded if used inappropriately or if more than two incidents total occur annually in the state. Currently, lethal take by landowners of state endangered and threatened species in the act of attacking livestock or pets is not legally allowed (RCW 77.36.030). Allowing landowners to do so with wolves will require a statutory change.

E. Proactive Assistance in Washington

WDFW will address wolf-livestock conflicts by providing individual livestock producers with 1) technical assistance on proactive management activities designed to minimize conflicts and 2) financial compensation for depredations on livestock. Both activities will be administered and implemented by WDFW in cooperation with other agencies and private organizations, as appropriate. These two elements, proactive management and financial compensation, complement one another and are vital to the goals of developing and maintaining a viable wolf population and addressing economic losses.

Proactive Management Assistance

WDFW wolf management specialists will work proactively with livestock producers to provide technical assistance on non-lethal management techniques and technologies to minimize wolf-livestock conflicts and depredations. WDFW will also be open to partnerships with other organizations and agencies that are interested in providing livestock producers with funding, additional training, and other resources needed to implement this type of assistance. The Defenders of Wildlife Bailey Wildlife Foundation Proactive Carnivore Conservation Fund is an example of such a possible partnership. As described in Section C, this fund assists with conflict prevention between imperiled predators and humans by supporting the use of preventative measures, including non-lethal deterrents and best management practices. WDFW will actively encourage livestock producers to implement such management techniques through outreach and education. In addition to building social tolerance of wolves and aiding wolf conservation, proactively reducing depredations will also likely reduce the total compensation payments that the state will make over the long-term.

F. Compensation in Washington

Defenders of Wildlife currently offers the only compensation program to individual ranchers and farmers in Washington to help offset the costs of wolf-related depredations. After approval of this plan, it is recommended that a new state-sponsored and state-guaranteed compensation fund be developed, which will manage state funds as well as private donations, grants, and federal funds in an interest-bearing account. This account will provide compensation to ranchers and farmers for confirmed and probable livestock depredations, as well as unknown losses. Contributions may include funds that WDFW already provides for animal damage management; however, the majority of the monies for this fund will need to be approved by the State Legislature. WDFW will also work with the livestock industry and conservation organizations to identify additional funding from a diversity of sources, including special state or federal appropriations, private foundations, and other private resources to augment state compensation and to potentially offer compensation for livestock losses related to wolf presence and conflict not covered by this recommended state compensation fund.

Rationale

The recommendation for a state-funded compensation program is based on the need for: 1) public support, 2) fairness, and 3) a plan that meets the concerns of livestock producers. A plan that meets

these needs will build support for wolf conservation and be consistent with existing precedent of compensation programs in other states and countries. Public support for a state-funded compensation program was expressed in comments generated during public scoping meetings held around the state by WDFW in August 2007. Many people supporting wolf restoration view compensation as an opportunity to share what they perceive as a burden that livestock producers should not have to bear alone and as a way to build public support for wolf recovery. Many livestock producers support payment for livestock losses in exchange for allowing wolves to return to Washington. An effective compensation program supported by the public and State Legislature can also help increase some landowners and livestock producers' tolerance of wolves, which can help decrease illegal killings and aid wolf recovery.

The Washington Legislature will need to approve a state-sponsored wolf compensation program before it can be implemented. The details of legislation to authorize payment for livestock losses are unknown at this time. Therefore, the proposed livestock compensation program described in this document may change as the authorizing legislation proceeds through the review process.

Compensation

It is recommended that the state compensation fund reimburse livestock owners for known or suspected wolf-related losses of livestock, as follows:

1. Compensation for confirmed and probable wolf-caused losses.

    a. On public land and large blocks of private land (100 acres or more):

        - Confirmed Wolf Depredation – For any livestock confirmed to have been killed by a wolf, the owner shall receive twice the current market value for the animal.

        - Probable Wolf Depredation – For any livestock documented as a probable kill by a wolf, the owner shall receive one and one half times the current market value for the animal.

    b. On small blocks of private land (less than 100 acres):

        - Confirmed Wolf Depredation – For any livestock confirmed to have been killed by a wolf, the owner shall receive the current market value for the animal.

        - Probable Wolf Depredation – For any livestock documented as a probable kill by a wolf, the owner shall receive half of the current market value for the animal.

    This two-tiered compensation system is designed to accommodate the needs of livestock owners using larger blocks of land who have a greater likelihood of experiencing higher levels of unverifiable losses than producers on smaller areas, who typically are able to supervise their stock more closely and detect nearly all of their losses (see Section A).

    Current market value is defined as the value of an animal at the time it would have normally gone to market. Livestock eligible for compensation include cattle, calves, hogs, pigs,

horses, mules, sheep, lambs, goats, and guarding/herding animals. Appropriate documentation, such as a contract, previous sales record, or current market reports, would be required.

Compensation will be at current market value for wolf-caused injuries to livestock that are, as a result of those injuries, unable to reproduce and have to be destroyed or sold. Producers will be able to recoup veterinary treatment costs for injured animals. Domestic pets and hunting dogs will not be covered for compensation; however, dogs used for animal control efforts under contract with WDFW or other public entities may be eligible.

Compensation payment will be made in a timely manner upon discussion with the livestock producer to reach agreement when payment would be most beneficial. Payments for wolf-caused depredation shall be reduced by the amounts received by the owner's proceeds from an insurance policy covering livestock losses or from any other source for the same purpose including a federal or private compensation program.

Eligibility

To qualify for compensation for direct losses, incidents of suspected wolf depredation must be reported to WDFW and verified as confirmed or probable (as defined below) during a follow-up investigation conducted by trained personnel from WDFW or USDA Wildlife Services. Prompt investigations are critical for determining the validity of reported complaints, thus livestock producers need to report suspected wolf depredations as soon as possible. Washington's Wolf Reporting Hotline (1-888-584-9038) is available for making reports (see Appendix H for reporting guidelines and associated information). Agency personnel will conduct their investigation within 48 hours of receiving a report. After an investigation is completed, the complaint will be classified under one of the following categories:

- Confirmed Wolf Depredation – Clear evidence that wolves were responsible for the depredation, which may include, but is not limited to, evidence from a carcass, such as tooth punctures and associated hemorrhaging, broken bones, and wolf-like feeding patterns, as well as wolf tracks in the immediate vicinity or other wolf sign.

- Probable Wolf Depredation – Carcass missing or inconclusive, but good evidence of wolf presence exists. This may include, but is not limited to, a characteristic kill site, blood trails, wolf tracks and scat in the immediate vicinity, a baseline history of depredation rates documented by an independent third party, and known presence of wolves and/or a history of wolf depredations in the area.

- Confirmed Non-Wolf Depredation – Clear evidence that the depredation was caused by another species, such as a coyote, black bear, cougar, bobcat, domestic dog, wolf hybrid, or pet wolf.

- Unconfirmed Depredation – Any depredation where the predator responsible cannot be determined.

To receive compensation, it is expected that producers will be responsible for following best management practices that limit wolf attractants in the vicinity of their livestock, including removal of dead and dying animals. Livestock producers who have already been compensated for a depredation will also be required to demonstrate that they have made a reasonable attempt at implementing such best management practices, as well as non-lethal conflict management strategies, to be eligible for compensation for subsequent depredation occurrences.

2. Compensation for unknown losses.

Additionally, WDFW shall develop a compensation program for unknown losses in areas where wolves are present and at least two depredations have occurred within the previous 12 months. The purpose of this program is to compensate producers in these areas for the loss of livestock when there is no direct evidence of depredation. The program will be available to livestock owners who can demonstrate a loss ratio in excess of historic losses (most recent five years) for the year in question. Compensation will be based on 100 percent of the value of the difference between the historic loss ratio and the demonstrated loss by the livestock owner multiplied by the market price for the equivalent number of animals that would have been expected to return. Criteria for documenting the presence of wolves will be needed for the program.

A state-funded compensation program for unknown losses must establish a high degree of accountability and verifiability, minimize the problems that have occurred with wolf compensation programs in other states, avoid creating a costly new bureaucracy, be as low cost as possible, be implementable, and be simple to understand and use. If such a program cannot be developed meeting these conditions, WDFW shall work with a balanced advisory group to determine the need for an alternative compensation program. Compensation for direct and unknown losses shall not be additive or redundant.

Accountability, Review, and Phasing Out

A Washington Compensation Review Board is proposed to oversee the implementation of the state compensation program. Key objectives of the Review Board will be to maintain a high degree of accountability, review whether the compensation program is working effectively, finalize validation criteria, and assess the validity of claims seeking compensation for unknown losses. The Review Board should contain an equal number of members representing conservation and livestock producer interests. One or both of the WDFW wolf biologists who will be in the field monitoring wolf recovery and working with ranchers on mitigation will provide technical expertise and attend meetings, if requested.

The compensation program will be subject to review, along with the rest of Washington's Wolf Conservation and Management Plan, when the listing status of wolves changes from state endangered to threatened and from threatened to sensitive. Compensation for livestock depredations may begin to be phased out upon delisting from sensitive depending on the type of management tools authorized and flexibility of control options available to livestock owners. It is assumed that a new management plan will accompany the delisting and the need for continued compensation will be evaluated at that time.

V. WOLF-UNGULATE INTERACTIONS

This chapter focuses on interactions between gray wolves and wild ungulates, current status and management of ungulates in Washington, and strategies for ensuring the retention of healthy ungulate populations while achieving wolf recovery. Wolves dispersing into Washington likely will settle in areas with abundant prey that already support multiple species of predators, including hunters, cougars, black bears, and coyotes. The effect on ungulate populations from adding wolves to existing predation levels and hunter harvest is difficult to predict in the state because of localized differences in predator and ungulate abundance and harvest management practices within each geographic area.

A. Wolf Predation of Ungulates

Ungulates are the primary food of wolves throughout their distribution. Prey selection by wolves probably reflects a combination of capture efficiency and profitability versus risk (Mech and Peterson 2003). Thus, wolves may concentrate on species that are easier to capture or offer greater reward for the amount of capture effort expended rather than on species that are most common. Diet can vary greatly among locations in the same region (Table 2) or even among packs living in the same vicinity (e.g., Kunkel et al. 2004, Smith et al. 2004) in response to differences in prey populations, seasonality, weather conditions, the presence of other predators, levels of human harvest, and other circumstances (Smith et al. 2004). In the central and northern Rocky Mountains of the United States and Canada and other areas of British Columbia, wolves commonly rely on elk as their primary prey, but deer and even moose are more important in some areas (Table 2). Bighorn sheep and mountain goats are not regularly taken anywhere in this region, probably because of little habitat overlap with wolves (Huggard 1993).

Wolf diets in Washington are expected to be similar to those elsewhere in the region, with elk and deer being the primary prey species. Prey selection will likely vary among locations based on species availability, season, local terrain, and other factors. In areas of the state with few or no elk, deer will undoubtedly serve as the primary prey. Moose, which are numerous and widely distributed in northeastern Washington, may also contribute significantly to diets in that area. Predation on bighorn sheep and mountain goats will probably be minor. For goats, range overlap with wolves is most likely to occur in the spring as wolves follow other prey to higher elevations and encounter goats still lingering in mid- to high elevation forests from winter (C. Rice, pers. comm.).

The rates at which wolves kill and consume prey are highly variable with time of year and species taken. Both rates (usually expressed as biomass per wolf per day) have been investigated in many North American studies and average about 7.2 kg/wolf/day for kill rate (winter only; Mech and Peterson 2003) and 5.4 kg/wolf/day for consumption rate (winter only; Peterson and Ciucci 2003). The figure for kill rate roughly corresponds to about one 150-kg elk killed per 21 days per wolf (or 17 elk per wolf per year) or one 60-kg deer killed per 8.3 days per wolf (or 44 deer per wolf per year). However, these estimates are probably somewhat inaccurate because they are based on 1) winter studies, when predation rates are highest causing annual take to be overestimated, and 2) do not account well for the number of fawns and calves killed in summer or supplementary prey (e.g., beavers, hares) taken in other seasons (Mech and Peterson 2003, Smith et al. 2004). White et al.

(2003) attempted to overcome some of these problems and estimated an annual kill rate of 25 ungulates per wolf per year in prey-rich Yellowstone National Park. However, it should be noted that wolf kill rates are generally higher for reestablishing and expanding wolf populations like those at Yellowstone than for long established and stable populations (Jaffe 2001). Predicting predation rates for wolves in Washington is difficult because of many uncertainties, including where wolves will become reestablished in the state and at what population level.

Wolves tend to select the more vulnerable and less fit prey. Young of the year (especially in larger prey like elk and moose; Kunkel and Pletscher 1999), older animals, and diseased and injured animals are taken in greater proportion than healthy, prime-aged individuals (Mech 1970, 2007, Kunkel et al. 1999, Mech and Peterson 2003, Smith et al. 2004). Similar to other coursing predators, wolves will test and evaluate available prey, and will focus on those animals that require the least energy to capture and present the least risk of injury or death to pack members. When young and infirm animals are not available, wolves are capable of killing healthy, prime-aged animals.

Prey species have evolved defensive techniques such as alertness, speed, herding behavior, synchronous birthing of young, spacing, migration and retreating into water, all of which reduce vulnerability to wolves (Mech and Peterson 2003). Because of these defense mechanisms, the majority of hunts initiated by wolves are unsuccessful. Hunting success of wolves can be influenced by many factors, including pack size, terrain, habitat features, snow and other weather conditions, time of day, prey species, age and condition of prey, season, experience, and other factors (Mech and Peterson 2003, Hebblewhite 2005, Kauffman et al. 2007).

The impacts of wolves on prey abundance have been, and continue to be, widely debated (see Boutin 1992). Some common conclusions on this topic have been drawn. A number of studies have reported effects on ungulate populations (Bergerud and Snider 1988, Larsen et al. 1989, Ballard et al. 1990, Skogland 1991, Gasaway et al. 1992, Dale et al. 1994, Messier 1994, Van Ballenberghe and Ballard 1994, Adams et al. 1995, Boertje et al. 1996, National Research Council 1997, Hayes and Harestad 2000, Hebblewhite et al. 2002, 2006, Hayes et al. 2003, White and Garrott 2005, Hebblewhite and Merrill 2007), indicating that wolf predation can limit prey populations (Mech and Peterson 2003). Population-level effects result primarily through predation on young-of-the-year and are frequently enhanced when occurring in combination with other predators (e.g., bears) (Larsen et al. 1989, Barber-Meyer et al. 2008). However, as pointed out in many studies, numerous other factors (human harvest, severe winters, variable forage quality, and fluctuating abundance of other predators and prey) also influence prey populations and complicate the ability to make solid conclusions about wolf-related impacts. Several studies have detected little or no effect from wolves on ungulate populations (Thompson and Peterson 1988, Bangs et al. 1989, Peterson et al. 1998; see Mech and Peterson 2003). Mech and Peterson (2003) suggested three reasons why researchers have failed to reach agreement regarding the significance of wolf predation on the dynamics of prey populations. These are: 1) each predator-prey system has unique ecological conditions, 2) wolf-prey systems are inherently complex, and 3) population data for wolves and their prey are imprecise and predation rates are variable.

The question of whether wolf-caused mortality is "compensatory" or "additive" is another widely debated topic. Predation is considered compensatory when it replaces other mortality sources (starvation, disease, etc.) that would have otherwise occurred. Predation can be classified as additive when prey are lost that were not necessarily destined to die of other causes in the short term. Mech

and Peterson (2003) concluded that in most cases wolf predation is probably a combination of both, making clear evidence even more difficult to discern. This holds especially true for predation on young animals (calves and fawns), where some but not all young killed by wolves would have otherwise likely survived to adulthood. Recent analyses from Yellowstone National Park are contradictory on this topic. Vucetich et al. (2005) reported that wolf predation on elk in the park is thus far primarily compensatory and replaces mortality that would have been caused by hunting and severe winter weather, but noted that wolf predation could become more additive in the future as circumstances change. Others (White et al. 2003, White and Garrott 2005) have concluded that take of female elk by wolves and hunters is probably additive because of the high survival rates of females in the absence of hunting and major predators. In multi-predator ecosystems, where species such as cougars, bears, and coyotes also exist, one might expect that wolf reestablishment would result in declines in some other predators and that wolf predation would therefore be compensatory. However, under recent conditions at Yellowstone, predator losses (primarily by bears, but also including by wolves and coyotes) on elk calves were considered mainly additive (Barber-Meyer et al. 2008). At Glacier National Park, Kunkel and Pletscher (1999) reported that prey losses from wolves were largely additive to those from other predators. A myriad of literature can be produced that presents examples of each type of mortality in predator-prey systems involving mammals. Each is unique to the ecosystem studied and the inherent strengths and weaknesses of the study design. It is beyond the scope of this plan to attempt to evaluate all of those in the context of wolf reestablishment in Washington, and would add little value in terms of a management plan. For a more complete treatment on the theories of predator regulation, compensation, and other related topics on population dynamics, see Sinclair and Pech (1996).

An important recent finding by Eberhardt et al. (2007) is that removals by wolves have a much lower overall impact on ungulate populations than do antlerless harvests by hunters. Wolves primarily prey on young of the year and older individuals beyond their prime, both of which have lower reproductive value, whereas antlerless removals by hunters are concentrated on adult females of prime age. Thus, wolf predation has considerably less effect on reproductive rates and growth of populations. Eberhardt et al. (2007) also remarked that conservative harvests of females are necessary wherever ungulate populations are exposed to hunting and predation by multiple species of large carnivores at or near carrying capacity.

Preliminary evidence suggests that wolf predation can reduce the occurrence of some diseases in prey populations through the removal of infected individuals, thus perhaps imparting an overall benefit to surviving animals (Barber-Meyer et al. 2007). However, increased prevalence of other diseases can occur simultaneously if predation results in greater herding behavior, thereby enhancing transmission.

B. Recent Impacts of Wolves on Ungulates in Neighboring States

Observations from Montana indicate that elk abundance has declined in a few areas due in part to wolf predation, but has remained stable or increased in many other areas where wolves are present (Garrott et al. 2005, MFWP 2007a, USFWS et al. 2008). For example, two-thirds of the hunting districts in southwestern Montana (all of which support wolves) currently offer the most liberal elk hunting opportunities seen in nearly 30 years because of higher elk populations. However, lethal wolf control is practiced in many of these areas to remedy conflicts with livestock and may keep local wolf densities low enough to minimize impacts on elk populations. Where decreasing elk

populations have occurred, evidence suggests that these were caused by a combination of factors rather than wolf predation alone, although wolves may have exacerbated the declines or lengthened recovery times. Impacts on deer and other ungulates in Montana have not been detected to date (C. Sime, pers. comm.).

In Idaho, wolf predation may be causing reductions in the harvestable surplus of elk in some parts of the state, even if elk populations are not declining (IDFG 2008). The Lolo region, where experimental wolf control is proposed, has experienced a significant reduction in elk abundance, but this trend began in the mid-1980s well before wolves became common (IDFG 2006). The extent that wolves have contributed to this decline in recent years is unknown but perhaps significant. Declines in elk herds were detected in several other parts of the state with wolves in 2007, but the role of wolves in these declines has not been investigated (S. Nadeau, pers. comm.). IDFG (2008) has also reported that wolves are possibly reducing success rates for some hunters in parts of the state by changing the behavior and habitat use of elk during the hunting season. As observed in the greater Yellowstone ecosystem (Creel and Winnie 2004, Mao et al. 2005), Idaho's elk may now be spending more time in forested areas, on steeper slopes, and at higher elevations than before wolf reintroductions, making it more difficult for hunters to find animals. Other ungulates have not been impacted by wolves in Idaho, with the possible exception of moose (S. Nadeau, pers. comm.). Declines in moose in some areas are poorly understood and may in fact be related to habitat changes or other causes.

In Wyoming, wolf predation is one of several causes, along with high human harvest, drought, and increased bear predation, contributing to a roughly 50% decline in the elk population in and around northern Yellowstone National Park since 2000, with wolves having an increasingly greater impact as their population has expanded (Vucetich et al. 2005, White and Garrott 2005, Barber-Meyer et al. 2008). Bear predation on elk calves has greatly expanded over the last decade or two and is currently having a much larger impact on recruitment into the elk population than wolf predation (Barber-Meyer et al. 2008). There has been insufficient time to determine whether elk abundance will eventually rebound due to density-related responses causing higher survival and reproduction in combination with changes in predation pressure. Wolf numbers were originally predicted to follow elk abundance, but have instead continued to increase (USFWS et al. 2007) despite the lower elk population. Whether wolves maintain high numbers or eventually decline in response remains to be seen. To date, wolves have not had substantial effects on deer and other ungulates in and around the park (White and Garrott 2005, White et al. 2008). Elsewhere in Wyoming, wolves are considered a potential threat to important populations of bighorn sheep and moose on their wintering ranges, but documented effects on such populations are lacking (WGFC 2007).

C. Ungulate Status in Washington

Elk

Ten major elk herds are recognized in Washington (Figure 7) and range in size from post-hunting season estimates of 600 to 12,500 animals (Table 7). These total about 54,000 animals statewide, of which about 62% occur west of the Cascade crest. Elk are largely absent from a sizable portion of the state, including much of the Columbia Basin, much of Okanogan County, the North Cascades, and the Puget Trough (Figure 7). Elk are not uniformly distributed within identified herd ranges, but instead are concentrated in some areas and less abundant or absent in other areas. Many herds

display distinct seasonal movements, which also influence distribution. Animals generally occupy higher elevations in the summer and lower elevations in the winter (usually November to April). Hunting mortality (including wounding loss and poaching) is by far the greatest source of elk mortality (64-82%) in those portions of the state examined thus far (Table 8). About 8,000 elk are harvested annually in Washington, excluding kill by treaty tribes. Marked reductions in timber harvest, especially in western Washington, and increasing human populations in elk habitat have reduced the state's carrying capacity for elk compared to past decades. Each herd is different and has different management issues. Individual summaries of the ten herds are provided below.

1. Selkirk Herd – Herd size currently totals about 2,400 elk, which represents substantial growth from an estimate of 1,200 animals in 2001 (WDFW 2001a). The management objective for this herd is in development and will be finalized when the herd's management plan is completed. Nearly 70% of the herd occurs north of the Spokane River in the forested uplands of eastern Ferry, Stevens, Pend Oreille, and northern Spokane counties. Habitat conditions in this portion of the herd's range appear favorable for continued population growth for at least the near future (Zender and Base 2006). Localized populations also occur south of Spokane and in parts of Lincoln counties (WDFW 2001a). Damage to agricultural crops has been an ongoing problem at various sites south of the Spokane River and at a few farms in northern Pend Orielle County.

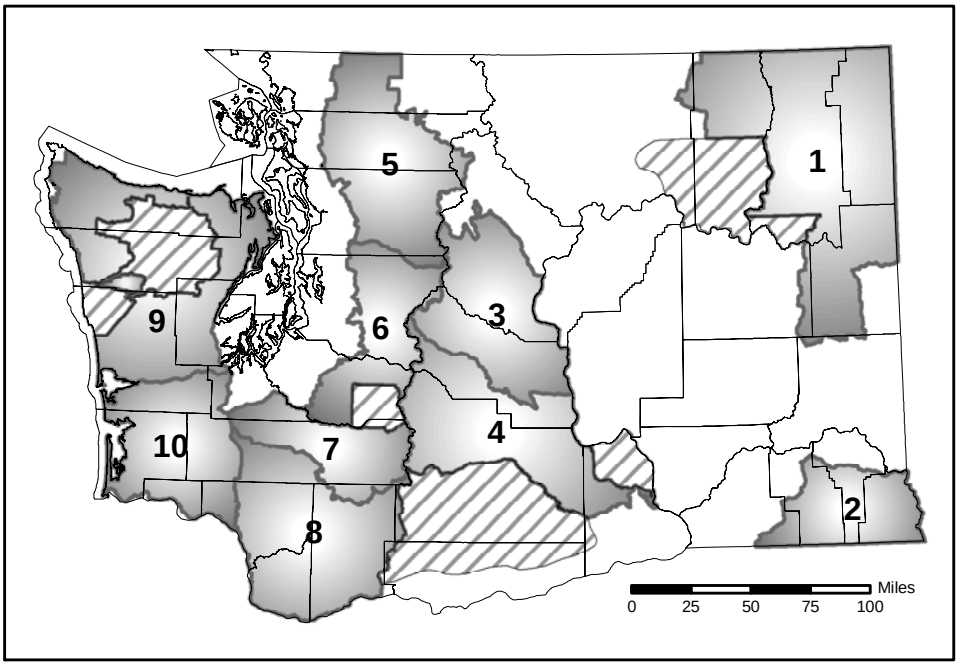


Figure 7. Ten major elk herds managed by WDFW in Washington (1, Selkirk herd; 2, Blue Mountains herd; 3, Colockum herd; 4, Yakima herd; 5, North Cascade (Nooksack) herd; 6, North Rainier herd; 7, South Rainier herd; 8, Mount St. Helens herd; 9, Olympic herd; and 10, Willapa Hills herd). Elk living year-round on tribal and some federal lands are not included in these herds, but their distribution is illustrated here (diagonal lines) to give a more complete depiction of elk distribution in the state.

Table 7. Current population estimates of the 10 major elk herds managed by WDFW in Washington.

Elk herd	Estimated herd size[a,b]	
	Eastern Washington	Western Washington
Selkirk	2,400	-
Blue Mountains	4,500	-
Colockum	3,300	-
Yakima	10,600[c]	-
North Cascade (Nooksack)	-	600
North Rainier	-	1,800
South Rainier	-	2,100
Mount St. Helens	-	12,500
Olympic	-	9,000
Willapa Hills	-	7,600
Total	20,500	33,600

[a] Source: WDFW 2001b, 2002a, b, c, d, 2003, 2005, 2006a, b; WDFW, unpubl. data.
[b] Excludes animals residing year-round on tribal and National Park Service lands.
[c] Includes the Rattlesnake Hills sub-herd.

Table 8. Reported causes of elk mortality in Washington.

Herd(s)	Cause of mortality (%)								Source[a]
	Legal harvest	Wounding loss	Poaching	Malnu-trition	Predation	Vehicle accidents	Other accidents	Unknown causes	
Mt. St. Helens, Olympic, Colockum	59	7	15	12	2	1	<1	3	1
Blue Mountains[b]	41	14	9	-	11[c]	-	-	25	2
Yakima	56	13	13	13[d]	5[d]	-	-	-	3

[a] Source, dates of study, and sample size: 1, Smith et al. (1994), 1988-1993, 165 elk; 2, Myers et al. (1999), 1990-1996, 47 elk; 3, McCorquodale et al. (2003) and S. M. McCorquodale (pers. comm.), 1992-1992, 39 elk.
[b] Study results also included two capture-related mortalities and three cougar mortalities that were likely related to capture activities, but these are excluded here.
[c] Predation was attributed to cougars in three instances and undetermined predators in two instances.
[d] In addition to the hunting-related losses cited in McCorquodale et al. (2003), S. M. McCorquodale (pers. comm.) reported that five elk were considered winterkill and two were killed by cougars.

Current harvest management consists of:

1) A general hunting season for bulls or either-sex elk depending on the Game Management Unit (GMU).
2) A special permit season for a limited number of either-sex elk in GMUs having any bull general seasons.
3) A tribal either-sex season conducted by the Colville, Spokane, and Kalispel tribes on their respective reservations and on the "North Half" (GMUs 101 and 204) by the Colville tribe.

2. Blue Mountains Herd – Total numbers have averaged about 4,500 animals during the past decade, which is below the management objective of 5,600 elk (WDFW 2001b). Abundance has been limited by habitat changes, loss of habitat, and past levels of antlerless hunting. The herd occupies an area of about 900 mi^2. Elk damage to crops and fences is a continuing problem on the lowland portions of the herd's range.

Current harvest management consists of:

1) A general season for spike bulls only.
2) A special permit season for a limited number of branch-antlered bulls and antlerless elk.
3) A tribal either-sex season held by the Umatilla and Nez Perce tribes.

3. Colockum Herd – This herd has shown a declining trend since the late 1990s due to high antlerless harvest and hard winters in the early 1990s (WDFW 2006a). The most recent herd estimate totals about 3,300 elk, which is well beneath the desired population objective of 4,500 animals. The herd inhabits about 1,600 mi^2, with most use occurring in the eastern half of the area. Elk damage on private lands has been a problem at a number of locations since the late 1980s.

Current harvest management consists of:

1) A general season for spike bulls only.
2) A special permit season for small numbers of branch-antlered bulls and antlerless elk mostly to address agricultural damage.
3) A tribal either-sex season held by the Yakama Nation.

4. Yakima Herd – Total numbers in this herd are currently about 10,600 elk, which places the herd at management objective (WDFW 2002a, Bernatowicz 2006). About 92% of all animals occur in the Cascade Slope sub-herd that resides west of the Yakima River, whereas the much smaller Rattlesnake Hills sub-herd, numbering about 800 animals, is centered on the Arid Lands Ecology Reserve and Yakima Training Center east of the Yakima River. Two unique aspects of management of this herd come from the extensive crop damage that it has caused dating back to the early 1900s. This has resulted in the building and maintenance of more than 100 miles of elk-proof fencing to keep animals out of high value croplands and orchards. Because the fences block elk from their historical winter range, WDFW conducts a large-scale winter-feeding program at nine sites to keep animals at higher elevations.

Current harvest management consists of:

1) A general season for spike bulls only.
2) A special permit season for a limited number of branch-antlered bulls and antlerless elk.
3) Some tribal either-sex hunting by the Yakama nation and Umatilla tribe.

5. North Cascade Herd – This herd, also known as the Nooksack herd, is the smallest in Washington and currently numbers about 600 elk. The herd has shown positive growth in recent years, but remains well below the stated population objective of 1,950 animals (WDFW 2002b). Augmentation efforts in 2003 and 2005 added reproductive-aged females and calves to the herd. The core population currently inhabits about 500 mi^2 between the Skagit River and Mt. Baker (WDFW 2002b). Intensive logging and loss of winter range from urban development and agricultural conversion are the main threats to the herd. Elk cause some agricultural damage in the Skagit River valley.

Current harvest management consists of:

1) A special permit season for a small number (less than 20 at this writing) of branch-antlered bulls.
2) An equally limited number of elk permits authorized by the Point Elliot Treaty tribes for tribal members.

6. North Rainier Herd – Herd size totals about 1,800 elk, which is below the management objective of 2,800 animals (WDFW 2002c). The bulk of the herd ranges over a 2,800-mi^2 area of eastern King and Pierce counties. Herd numbers declined 46% from 1989 to 2000 (WDFW 2002c), but have since stabilized. The decline was attributed to several interrelated factors including antlerless harvest, predation, a decline in habitat quantity/quality due to forest succession, low calf survival, and poor nutrition.

Current harvest management consists of:

1) A general season for any bull in GMU 454 and bulls with three or more antler points on a side in GMUs 460 and 466.
2) A special permit season for a small number of bulls in GMUs 485 and 653.
3) A tribal either-sex hunt by the Medicine Creek Treaty and Point Elliot Treaty tribes.

7. South Rainier Herd – This herd contains about 2,100 elk, which is below the desired objective of 3,000 animals (WDFW 2002d). Most of the herd occupies a 1,000-mi^2 area of northern Lewis and southern Thurston counties and southern Mt. Rainier National Park. WDFW has tried to balance the desire to meet the current population objective, maintain hunting opportunity, and address depredation on crops. Agricultural and property damage by the elk herd have increased over the past 10-15 years.

Current harvest management consists of:

1) A general season for bulls with at least three antler points per side.
2) A tribal either-sex season by the Medicine Creek Treaty tribes.

8. Mount St. Helens Herd – This is one of the largest herds in the state, with an estimated 12,500 elk (WDFW 2006b). Management objectives call for numbers to be reduced to 10,000 animals by 2015, primarily through expanded antlerless harvest. Abundance is highest in south-central Lewis, Cowlitz, northern Clark, and northern and central Skamania counties (WDFW 2006b). Wintering elk in the Toutle River valley, which typically comprise only about 3-6% of the herd, occasionally suffer substantial mortality from malnutrition caused by winter weather conditions and declining forage quality (WDFW 2006b). Chronic elk damage to agriculture and commercial forestlands occurs in several areas and has become more widespread in recent years.

Current harvest management consists of:

1) A general season for bulls with a minimum of three antler points per side.
2) A special permit season for a limited, but substantial, number of antlerless elk.
3) No tribal harvest currently occurs.

9. Olympic Herd – This herd holds an estimated 9,000 elk and has shown some recent population growth, but remains below the management objective of 11,350 animals (WDFW 2005b). These numbers exclude Olympic National Park, where an additional several thousand elk reside year-round (P. Happe, pers. comm.). Elk abundance is highest on the west side of the Olympic Mountains, followed by several southern drainages (WDFW 2005b). Elk are less common on the northeast and east sides of the Olympic Peninsula, where small groups are generally present. Restrictions on antlerless harvest have allowed the herd to increase over the past decade. Damage caused by the herd is generally restricted to a few localized areas.

Current harvest management consists of:

1) A general season for bulls with at least three antler points per side.
2) A special permit season for small numbers of antlerless elk, mostly to address agricultural damage issues.
3) A tribal either-sex hunt by nine treaty tribes on the Olympic Peninsula.

10. Willapa Hills Herd – This is Washington's least known elk herd. It occurs almost entirely on private industrial timberland and holds an estimated 7,600 animals, which is slightly below a management goal of 8,000 elk (WDFW 2003).

Current harvest management consists of:

1) A general season for bulls with at least three antler points per side.
2) A special permit season for small numbers of antlerless elk, mostly to address agricultural damage issues.
3) No tribal harvest currently occurs.

Deer

Washington has four subspecies of deer: mule deer, black-tailed deer, white-tailed deer, and Columbian white-tailed deer (Figure 8). Total deer numbers in the state are estimated at roughly 300,000 animals (J. Nelson, pers. comm.), with population trends varying by species and location. From 1996 to 2005, hunters harvested an average of about 38,000 (range of 30,300 to 44,600) deer annually in Washington, which was divided fairly equally among black-tailed deer, white-tailed deer, and mule deer (Nelson 2006). Deer generally prefer habitat in early to mid-successional stages. Reduced emphasis on clear-cutting and other changes in forest management practices on public lands over the past few decades and expanding human development in low elevation habitat has caused a decline in deer abundance in Washington since the early 1990s (Nelson 2006).

Unlike elk, deer in Washington are not currently assigned to or managed as herds. Instead, WDFW manages deer by Population Management Units (PMU), which are defined geographic areas usually comprised of multiple game management units. Population estimates are generally unavailable for specific PMUs, but population trends are tracked using harvest and survey data. WDFW's goal for managing black-tailed deer, mule deer, and white-tailed deer populations is to maintain numbers within habitat limitations, which includes landowner tolerance, a sustainable harvest, and non-consumptive opportunities. Deer-related damage to agricultural land and residential properties is widespread and will continue to increase as human activity expands across traditional deer habitat. Deer-vehicle collisions are a problem in some areas.

White-tailed Deer

White-tailed deer occur primarily in the eastern quarter of Washington (Figure 8). Total population estimates are beyond the scope of WDFW's budget and staffing resources, but white-tailed deer numbers are probably somewhat higher than for mule deer or black-tailed deer. Population trends are generally stable or somewhat declining in northeastern Washington (S. Zender, pers. comm.) and

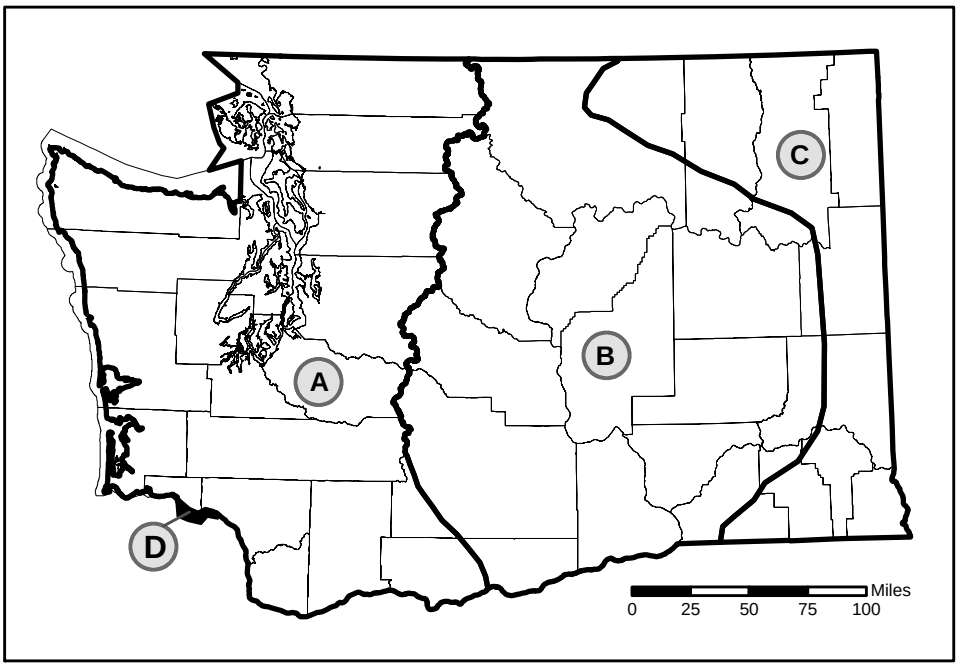


Figure 8. Distribution of four deer subspecies in Washington (A = black-tailed deer; B = mule deer, C = mule deer and white-tailed deer, D = Columbian white-tailed deer and black-tailed deer).

stable or increasing elsewhere (WDFW 2003, Nelson 2006, WDFW 2006c). Densities are highest in Pend Oreille, Stevens, and Ferry counties.

White-tailed deer commonly undertake seasonal movements in elevation in many areas of their Washington distribution. Populations are influenced significantly by winter severity and tend to increase during years with mild winters and experience major declines during severe or protracted winters. Outbreaks of epizootic hemorrhagic disease have also produced some temporary localized declines. White-tailed deer have the highest potential maximum rate of increase of any North American ungulate due to their early age at first reproduction and ability to produce twins when nutritionally fit. Coupled with a higher tolerance for human disturbance and agriculture, white-tailed deer can persist and thrive in Washington. These traits make the species somewhat less susceptible to overharvest than mule deer.

Estimated numbers of white-tailed deer harvested in Washington have gradually increased since 1995, with an average annual kill of about 13,500 animals from 2001 to 2005 (Nelson 2006). Current harvest management consists of:

1) An early general season in October for bucks as well as either-sex hunts in many locations for youth, seniors, and hunters with disabilities.
2) A late general season for bucks in November, with some antlerless opportunity for youth, seniors, and hunters with disabilities.
3) An early (September) and late (November-December) either-sex archery season.
4) An early (October) either-sex muzzleloader season, with a limited number of GMUs open for late muzzleloader (November-December).

5) A late (December) general season for antlerless deer in a limited number of GMUs.
6) A substantial number of antlerless special permits are offered, with a more limited number of late season buck special permits for quality hunts.
7) Tribal either-sex seasons held by the Colville, Spokane, Umatilla, and Nez Perce tribes.

Mule Deer

Mule deer are distributed throughout eastern Washington (Figure 8). Total population size is unknown. Densities are currently highest in Okanogan and Chelan counties, whereas populations in northeastern Washington, the Blue Mountains, and Kittitas and Yakima counties are declining or remain below management objectives (WDFW 2003, Nelson 2006, WDFW 2006c). Although populations in Okanogan County are in relatively good condition, abundance has nevertheless shown a gradual long-term decline that suggests a reduction in landscape carrying capacity (Fitkin 2006). Most mule deer in Washington undertake seasonal elevational movements and the species is considered more reliant on access to winter range than other deer in the state. Population levels are closely tied to winter severity and are sensitive to overharvest. The species is also more susceptible than white-tailed deer to suburban sprawl, agricultural expansion, fire suppression, and ecological succession of younger aged habitat. These factors suggest that mule deer in Washington may experience declining trends in the future.

Statewide harvest of mule deer has remained fairly steady since 2000, averaging about 12,900 animals per year (Nelson 2006). Current harvest management consists of:

1) An early general season in October for bucks having at least three antler points per side.
2) An early (September) and late (November-December) archery season for bucks having at least three antler points per side. Antlerless hunting is allowed during archery if population numbers can sustain the pressure. Currently, antlerless hunting is not offered in central Washington due to low mule deer numbers.
3) An early (October) muzzleloader season for bucks having at least three antler points per side, with a very limited number of GMUs open for late muzzleloader (November-December).
4) Antlerless special permits are offered when populations can sustain the pressure. A limited number of late season buck special permits are offered for quality hunts, mostly in Chelan, Okanogan, and Douglas counties.
5) Tribal harvest by the Colville, Spokane, and Yakama tribes.

Black-tailed Deer

Black-tailed deer occur throughout western Washington (Figure 8). No estimates of total population size exist, but harvest data suggest that densities are highest in Cowlitz, Lewis, San Juan, and portions of Thurston and Grays Harbor counties. Annual harvest statistics indicate that black-tailed deer numbers have remained fairly stable, but increases in the number of days per harvested animal reveal that the population may have in fact declined somewhat over the past two decades (WDFW 2003). Some animals move elevationally in response to seasonal conditions, but the extent of this behavior is less than in either mule deer or white-tailed deer. Hairloss syndrome has had some localized impacts on abundance in recent decades, but the effects are usually short-term. Habitat for black-tailed deer has been reduced in western Washington due to reductions in timber harvest,

natural succession of aging timber stands, and expansion of human development. These changes are expected to result in a gradual decline in overall abundance in the future.

Estimated numbers of black-tailed deer harvested in Washington have been fairly constant during the past decade, with an average annual kill of about 14,300 animals between 2001 and 2005 (Nelson 2006). Current harvest management consists of:

1) An early general season in October for bucks. Some GMUs have two-point antler restrictions.
2) An early (September) and late (November-December) either-sex archery season. Some GMUs have two-point antler restrictions.
3) An early (October) and late (November-December) either-sex muzzleloader season. Some GMUs have two-point antler restrictions.
4) Antlerless special permits are offered when populations can sustain the pressure. A limited number of late season special permits for bucks are offered for quality hunts.

Columbian white-tailed deer

This subspecies is state and federally listed as endangered. Information on population size and distribution is presented in Chapter VI.

Moose

Numbers of moose in Washington have increased from about 60 in 1972 to about 1,500-2,000 in 2007 (WDFW, unpubl. data), corresponding to an average annual increase in population size of 67-90%. This growth is the result of greater moose density in prime habitats and colonization of animals into new areas. Moose primarily occur in Pend Oreille, Spokane, Stevens, and Ferry counties (Figure 9), but are occasionally recorded in Lincoln, Whitman, Okanogan, and Whatcom counties, with a few dispersing animals documented in more distant areas. Moose generally occur

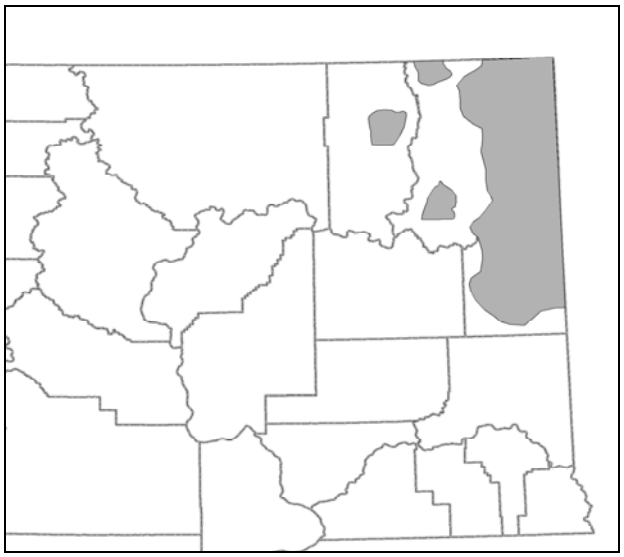


Figure 9. Current distribution (shaded area) of moose in Washington.

above 3,000 feet in elevation (S. Zender, pers. comm.) and prefer dense thickets of willows and other hardwood shrubs that are frequently associated with 15-25-year-old clear cuts or thinnings on mesic sites (Base and Zender 2006). Forest successional conditions in northeastern Washington generally appear to be excellent for moose over the next few decades, thus moose numbers are expected to continue at current levels or gradually increase for some time. Harvests are currently by permit only and have totaled about 90-100 animals annually in recent years (Base and Zender 2006; D. A. Martorello, unpubl. data). Moose occasionally become a nuisance or create problems for human safety, but agricultural damage has not been reported.

Bighorn Sheep

Washington's population of bighorn sheep currently numbers about 1,100 animals distributed in 16 isolated herds distributed in the Cascades, northeastern Washington, and the Blue Mountains (Figure 10; WDFW 2003). Herd size averages 69 sheep and ranges from 24 to 173. Populations are stable to increasing in 11 herds and declining in five herds. The statewide population estimate is well beneath the desired objective of 1,750-2,130 sheep, which is based on potential habitat capacity (WDFW 2003). Diseases and parasites from domestic sheep are the primary causes for decline (e.g., Fowler and Wik 2006), but many herds are also limited by habitat availability. Harvests are currently by permit only and have totaled about 20-25 animals annually in recent years (D. A. Martorello, unpubl. data).

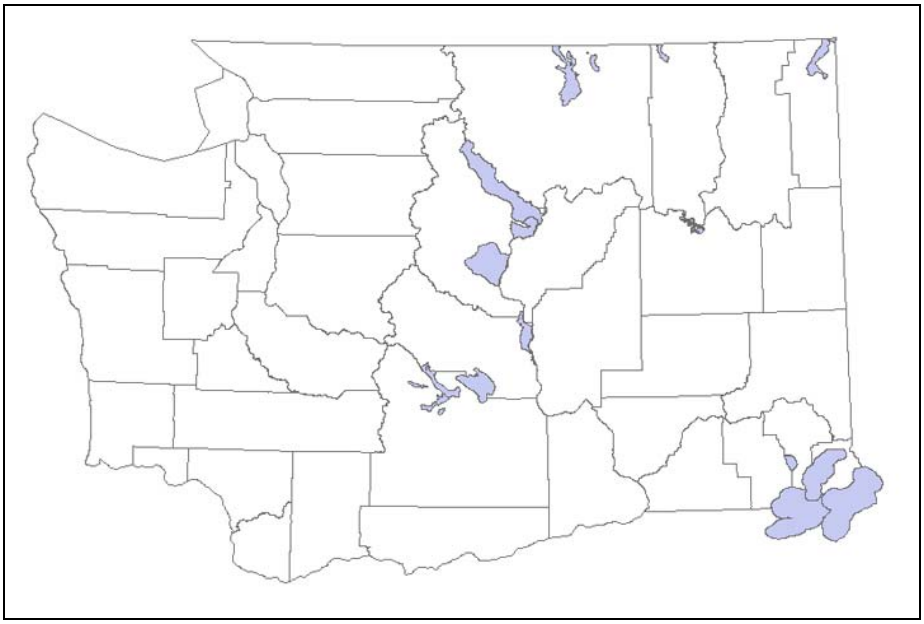


Figure 10. Current distribution (shaded areas) of bighorn sheep in Washington.

Mountain Goats

Mountain goat populations have been declining in Washington for many years. Current numbers probably total 3,000-4,000 animals, with nearly all populations located in the Cascade and Olympic Mountains (Figure 11; Martorello 2006; C. Rice, pers. comm.). A few populations appear to be

stable or slightly increasing, including those in the southern Cascades, along the north shore of Lake Chelan, and in the Methow region. Historic overharvest, impacts of timber harvest on wintering habitat, degradation and loss of alpine meadows, and increasing human recreational use and disturbance of alpine habitat likely have had the greatest negative impacts on abundance. Hunting opportunity and total harvest have decreased with falling populations. Harvests are currently by permit only and total about 20 goats annually (D. A. Martorello, unpubl. data).

Figure 11. Current distribution (shaded areas) of mountain goats in Washington.

Mountain Caribou

Washington's population of mountain caribou is state and federally listed as endangered. Information on numbers and distribution is presented in Chapter VI.

D. Wolf-Ungulate-Agriculture Interactions

WDFW is mandated by statute to address commercial agricultural damage to crops, orchards, and vineyards caused by elk and deer (RCW 77.36). In response, the agency has relied on fencing and supplemental winterfeeding to keep animals at higher elevations away from agricultural sites. About 100 miles of 8-ft-tall elk-proof fence exist in Yakima and Kittitas counties and border nine permanent feeding stations. An additional 27 miles of elk fence in the Blue Mountains were installed between the Wooten and Asotin Wildlife Areas to segregate elk from agricultural lands. Fourteen miles of this fence were damaged in recent fires and are under reconstruction. Fencing along Highway 97A north of Wenatchee is also being built to keep mule deer and bighorn sheep off the highway. How wolves will interact with ungulates at fenced sites is mostly speculative. Fencing will likely impede ungulate escape and facilitate capture by wolves. Increased fence maintenance may be needed if elk are pushed into fences by wolf activity. Elk breaking through fences and

entering private croplands may cause financial loss to nearby landowners. In Wyoming, wolves and coyotes are known to key in on fence lines and follow them while searching for prey (M. D. Jimenez, pers. comm.). However, increased fence breaching by elk has not been noted.

WDFW conducts winter elk feeding operations at nine permanent feeding stations in Yakima and Kittitas counties. Feeding starts as soon as elk arrive in significant numbers (usually in December) and lasts until animals depart during spring green-up. An estimated 50-60% of the main Yakima sub-herd, or about 5,000-6,000 elk, is fed during typical winters, although up to 90% of the sub-herd visits feeding sites in harsh winters with extreme snow depths.

Wyoming is the only state or province with wolves and elk interacting at winter feeding stations. Dean et al. (2003) reported that wolf visitation increased from one of the state's 22 feeding sites in 1999 to 14 sites by 2003. Total numbers of elk killed by wolves at these sites were insignificant when compared to herd size. In four of the five years between 1999 and 2003, wolves killed fewer than 30 elk per year. Wolves tended to select for elk calves when hunting at feeding stations. Attempted predation by wolves often temporarily displaced elk less than 3 miles from feeding sites for as long as a day. On occasion, elk moved up to 30 miles away and relocated to another feeding station, or were displaced onto private lands, where they created conflicts with livestock and landowners. None of the feeding sites were ever completely abandoned by elk during any given winter. Elk commonly responded to the presence of wolves by banding together in larger than normal herds, which increased the potential for disease transmission, competition between elk, and damage to soil and vegetation. However, some benefits were also gained by increasing use of feeding stations with shorter feeding seasons. The unpredictable movements of elk in response to wolf activity created logistical problems for the Wyoming Game and Fish Department, which needed to increase the amount of hay purchased and stored for the program. During mild winters, elk made less use of feeding stations and more animals were dispersed in the surrounding landscape. In response, wolf packs made fewer visits to stations and preyed more frequently on animals in poorer condition than those being fed.

VI. WOLF INTERACTIONS WITH NON-PREY AND OTHER SPECIES

This chapter describes potential interactions between gray wolves and non-prey species, ESA-listed species, and potential changes to ecosystems following the reestablishment of wolves. With the prospect of wolves entering Washington, much of the overall discussion and concern about wolves has centered on interactions with livestock and ungulates. However, wolves will also interact with a host of other species, including other carnivores such as cougars and coyotes, as well as other mammals and birds. Many of these interactions will have immediate implications for either wolves or the species in question. Other interactions, such as those with plant communities and ecosystems in general, may be more subtle, long-term, and difficult to directly relate to wolves.

A. Wolves and Other Carnivores

Gray wolves in North America and elsewhere have co-existed for centuries with a variety of other carnivore species in many different habitats. How different carnivores interact with wolves varies depending on the extent of dietary overlap, habitat, environmental conditions, and other factors. To date, no definitive research exists on the effects that wolves have on carnivore community structure or populations (USFWS 1994, Ballard et al. 2003). Information regarding the interactions between other carnivores and wolves is primarily observational and subject to interpretation when attempting to make predictions at the population or community level. Because wolves are wide-ranging and many carnivores are secretive in nature, collecting data on interactions is difficult. Observations to date suggest that wolves can reduce, or in rare cases eliminate, certain carnivores (such as coyotes) locally, but no evidence of long-term spatial partitioning of resources within an area has yet been detected (Ballard et al. 2003).

In Washington, wolves will share habitats occupied by a number of other carnivores, including cougars, coyotes, black bears, grizzly bears, bobcats, lynx, red foxes, river otters, mink, martens, weasels, skunks, wolverines, badgers, raccoons, and fishers. Direct interactions almost certainly will occur as wolves begin to reoccupy portions of their historic range in Washington and establish packs.

A review of the scientific literature offers clues to what may occur in Washington when wolves interact with the carnivore species noted above. Cougars and wolves both rely on ungulates as their main food source, but use different hunting techniques. Wolves hunt in packs and generally course or test prey, whereas cougars are solitary hunters and rely on ambush of unsuspecting prey. Few observations of direct wolf-cougar interactions have been reported, but the two species do occasionally kill each other. During winter, wolves and cougars often occupy the same range and may have similar diets (Kunkel et al. 1999, Akenson et al. 2005, Kortello et al. 2007). However, cougars have been noted moving away from kills to avoid wolf contact (Akenson et al. 2005) and in general may avoid areas recently used by wolves (Kortello et al. 2007). Wolves also seek out and take over cougar kills, which may force cougars to increase their kill rates to replace lost prey (Hornocker and Ruth 1997, Murphy 1998, Kunkel et al. 1999, Kortello et al. 2007). In one area of central Idaho, cougars showed lower recruitment, fewer adults, and a disrupted social structure several years after recolonization by wolves, but other factors (declining prey populations, high hunter harvest, and a large forest fire) occurring simultaneously probably contributed to these effects

(Akenson et al. 2005). Recent information from Yellowstone National Park indicates that cougar abundance there has declined slightly since the reestablishment of wolves and that cougars now focus more of their hunting behavior in denser habitats that are more conducive to their hunting style (K. Murphy, unpubl. data). In one area of Banff National Park, Alberta, a largely wolf-related decline in the elk population resulted in cougars shifting their diets toward mainly deer and bighorn sheep (Kortello et al. 2007). Cougars also exhibited low annual survival and poor body condition during the period of wolf reestablishment.

Ballard et al. (2003) summarized wolf-bear interactions in North America. Most reported encounters between wolves and black bears involved fighting or chasing one another, or wolves killing black bears. In a smaller number of interactions, wolves displaced black bears from kills. Wolves will seek out and kill black bears in their dens but often do not consume them, suggesting that interference competition exists between the two species. One observation of a black bear killing a wolf has also been made. Most wolf-grizzly bear interactions also involve fighting and chasing, which often take place at kill sites. Encounters at kill sites always appear to be won by grizzlies, whereas wolves usually win those at wolf dens. Both species are occasionally recorded killing the other. Because grizzlies readily usurp ungulate kills made by wolves, Servheen and Knight (1993) speculated that the presence of wolves might be beneficial to threatened populations of grizzlies by supplementing their diet with greater amounts of protein through increased availability of ungulate carcasses. This may be especially true following mild winters, when ungulate carrion is normally far less available.

Interactions between wolves and coyotes have been discussed in the scientific literature more often than for other carnivores. Reestablishment of wolves has led to reductions in coyotes in some areas (e.g., Yellowstone and Grand Teton National Parks), but not at others (Ballard et al. 2003). Extirpation of coyotes by wolves can occur rarely (e.g., at Isle Royale National Park; Krefting 1969), but probably only under limited ecological circumstances, such as where immigration is prevented. Recent studies at Grand Teton and Yellowstone National Parks have detected declines in coyote densities of 33% and 39%, respectively, in areas reoccupied by wolves and are reflective of competition between the two species (Berger and Gese 2007). Localized or short-term decreases in coyote abundance can be even higher, such as a 50% loss in the Lamar Valley population of Yellowstone from 1996 to 1998 (Crabtree and Sheldon 1999).

In contrast to these locations, Berger and Gese (2007) hypothesized that wolves may have little or no effect on coyote densities outside of protected areas, although this observation was based on few data. Transient coyotes are especially vulnerable to wolves and exhibit poorer survival and greater rates of dispersal when wolves are present (Berger and Gese 2007, Berger et al. 2008). Although records of wolves killing coyotes are common in the literature (e.g., Seton 1929, Young and Goldman 1944, Carbyn 1982, Thurber et al. 1992, Ballard et al. 2003), such killing is usually fairly low (3-16%; see Berger and Gese 2007). Wolf-coyote interactions typically occur near wolf kills as coyotes attempt to scavenge ungulate carcasses (Crabtree and Sheldon 1999). Switalski (2003) found that coyotes quickly learn to avoid interactions with wolves by becoming more vigilant and waiting to feed at carcasses until after wolves have departed. Other behavioral changes by coyotes, such as denning closer to roads and reducing their vocalizations, presumably also help avoid detection by wolves (Switalski 2003). Resident coyote home ranges often overlap extensively with those of wolves, suggesting that coyotes in fact derive some benefit from wolves by having a year-round source of ungulate carcasses on which to scavenge (Switalski 2003, Berger and Gese 2007). Carrera

et al. (2008) hypothesized that competition between the two species may be especially high where their diets substantially overlap.

Wolves can affect some other carnivores, such as wolverines, red foxes, and fishers, in the same ways described above for bears and coyotes (Ballard et al. 2003). Increased availability of wolf-killed carcasses may benefit these species by providing more food for scavenging, particularly during the winter months. However, wolves sometimes kill these species during direct interactions. In areas where coyote abundance is reduced by wolves, predators such as red foxes, lynx, and bobcats may benefit from reduced competition with coyotes (Mech and Boitani 2003). Additionally, some prey species of coyotes may increase, which has the potential to enhance populations of other medium-sized and small carnivores (Buskirk 1999).

It is doubtful that wolves will greatly affect the overall numbers or distribution of other carnivore species in Washington. However, the presence of wolves likely will change the local distributions and behaviors of some carnivores as they attempt to avoid direct interactions with wolves or as they respond to changes in food availability. Such changes could favor some carnivore species over others.

B. Wolves and Scavengers

Increased availability of wolf-killed carcasses can benefit a number of scavenging species, such as ravens, magpies, jays, golden eagles, and bald eagles, especially during winter when other foods become scarcer (Smith et al. 2003). At Yellowstone National Park, at least 12 vertebrate species scavenge at wolf-killed carcasses, with five (bald and golden eagles, coyotes, ravens, and magpies) visiting nearly every wolf kill (Wilmers et al. 2003a 2003b).

C. Wolves and Listed/Candidate Species

Gray wolves are likely to have few measurable adverse impacts on any current federal or state listed (endangered, threatened, sensitive) or candidate species (see Appendix A) in Washington in the foreseeable future, with the possible exception of mountain caribou. Interactions with listed or candidate carnivores and birds of prey (i.e., grizzly bears, lynx, wolverines, fishers, bald eagles, and golden eagles) are briefly discussed in Sections A and B.

Washington's only population of mountain caribou, the Selkirk Mountains herd, spends most of its time in the British Columbia portion of its range, with members infrequently entering Washington. The herd has been fairly stable at about 35-45 animals during the past five years (S. Zender, pers. comm.). Distribution in Washington is restricted primarily to the Salmo-Priest Wilderness Area in northeastern Pend Oreille County. The area is characterized by high elevations and extensive closed canopy forests, and therefore supports relatively low densities of other ungulate species. Hence, few wolves are expected to reside in the Salmo-Priest, meaning that predation on caribou would probably occur infrequently. Nevertheless, any wolf-related losses to the herd would have a significant impact on the population. Wolves are an important predator of mountain caribou in parts of British Columbia (Wittmer et al. 2005). It has been suggested that localized reductions of specific wolf packs and other predators may be effective in reducing the impact of predation on mountain caribou populations, but this type of management has not yet been attempted elsewhere

and may carry unacceptable ethical implications for the recovery of rare species (Wittmer et al. 2005).

In Washington, Columbian white-tailed deer occur along the lower Columbia River in Wahkiakum and Cowlitz counties (Figure 8). The population in Washington numbers about 600-800 animals and is generally located near human habitation. Predation levels on this subspecies by wolves are difficult to predict, but could potentially harm this deer's recovery in the state. However, wolves are not expected to disperse to southwestern Washington and reestablish packs in the near future.

Golden eagles and bald eagles may both derive a benefit from the presence of wolves through greater availability of wolf-killed ungulate carcasses, especially during winter. Golden eagles in particular may currently be food limited because of declines in jackrabbits and perhaps other prey species in Washington (J. Watson, pers. comm.).

Wolves feed on many different small prey species (e.g., mice, tree squirrels, muskrats, woodchucks, grouse, songbirds; van Ballenberghe et al. 1975, Fritts and Mech 1981, Boyd et al. 1994, Arjo et al. 2002), especially in the summer when ungulates become less available, but small prey never comprises a significant portion of the diet. A number of listed and candidate species in Washington fall into this size category and might be rarely caught and eaten by wolves. These include Merriam's shrew, pygmy rabbit, white-tailed jackrabbit, black-tailed jackrabbit, western gray squirrel, Washington ground squirrel, Townsend's ground squirrel, Mazama pocket gopher, gray-tailed vole, greater sage-grouse, and sharp-tailed grouse. Many of these species occur in open habitats (i.e., shrub-steppe, grasslands, prairies, farmland) that are unlikely to be recolonized to any significant extent by wolves in Washington.

Although not state or federally listed, Olympic marmots have been declining in recent years and are now estimated to total fewer than 1,000 animals. Coyote predation is probably the main threat to the species (S. C. Griffin, pers. comm.). Coyotes were historically rare or absent from the Olympic Peninsula when wolves were widespread in western Washington (Taylor and Shaw 1929, Scheffer 1995). Although reestablishment of wolves in the Olympics might result in additional predation pressure on Olympic marmots, it more likely could benefit marmots by reducing coyote abundance.

D. Ecosystem Responses to Wolf Presence

Gray wolves affect ecosystem components through a variety of direct and indirect processes, including 1) limitation of herbivore prey abundance, 2) removal of inferior prey individuals and stimulation of prey productivity, 3) limitation of some non-prey abundance, and 4) increasing food availability for scavengers (Mech and Boitani 2003). However, the ecological impacts of wolf predation on food webs are complex and interact with other biotic and abiotic factors, especially at lower trophic levels, and therefore generally remain poorly understood and difficult to predict (Berger and Smith 2005).

Regulation of large herbivore abundance by wolves can alter vegetation patterns (structure, succession, productivity, plant composition, and species diversity), thereby potentially affecting many wildlife species residing in an ecosystem (Berger and Smith 2005). Substantial evidence for this comes from Yellowstone National Park and other locations, where wolf predation on elk and associated changes in elk behavior are believed to have resulted in localized resurgence of woody

browse species such as aspen, cottonwood, and willows (Smith et al. 2003, Ripple and Beschta 2004, 2007, Beschta 2005). This in turn has allowed beaver numbers to increase and will probably result in greater amounts of foraging and nesting habitat for various birds and other species. At Grand Teton National Park, Berger et al. (2001) hypothesized that overbrowsing of riparian zones by moose following the eradication of wolves and grizzly bears had produced changes in vegetation structure resulting in substantial reductions or elimination of a number of neotropical migrant bird species (e.g., calliope hummingbird, willow flycatcher, gray catbird, yellow warbler, MacGillivray's warbler, fox sparrow, and black-headed grosbeak). Reduced tree and shrub coverage in riparian areas may also increase stream temperatures and erosion, thereby potentially harming trout, salmon, and other fish.

Eradication of wolves has likely produced a number of important ecological changes in Olympic National Park in northwestern Washington (Beschta and Ripple 2008). Overbrowsing by elk during the past century or so has caused substantial changes in riparian plant communities, including severe declines in the recruitment of black cottonwood and big-leaved maple. This in turn has led to increased riverbank erosion and channel widening. Probable reductions in the amount of large woody debris in river channels during this period has likely reduced rearing habitat for salmon, steelhead, and resident fish. These changes in river ecology have probably also lowered the amount of aquatic invertebrate prey (including emerging adult insects) available for fish, birds, and bats (Beschta and Ripple 2008).

Wolves tend to prey mainly on younger, older, and debilitated animals (Mech 1970, 2007, Kunkel et al. 1999, Mech and Peterson 2003, Smith et al. 2004). Removal of such individuals can leave prey herds comprised of a greater proportion of animals of prime age and in good health, which may in turn result in higher productivity in prey populations (Mech and Boitani 2003). Preliminary evidence suggests that wolf predation can also change the occurrence of some diseases in prey populations, causing either reduced prevalence through the removal of infected individuals or increased prevalence where greater herding behavior enhances transmission (Barber-Meyer et al. 2007).

Wolf-related reductions in coyote abundance (see Section A) may result in population changes among other medium-sized and small carnivores, either directly through reduced predation by coyotes or indirectly through adjustments in prey availability. For example, reduced interference competition with coyotes may increase in the abundance of red foxes (Mech and Boitani 2003). Similarly, wolf-related reductions in coyotes may result in increased survival for some prey species consumed by coyotes (e.g., pronghorn; Berger et al. 2008).

VII. WOLF-HUMAN INTERACTIONS

Because of the long absence of gray wolves from Washington, most people in the state are unfamiliar with wolves and wolf behavior. Hence, addressing public safety concerns and providing information on wolf behavior are important steps in achieving conservation and tolerance of wolves by citizens.

A. Human Safety

Background

Wild wolves generally fear people and rarely pose a threat to human safety. Compared to other wildlife-human interactions, attacks by wolves on humans are quite rare. Since about 1950, records are known of only four people being killed in Europe (where current wolf numbers total about 10,000-20,000), four in Russia (about 40,000 wolves), and possibly one in North America (about 60,000 wolves) by non-rabid wolves (Linnell et al. 2002, Boitani 2003, McNay 2007; P. Paquet, unpubl. data); injuries have also been extremely rare. In the same time period, where rabies was a factor, only five, four, and zero additional deaths, respectively per region, are known. Human deaths have also been reported in India, where conditions have deprived wolves of all wild prey and livestock is heavily guarded (Fritts et al. 2003).

By comparison, during the 20th century, grizzly/brown bears killed about 36 people in Europe, 206 in Asia, and 71 in North America (Swenson et al. 1996). An estimated 25 attacks by black bears occur annually in North America, with one being fatal about every third year on average (Conover 2001). For cougars, there were 17 fatal and 72 injurious attacks from 1890 to 2001 in North America (Beier 1991; L. Fitzhugh unpublished data in Linnell et al. 2002). Domestic dogs in the United States are responsible for 4.7 million bites resulting in 500,000-800,000 hospital visits and 15-20 fatalities per year (Sacks et al. 1996, Centers of Disease Control 2003). Dogs also are the single most important vector for the transmission of rabies to humans (Moore et al. 2000). Annual numbers of interactions between humans and other species in the United States average about 27,000 bites/injuries and an unknown number of fatalities by rodents, 8,000 bites/injuries and 15 fatalities by venomous snakes, 750 bites/injuries by skunks, 500 bites/injuries by foxes (Conover 2001), and 40-50 fatalities by bees (Cyr and Johnson 2006).

Fatal wolf attacks on humans in North America have been relatively rare when compared with Europe and Asia (Linnell et al. 2002, Fritts et al. 2003). This appears to be strongly correlated with the much higher incidence of rabies outside of North America. In those parts of the world where attacks by rabid wolves have occurred, wolves are not a major reservoir of rabies, but rather contract it from contact with other wildlife harboring the disease. Given the past severity of sporadic attacks in Europe and Asia, it is likely they contributed to a perception brought to North America by European settlers that all wolves are violently dangerous animals. However, in the United States and Canada, such episodes have rarely occurred due to the low overall incidence of rabies on the continent (Linnell et al. 2002).

By far the majority of wolf attacks on humans worldwide have involved wolves infected with rabies (Linnell et al. 2002). Other incidents have typically involved captive wolves, healthy wild wolves that became habituated to humans (with or without food being present), territorial attacks by wolves on pet dogs where the dog owner tried to intervene, defensive attacks by wolves when trapped or cornered or when den sites with pups were threatened, wolves acting as predators under unique circumstances, and wolf-dog hybrids (Linnell et al. 2002, McNay 2002a).

Only 18 reports of unprovoked aggression by wolves were documented in North America between 1969 and 2000, with just seven of these involving wolves not habituated to humans (McNay 2002a). McNay (2002a) reported that unprovoked aggression by wolves toward humans increased substantially from 1969 to 2000, as compared with 1900 to 1968, and noted that this corresponded with increased protections for wolves, larger wolf populations, and greater numbers of humans visiting parks and other areas inhabited by wolves. As with other wildlife species, this scenario provided more opportunities for wolves to become conditioned to humans and their foods. McNay (2002b) also mentioned six cases of non-habituated wolves being aggressive toward people accompanied by dogs. The dogs may have been the main stimulus for the wolves' aggression, with attacks on the people occurring secondarily. An unusual number (at least eight) of wolf-human encounters, including several attacks, occurred in Ontario in 2006-2007, but many of these apparently involved animals habituated to people (Grooms 2007).

Habituation of wolves to humans can occur in locations where wolves commonly encounter people and may or may not involve conditioning to human foods (McNay 2002a). Instances of camp robbing by wolves have long been known (Young and Goldman 1944) and may develop from wolves finding novel or chewable items (e.g., camping equipment, clothing) on a repeated basis in a human setting. This type of conditioning does not involve the presence of food, but can nevertheless lead to unprovoked aggression toward humans (see Linnell et al. 2002 for examples). Wolves can quickly develop persistent aggressive approach behavior in situations where they receive food directly from people (McNay 2002a). Habituated wolves can remain non-aggressive toward humans for extended periods, but can quickly transition to strong aggressive or predatory behavior depending on the behavioral stimuli shown by potential human victims (McNay 2002a).

Avoidance of Close Encounters with Wolves

Because wolves are large carnivores capable of inflicting serious injury to people, wolves should be respected for their capabilities and humans should avoid close contact at all times. Wolves are best left wild and observed from a safe distance. Wolves can gradually lose their fear of people through increasingly frequent contact and receiving food rewards for their boldness (MFWP 2007b). Bold wolves are more likely to approach humans and human-populated areas when positively rewarded for doing so.

To prevent wolves from becoming habituated, people should:

- Resist the temptation to approach wolves.
- Not entice or allow wolves to come nearby.
- Not feed wolves or leave food outdoors, including pet food. Food should not be offered to wolves from vehicles or near an inhabited area.
- Not approach fresh wolf kills, dens, or rendezvous sites.
- Avoid teaching wolves to be comfortable around or lose their fear of people.

- Not let wolves become comfortable near human-inhabited areas.
- Notify authorities about wolves that seem comfortable around people, seek human food, or frequent human areas. Early intervention can keep a problem from getting worse.

During a close encounter with a wolf, people should do the following to frighten the animal away:

- Stand tall and make themselves look larger.
- Act aggressively towards it -- make noise and throw objects.
- Calmly but slowly back away and maintain eye contact.
- If the wolf does not run away immediately, continue making themselves large, maintaining eye contact, and backing away.
- Not turn their back on the wolf or run away.
- If a person with a dog encounters a wolf, the dog should be brought to heel at the person's side as quickly as possible. Standing between the dog and the wolf often ends the encounter. To avoid risk of injury to themselves, a person should not attempt to break up a physical fight between a wolf and a dog.

B. Interactions with the Public

In Washington, various groups of people with a higher than average likelihood of coming in contact with wolves in the wild include, but are not limited to, hunters, trappers, rural residents, recreationists, outfitters and guides, and forest workers/contractors. Some members of these groups may welcome seeing wolves and may seek them out, while others may consider wolves as problematic to their activities. Regardless, user groups should be informed about wolves. To reduce concerns over safety, efforts should be made to inform rural residents and backcountry users of ways for reducing the likelihood of encounters with wolves and methods for preventing habituation toward people. Strategies for accomplishing these needs are presented in greater detail in Chapter XII and will be essential to achieving the conservation and management goals for wolves.

C. Interactions with Domestic Dogs

Situations where wolves and domestic dogs encounter each other can result in deaths and injuries to the dogs. In some instances, wolves may alter their regular movements or activities to seek out and confront domestic dogs. Attacks on dogs are usually believed to represent conflicts related to inter-species competition for territories rather than acts of predation (Bangs et al. 2005a). Wolves killed at least 104 dogs in Idaho, Montana, and Wyoming from 1987 to 2007 (USFWS et al. 2008). Dogs used for livestock guarding, herding, and hunting are most vulnerable to attack (see Chapter IV regarding herding/guarding dogs), but pet dogs are also at some risk (McNay 2002b, Treves et al. 2002, Bangs et al. 2005a). None of the dogs killed in these states through 2006 were accompanied by their owners at the time of attack (USFWS 2007b). Most attacks on dogs in Idaho, Montana, and Wyoming occur in remote areas away from homes (Bangs et al. 2005a), but in a few cases, wolves have come close to homes to fight with dogs, even when people were present close by. Domestic dogs are also vulnerable to attack or killing by a variety of predators other than wolves, such as coyotes, cougars, bears, and feral dogs.

As wolves expand their range in Washington, dog owners will need to be aware of the potential risks to their animals. Some wolves are likely to occupy areas near human habitation or areas used

recreationally (e.g., national forests), which could put hunting or pet dogs at risk of depredation, especially those running at large.

Hunting Dogs

Hunting for cougars, bears, and bobcats with hounds was banned in Washington by state initiative (I-655) in 1996. Through legislative authorization and other exceptions, hounds may currently be used to pursue three game species in Washington: cougars in a pilot study for mainly the five northeastern counties (Pend Oreille, Stevens, Ferry, Okanogan, and Chelan) and recently extended to other counties; raccoons statewide; and black bears in western Washington. Hounds are susceptible to wolf attacks, as seen in Idaho and Montana, where one or two fatal attacks have been reported in most years since 2000 (USFWS et al. 2008 and older annual reports; S. Nadeau, pers. comm.). Together, these have resulted in the deaths of at least 13 dogs total, all of which were involved in cougar hunts.

The five counties in Washington where most hound hunting of cougars occurs are among those likely to have wolves recolonizing in the future. Thus, houndsmen should be trained on steps that can be taken to reduce interactions between their dogs and wolves. These include releasing hounds only on fresh sign to avoid longer chases, avoiding releases in areas with fresh evidence of wolves, reaching hounds at trees as quickly as possible so they are not unattended for long periods, and placing bells or beeper collars on hounds (IDFG, no date). Outreach on similar measures that can be taken by forest grouse hunters using dogs (IDFG, no date) should also be conducted.

D. Wolf Hybrids and Pet Wolves

Wolves are capable of hybridizing with other canid species and have been documented breeding with coyotes, domestic dogs, and feral dogs. However, behavioral differences between wolves, coyotes, dogs, and wolf hybrids usually keep the populations distinct.

A new state law (RCW 16.30) prohibiting the ownership, possession, and breeding of pet wolves and other potentially dangerous wildlife species was enacted July 22, 2007. Provisions of the law allow current owners of pet wolves to retain their animals until the death of the animals. The law will be enforced by local animal control authorities and law enforcement officers or, in their absence, WDFW law enforcement officers.

Wolf hybrids, also known as wolf dogs, were excluded from RCW 16.30 and remain regulated as domestic dogs in Washington. Hence, WDFW has no jurisdiction over wolf hybrids. Authority to regulate the ownership, possession, and breeding of wolf hybrids currently lies with individual Washington counties and cities. King County, Tacoma, and Puyallup are among the jurisdictions that have adopted ordinances prohibiting the possession of wolf hybrids (and wolves) as pets by private citizens. Efforts will be made to ensure that counties and cities are aware of the wolf conservation and management plan and to coordinate their actions with WDFW as appropriate.

Possession of wolf hybrids and pure wolves as pets should be discouraged because of the potential threat to human safety. Hybrids and pet wolves are dangerous to people because of their physical strength, lack of shyness, and predatory instincts, which makes their behavior unpredictable in many

situations (Fritts et al. 2003). Hybrids and pet wolves killed at least 13 children and injured at least 43 others in North America from 1981 to 1999 (Linnell et al. 2002).

Wolf hybrids and pet wolves regularly end up in the wild when their owners allow them to run free, abandon them, or permanently release them, or the animals escape. Washington has had a number of instances of hybrids being killed on roads in vehicle collisions, or released in national forests or other areas. These are commonly reported as wolf sightings by the public (Appendix D).

Because wolf hybrids can be difficult to distinguish from wild wolves, negative encounters between humans and hybrids often are attributed to wild wolves and therefore can impede efforts to reestablish and conserve wolves. There is also potential for the genetic pollution of wild wolf populations, but the risk is low considering the poor survival of wolf hybrids released into the wild.

VIII. LAND MANAGEMENT

Gray wolves are habitat generalists and one of the most adaptable large predators in the world (USFWS 2008). They require only a sufficient year-round prey base and protection from excessive human-caused mortality. Wolf populations are able to persist in many parts of the world featuring greater human development than the northwestern United States (Boitani 2003). Even active wolf dens can be resilient to non-lethal disturbance by people (Frame et al. 2007). In parts of the species' range (e.g., in northwestern Montana), wolf packs use a matrix of public, private, and corporate-owned lands where a variety of land uses occur, including dispersed outdoor recreation, timber production, livestock grazing, home sites within the rural-wildland interface, hobby farming/livestock, and even full-scale resort developments with golf courses.

Restrictions on human development and other land use practices have not been necessary to achieve wolf conservation in Idaho, Montana, and Wyoming (USFWS 2008). Thus, there have been no restrictions on grazing practices, road use, timber management and logging, mining, public access, or other activities due to the presence of wolves, with the exception of some temporary area closures near den sites in national parks only. Outside of national parks, no wolf-related restrictions have been placed on public or private lands in Montana (C. Sime, pers. comm.).

Based on observed habitat use in Idaho, Montana, and Wyoming, it is expected that wolves will primarily occupy public lands in Washington. As in these states, wolf reestablishment is not expected to result in any additional land use restrictions in Washington.

A. Federal Land

Responsibility for managing federal lands resides with the responsible federal administering agencies. WDFW has no legal authority to implement land use restrictions on land it does not manage; land management agencies can and may adopt seasonal or localized area restrictions independently from WDFW.

Wolf activity on national forest lands in Montana generally has not prompted any area closures or travel restrictions, primarily because recreational use of these lands is often dispersed and sporadic (MFWP 2003). In contrast, temporary area closures are sometimes established around occupied den or rendezvous sites in national parks because of the strong public desire to view wolves and the high visitation of areas with wolf activity that would otherwise occur. At Yellowstone National Park, areas around dens are closed until June 30, but at Glacier National Park, this type of seasonal closure has been implemented for only one wolf pack (MFWP 2003).

In Wyoming, the U.S. Fish and Wildlife Service always discouraged other agencies from placing any restrictions on federal lands to protect wolves (M. Jimenez, pers. comm.). The only exception would have been potential take involving a den site. For example, if an agency planned a controlled burn in April, the U.S. Fish and Wildlife Service would have asked the agency to wait until the wolves were out of the affected den later that summer. No other restrictions on federal lands have been added by other agencies.

B. State Land

As with federal lands, responsibility for managing state lands resides with the responsible state administering agencies. WDFW has no legal authority to implement land use restrictions on land it does not manage; land management agencies can and may adopt seasonal or localized area restrictions independently from WDFW.

The Washington Department of Natural Resources administers the Washington State Forest Practices Act Critical Habitats Rule for threatened and endangered species (WAC 222-16-080), which contains a provision for wolves. The rule applies to timber harvest permit applications on state and private lands. Forest practices where harvesting, road construction, or site preparation is proposed within 1 mile of a known active wolf den, as documented by WDFW, between the dates of March 15 and July 30, or 0.25 mile from the den at other times of the year, are designated as a Class IV-Special and require an extra 14 days of review, and are subject to State Environmental Policy Act (SEPA) review. The lack of confirmed wolf dens in Washington has meant that no forest practice applications for state lands have been affected to date by the wolf critical habitat rule. The rule was established in 1992, but much has been learned since then about habitat issues involving wolves in neighboring states, in particular that large disturbance buffers are not necessary for conservation of the species. This newer information suggests that the rule should be reviewed and perhaps modified to reflect prevention of excessive disturbance of occupied dens only during the denning period.

C. Private Land

As noted above, private lands in Idaho, Montana, and Wyoming have never had wolf-related restrictions placed on them by federal or state agencies. Therefore, minimal impacts to private land uses in Washington are expected due to the presence of wolves. Although WDFW has no legal authority to implement land use restrictions on private lands, it may nevertheless ask a private landowner to temporarily delay an activity near a den during the denning period, especially while wolves remain state listed.

The Washington State Forest Practices Act Critical Habitats Rule for threatened and endangered species (WAC 222-16-080), which includes a provision for wolves and is administered by the Washington Department of Natural Resources, also applies to timber harvest permit applications on private lands. The lack of confirmed wolf dens in Washington has meant that no forest practice applications for private lands have been affected to date by the wolf critical habitat rule. This rule should be re-examined and modified or removed in light of newer information on disturbance near wolf dens.

IX. INFORMATION AND EDUCATION

A well-informed public is essential to gray wolf conservation and some authorities consider outreach efforts to be the highest priority in restoring the species (Fritts et al. 1995, 2003). It is crucial that wolves and wolf management issues be portrayed in an objective and unbiased manner, and that the public receives accurate information on the species. Conflicts with wolves and the solutions and compromises needed to resolve those conflicts must be discussed fairly (Fritts et al. 2003).

Extensive public outreach was conducted before and during wolf recovery in Montana, Idaho, and Wyoming, with a broad mix of approaches used (Fritts et al. 1995). These efforts conveyed a factual and balanced view of wolves, stressed the differences between wolves and other canids, described the legal and biological rationale for recovery, pointed out that some wolf control must accompany recovery, and emphasized that very few restrictions on use of public or private lands are necessary for wolf recovery. The success of wolf recovery in these states is at least in part due to these information and education efforts.

Washington's citizens need access to information about wolves and wolf management from wildlife managers; and wildlife managers need information from the public on sightings, depredation events, and wolf behavior to effectively manage wolves in the state. With this two-way communication, implementation of the Wolf Conservation and Management Plan will have a higher probability of success and both managers and the public will have the necessary information to make conservation and management decisions to achieve plan objectives. Two-way communication depends on a public that is educated about wolves and informed about ongoing management activities.

An outreach campaign that is aggressive, rather than passive, in reaching specific groups will best benefit wolf conservation and should begin upon approval of this plan. Information and education strategies must be adaptive, reflecting the adaptive wolf conservation and management strategies described in the overall plan. Communication tools and education methods should be flexible and based on ongoing conservation and management activities, feedback from public attitude surveys, and available funding.

Although information and education objectives overlap, and any WDFW employee may include aspects of them in their work, WDFW functionally distinguishes the two. Most official information dissemination is coordinated by the Public Affairs staff, who work with the news media and update website information. Outreach and Education staff, working with schools, community groups, and other organizations, coordinates most formal education efforts. Strategies and tasks for informing and educating people about wolf behavior, conservation, and management in Washington are presented in Chapter XII.

X. RESEARCH

Development and implementation of research programs are essential parts of any successful wildlife conservation and management plan. Such programs should provide information that can promote adaptive management and process improvement over time. Future conservation and management actions involving Washington's gray wolves will depend on accurate and complete data related to a broad range of biological and social topics, including population status and impacts on affected resources and human activities.

Extensive research on wolves and their impacts has been conducted in recent decades in Idaho, Montana, and Wyoming, and has provided excellent information for directing wolf recovery and management in those states. This body of work will be useful in guiding future wolf investigations in Washington. In some instances, the results of this research will be directly applicable to Washington, but in many cases similar studies will be needed in-state because of differences among states in habitat quality, prey availability, human densities, and other characteristics.

Research will be needed to clarify the understanding of wolves in Washington and to guide the development of longer-term area-specific conservation and management objectives for the species. Research will likely be conducted by WDFW, other federal (e.g., USDA Wildlife Services' research program) and state agencies, tribes, universities, and other scientists and will rely on cooperative relationships among these entities.

Important research needs relating to wolf conservation and management in Washington are identified in Chapter XII. Availability of funding and personnel will determine the rate at which research is conducted. Long-term commitments of funding and support will be needed to do this work. Efforts will be made to obtain funding from multiple sources to conduct the needed research.

XI. REPORTING AND EVALUATION

The purpose of reporting and evaluation is to determine the success of the plan in meeting the established goals and objectives. Measurements of positive and negative outcomes for wolves and other groups must be identified, compiled, and compared to a standard. Tracking the status and trend of various measurements against a standard will indicate whether implementation of the plan is meeting its goals. An adaptive management approach will be used so that new information can be incorporated into management strategies, which can then be changed if warranted. Strategies for monitoring, evaluating, and reporting the effectiveness of the wolf plan's implementation are presented in Chapter XII. These strategies will begin after this plan goes into effect.

Benchmarks for measuring progress toward achieving wolf conservation and management in Washington will be whether objectives are being met for recovery (population numbers and distribution), for managing wolf-livestock conflicts and wolf-ungulate conflicts, for public outreach and education, and for law enforcement. While benchmarks measure results, not effort, monitoring those results can help determine whether to modify program objectives or management practices. An interagency technical committee and a citizen's advisory committee could assist WDFW in evaluating the effectiveness of wolf conservation and management in Washington. An evaluation could include measuring how well each portion of the plan is being implemented.

XII. GOALS, OBJECTIVES, STRATEGIES, AND TASKS

The purpose of the Washington Wolf Conservation and Management Plan is to ensure a self-sustaining population of gray wolves in the state and to encourage social tolerance for the species by reducing and addressing conflicts. The following goals, objectives, strategies, and tasks are intended to meet this purpose.

A. Goals

The goals of the Washington Wolf Conservation and Management Plan are to:

- Restore the wolf population in Washington to a self-sustaining size and geographic distribution that will result in wolves having a high probability of persisting in the state through the foreseeable future (>100 years).
- Manage wolf-livestock conflicts in a way that minimizes livestock losses, while at the same time not negatively impacting the recovery or long-term perpetuation of a sustainable wolf population.
- Manage ungulate populations in Washington to provide harvest opportunities for hunters and adequate prey for wolves so that wolf conservation goals can be met.
- Develop public understanding of the conservation and management needs of wolves in Washington, thereby promoting the public's coexistence with the species.

B. Objectives, Strategies, and Tasks

This section identifies objectives, strategies, and associated tasks, if needed, to recover and manage wolves so that the species can be removed from state listed status in Washington.

1. Develop and implement a program to monitor the population status, trends, and conservation and management needs of wolves in Washington.

A comprehensive population monitoring program is an essential part of the wolf conservation and management program and will be conducted throughout the implementation of this plan. Monitoring will begin as wolves become reestablished and be most intense while the species remains classified as state endangered, threatened, and sensitive. Upon delisting, monitoring will transition from counting numbers of successful breeding pairs to numbers of packs or total wolves.

WDFW will have primary responsibility for monitoring wolves, but collaboration with tribes, other state, federal, and provincial agencies, jurisdictions, universities, landowners, local governments, and the public will be necessary for a successful monitoring program. This coordination will be especially important when monitoring animals located on or near federal, tribal, and private lands, and along state borders.

1.1. Monitor locations of wolves dispersing into Washington and determine when resident packs and territories become established.

1.1.1. Conduct howling surveys, winter tracking, remote camera surveys, trapping, and genetic testing to determine locations of recolonizing wolves.

Refinements in survey methodology developed and tested in other states will be employed in Washington as they become available.

1.1.2. Collect sighting reports by the public and cooperators and conduct follow-up investigations, where warranted, to locate colonizing wolves and packs.

Reports of wolf activity and sightings will be emphasized to and solicited from the public. The U.S. Fish and Wildlife Service maintains a telephone hotline (1-888-584-9038) for the public to report wolf activity and sightings in Washington (see Appendix H). Additional outreach will be conducted to encourage the public to provide credible wolf sighting reports. Information on wolf identification and where to report sightings will be included in the WDFW hunting pamphlet.

1.2. Determine the status, trends, distribution, and other population parameters of wolves while listed.

1.2.1. Trap and radio-collar members of each pack as packs become established.

Radio telemetry will be the primary tool for monitoring wolves. The goal will be to collar the alpha male, alpha female, and as many remaining members of each pack as feasible. An attempt will be made to track at least one member of each pack via radio collars using satellite technology to record large-scale movements. Ear tagging will also be used to enable identification.

1.2.2. Determine the locations and numbers of successful breeding pairs, packs, and individual wolves each year.

Numbers of successful breeding pairs, packs, total wolves, and pups surviving until December 31 will be determined annually using the results of radio-tracking and other survey techniques. Packs with territories straddling state or provincial boundaries (transboundary packs) will be counted only in the administrative area where the den site is located. If the den location is not known with certainty, then other criteria such as amount of time, percent of territory, or number of wolf reports will be used to determine pack residency. A pack will not be counted in more than one state or province.

1.2.3. Determine home ranges, mortality, reproductive success, habitat selection, dispersal, and animal health.

Information from intensive radio tracking of each pack will be used to determine habitat use, prey selection, locations of den sites and rendezvous sites, number of pups, survival, and mortality.

1.2.4. Conduct genetic testing and health monitoring through the collection and analyses of biological samples from live-captured and dead wolves.

1.2.5. Publish an annual report with monitoring results, including status, trends, distribution, and other population parameters for wolves each year, and assess progress toward meeting conservation/recovery objectives.

1.3 Determine the status, trends, distribution, and other population parameters of wolves after delisting.

Following delisting, wolf populations will continue to be monitored to determine annual population status and trends and whether population objectives are being met. Monitoring efforts will transition from numbers of successful breeding pairs to numbers of packs or wolves. Collaring will be used in select situations, such as with dispersing wolves that appear in new locations.

2. Protect wolves from sources of mortality and disturbance at den sites.

2.1. Identify human-related and natural sources of mortality.

Intensive monitoring and research activities will be the primary means of identifying major mortality factors for wolves, both human-related and natural.

2.2. Minimize factors contributing to wolf mortality.

2.2.1. Minimize mortality from illegal killing.

Illegal killing is expected to be a significant source of mortality as wolves recolonize Washington. Programs that increase social tolerance for wolves will help reduce this type of mortality. Effective management programs that respond to and limit livestock depredation and provide compensation for losses will be especially important in reducing illegal killing. Education programs that provide accurate information about wolves to the public are equally necessary for reducing this threat. The WDFW Enforcement Program will be the lead agency in investigating illegal killings.

2.2.2. Minimize mortality from accidental killing.

Strategies will be implemented to minimize mortality of wolves from incidental shooting and trapping. Information and education efforts are needed to inform hunters and trappers about the presence of wolves in occupied areas of the state. These programs will also assist hunters in becoming proficient at distinguishing wolves from coyotes, and trappers in learning methods for avoiding accidental capture of wolves and what to do if a wolf is inadvertently caught. Incidental trapping of wolves is expected to be minimal because, with the exception of

tribal trappers, licensed trappers in Washington are only allowed to use box and cage traps.

2.2.3. Minimize mortality from lethal control.

Although lethal control is a necessary tool for reducing wolf depredation on livestock, excessive levels of lethal removal can preclude the recovery of wolf populations, as noted with the Mexican gray wolf in New Mexico and Arizona (USFWS 2005). Wolf managers will therefore monitor and, if necessary, adjust the extent of lethal removals in Washington to meet both conservation and management needs.

2.3. Minimize disturbance at active wolf den sites.

Current information pertaining to human disturbance of wolf den sites in other states will be reviewed to determine what protective measures may be appropriate in Washington.

3. Develop criteria for determining if and when wolves should be translocated into unoccupied areas to help achieve conservation/recovery objectives.

The overall timeframe for wolves to disperse naturally into Washington and reestablish a population is difficult to predict, but it could take one to several decades to reach downlisting and delisting objectives. If dispersal fails to meet these objectives, then translocation of wolves to unoccupied areas will be initiated in a timely manner. Translocation is considered by the Wolf Working Group to be a key tool for meeting the objectives of this plan (see Chapter III, Section B).

3.1. Determine if wolves are successfully dispersing to the three recovery regions and establishing successful breeding pairs.

Howling surveys, monitoring of radio-collared individuals, and other methods will be used to determine whether 1) wolves are successfully dispersing to new areas of the state and 2) sufficient numbers of wolves exist in a recovery region to be used as a source for translocation.

3.2. Determine the feasibility of translocating wolves into an unoccupied area.

A feasibility study will be prepared to determine if an adequate amount and configuration of suitable habitat and prey are available to support successful breeding pairs of wolves at potential translocation sites. Federal and state lands will be targeted for inclusion in the assessment. The connectivity of the potential translocation sites to other locations with wolves will also be considered. Forested public lands with low densities of people and livestock are most likely to support breeding pairs of wolves.

The feasibility study will be initiated upon approval and funding of the Washington Wolf Conservation and Management Plan. If wolves are still federally listed in Washington,

discussions with the U.S. Fish and Wildlife Service will be initiated to determine the possibility of translocating wolves within the state. Funding for the study should be a high priority.

3.3. Develop an implementation plan for a translocation and identify and prioritize core release areas.

The best methods for conducting a translocation and determining the exact translocation site will be investigated and described in an implementation plan. Experiences from previous translocations in Idaho and Yellowstone National Park during the 1990s will be evaluated. The implementation plan will be initiated following completion of the feasibility plan. If wolves are still federally listed in Washington, approval from the U.S. Fish and Wildlife Service will be obtained to translocate wolves within the state. Funding for the implementation plan should be a high priority.

3.4. Conduct a State Environmental Policy Act (SEPA) or National Environmental Policy Act (NEPA) public review process to evaluate the feasibility proposal and implementation plan to translocate wolves into an unoccupied area.

This process will be started after the completion of the feasibility study and implementation plan, and the documented establishment of two wolf pack territories in the any of the three recovery regions, with at least one of the two wolf packs containing a breeding pair. A NEPA review process will likely be required for any translocation occurring on federal lands and would preclude the need for a SEPA review.

3.5. Coordinate with federal and state agencies, tribal governments, landowners, and non-governmental organizations on translocation activities.

3.6. If funding and support are available, translocate wolves from within Washington.

Upon completion of SEPA or NEPA review, wolves will be captured and translocated, as described in the implementation plan. No wolves with a history of livestock depredation will be used in translocations.

3.7. Conduct post-release monitoring of wolves to evaluate translocation success.

4. Develop and implement a comprehensive program to manage wolf-livestock conflicts in cooperation with livestock producers.

Based on experiences in other states, wolf depredation on livestock is expected to occur in Washington and will require both non-lethal and lethal control responses to resolve the conflicts. This approach for managing a listed species is highly unusual, but is required because of the desire to reduce conflicts and build social tolerance for wolves, thereby enhancing the chances for reestablishing the species in the state. Resolution of wolf-livestock conflicts will be managed in a way that does not threaten the reestablishment of a naturally reproducing wolf population in the state or require relisting of the species. The wolf depredation management program will address depredation problems by investigating reported complaints, verifying wolf

depredations accurately, implementing depredation management actions to abate or prevent damage, and providing adequate compensation for documented losses.

4.1. Establish a minimum of two wolf management specialist positions within WDFW to monitor wolf movements and work directly with livestock producers in resolving conflicts with wolves.

4.2. Manage wolf-livestock conflicts using a range of options to reduce and resolve depredations.

4.2.1. Respond to and resolve reported wolf depredation events in a timely period and work with livestock owners to reduce potential conflicts with wolves.

Depredation management approaches will include both non-lethal and lethal responses, as described in Chapter IV and presented in Table 7. Responses to specific depredation events will be based on the local status of wolves to ensure that conservation/recovery objectives are met. Management responses will emphasize non-lethal techniques while wolves are recolonizing and will transition to more flexible approaches as wolves progress toward a delisted status. Livestock producers and the public will be actively informed of and equipped with tools to implement proactive non-lethal wolf management techniques. State personnel and cooperators will receive regular training for investigating complaints and resolving conflicts.

4.2.2. Work with livestock producer organizations, county extension services, the Washington Department of Agriculture, conservation organizations, and other appropriate groups and agencies to develop and conduct a comprehensive outreach and educational program on methods to discourage depredation by wolves using tools such as media materials, workshops, website resources, site reviews, and evaluations.

4.2.3. Assist livestock owners with obtaining resources necessary to implement non-injurious wolf control techniques such as fladry, hazing supplies, radio-activated guard devices, and electric fences.

4.2.4. Provide livestock owners with information for recognizing the characteristic signs of wolf kills and how to distinguish wolf kills from predation by other carnivores.

4.2.5. Inform public and private land managers of wolf activities on their respective lands as needed.

4.3. Verify reported wolf depredations.

Verification of reported wolf depredations is a critical step in the process of managing depredation problems. A reported wolf depredation complaint must be verified as confirmed or probable before compensation can be provided. Documenting losses is

key for both the livestock owner and WDFW to understand the severity of the problem and to plan appropriate action. In some cases, documenting the number and history of losses will tie directly to actions such as livestock owner compensation and lethal control of wolves. Consequently, a timely response by state or federal employees to suspected livestock depredation reports is critical to fostering good agency-livestock owner relations and to accurately determine the cause of livestock loss.

4.3.1. Establish a contract with USDA Wildlife Services to assist WDFW staff in responding to wolf depredation calls.

Prompt response by personnel trained in depredation investigation techniques is important for determining the validity of reported complaints. Either WDFW personnel or USDA Wildlife Services personnel will conduct wolf depredation investigations.

4.3.2. Provide the public with a toll-free line or other contact numbers so that complaints of suspected wolf depredation can be promptly reported.

If livestock are suspected to have been killed or injured by a wolf, complaints must be reported to WDFW or USDA Wildlife Services within 24 hours of finding the depredated animal (see Appendix H for current reporting guidelines and associated information). The U.S. Fish and Wildlife Service (USFWS) currently operates a reporting hotline (888-584-9038) for suspected wolf depredation in Washington. If the USFWS discontinues this service in the future, WDFW will establish a new reporting hotline.

4.3.3. Respond to complaints of suspected wolf depredation in a timely manner.

Upon receiving a wolf complaint, WDFW or USDA Wildlife Services will contact the complainant by phone within 24 hours. If agency staff determine that a field investigation is warranted, an on-site inspection will be made within 48 hours of the telephone consultation. An investigation into a reported wolf complaint may include an on-site inspection as well as other components, such as interviews with the complainant, adjacent landowners, and veterinarians, and examination of wolf pack location data.

4.3.4. Provide the complainant with a final determination about the suspected wolf depredation.

After the investigation is completed, the complaint will be classified under one of the following categories: confirmed wolf depredation, probable wolf depredation, confirmed non-wolf depredation, or unconfirmed depredation (see definitions in Chapter IV, Section F). Confirmed and probable wolf depredations will be eligible for compensation under this plan. If a reported complaint is determined by WDFW or USDA Wildlife Services to be confirmed non-wolf depredation or unconfirmed depredation, the incident will be recorded. If wild animals other than wolves are determined to be the cause of the

depredation, WDFW or USDA Wildlife Services will provide the appropriate assistance. Appropriate assistance depends on the species involved and may include providing technical or operational assistance.

4.4. Provide compensation for verified and unknown livestock losses from wolves and for implementing proactive deterrents to reduce such depredations.

4.4.1. Develop a compensation program for unknown livestock losses.

WDFW will develop a compensation program for unknown losses based on the criteria provided in Chapter IV, Section F. This will include devising appropriate procedures for documenting historic and current-year livestock losses.

4.4.2. Develop a funding source to provide compensation for verified and unknown livestock losses from wolves.

WDFW will work with livestock producers and other members of the public to explore funding sources for the compensation program, including state appropriations, foundations, and other sources. Legislative support for a funding mechanism for compensation will be sought.

4.4.3. Process and reimburse valid compensation claims within a timely period.

4.4.3.1. Develop an application and reimbursement process, including forms and instructions to applicants.

4.4.3.2. Provide technical assistance to applicants to apply for reimbursement.

4.4.3.3. Respond to applications within 14 days by either a) affirming the claim and initiating payment, or b) seeking additional justification for the claim.

4.4.4. Ensure a high degree of accountability within the compensation program.

A Washington Compensation Review Board will be established to oversee the implementation of the state compensation program, based on the criteria noted in Chapter IV, Section F. The purposes of the review board will be to maintain a high degree of program accountability, review whether the program is working effectively, finalize validation criteria, and assess the validity of claims seeking compensation for unknown losses.

4.4.5. Develop a funding source to provide compensation for implementing proactive non-lethal deterrents to reduce livestock losses from wolves.

Use of non-lethal tools by livestock producers will be encouraged as a way of reducing depredations by wolves. Funding for this activity could be included as part of the program to compensate producers for livestock losses (Task 4.4.2).

Defenders of Wildlife has stated its intention to make its Bailey Proactive Carnivore Conservation Fund available to producers in Washington for this purpose. However, it is unclear how much funding will be available under this program, so additional sources would be desirable.

4.4.6. Once funding is secured, develop a program to provide assistance to livestock owners interested in implementing proactive deterrents to minimize conflicts with wolves.

4.5. Cooperate with other entities to resolve wolf-livestock conflicts.

Cooperative relationships and agreements with other state, federal, and provincial agencies, tribes, landowners, local governments, and non-governmental entities will be developed and implemented to address depredation concerns. Close coordination with USDA Wildlife Services will be necessary to respond to wolf damage problems in a timely manner. Details regarding who will respond and what protocols are followed will be essential to successful handling of wolf conflicts. Non-governmental organizations such as Defenders of Wildlife, Washington Cattlemen's Association, and Washington State Sheep Producers will be engaged to assist on aspects of wolf management.

5. Manage ungulate populations and habitats in Washington to provide a prey base for wolves.

5.1. Monitor ungulate populations in areas occupied by wolves.

WDFW and its cooperators already conduct extensive surveys of annual production, recruitment, and harvest of ungulate populations in the state. These data are used to monitor population abundance, trends, and demographics, and to make recommendations for hunting seasons and other management actions. Nevertheless, management of many populations would benefit from increased survey intensity to improve the precision and accuracy of information. Obtaining better knowledge of tribal harvest is also desirable. Additionally, many of Washington's ungulate populations are difficult to survey because of their habitat, making it hard to detect population changes. Current survey methods may be inadequate for monitoring some populations. Survey protocols are currently being reviewed and new protocols considered where needed (WDFW 2003). Improvements in survey protocols will enhance efforts to assess the impacts of wolves on prey and whether changes in ungulate management strategies are needed.

5.2. Enhance ungulate populations wherever possible, subject to habitat limitations and landowner tolerance.

Maintaining robust prey populations will result in three key benefits for wolf conservation in Washington: 1) providing wolves with an adequate prey base, 2) supplying hunters and recreational viewers of wildlife with continued opportunities for harvesting and seeing game, and 3) reducing the potential for livestock depredation by providing an alternative to domestic animals for various predator species.

Wolf predation is not expected to harm ungulate populations across broad geographic areas of the state, but could cause some local reductions in ungulate numbers or changes in distribution. Other factors such as declining habitat quality, hunter harvest, severe seasonal weather conditions, and predation by other carnivores are expected to exert far greater influence on ungulate abundance. The following management tasks are available to improve ungulate abundance in areas occupied or likely to be occupied by wolves.

5.2.1. Improve habitat for ungulate populations.

Healthy ungulate populations rely on adequate summer and winter habitat. Deer and elk are generally most abundant in early successional forests, but this habitat has declined in many parts of Washington in recent decades due to reductions in timber harvest and other causes.

WDFW will work with other public land agencies, private landowners, non-governmental organizations (e.g., Rocky Mountain Elk Foundation, Mule Deer Foundation), and tribal governments to cooperatively manage forestlands and winter habitat for the benefit of ungulate populations and wolves. This will include the use of appropriate management practices to: improve forage quality in various habitats; manage some habitats preferentially for ungulates; reduce road densities and off-road vehicle use in critical habitat; maintain open habitats (e.g., meadows), winter habitats, and productive early successional habitat; and improve control of noxious weeds.

5.2.2. Manage ungulate harvest to provide sufficient prey for viable wolf populations.

Human harvest comprises the largest mortality source for elk and deer populations in Washington (Smith et al. 1994, McCorquodale et al. 2003). Hunter take of antlerless animals is one of the primary tools used to control or reduce ungulate populations in the state. To maintain ungulate populations at levels that meet desired management objectives and provide adequate prey for wolves, it may be necessary to reduce the levels of human harvest in some locations. Greater restrictions on anterless harvests and increased road closures (e.g., McCorquodale et al. 2003) are two means of achieving this goal. In more restrictive scenarios, general seasons in some regions may need to be modified in length, timing, or through restrictions on bag limits.

5.2.3. Reduce illegal hunting of ungulate populations.

Law enforcement efforts will be focused in wolf-occupied areas to reduce illegal take of elk and deer. Smith et al. (1994) recommended increased patrolling during October, November, and December, when most elk poaching occurs. In addition, elk enforcement activities will be concentrated within 30 miles of human population centers and in locations with high hunter and road densities because most poaching occurs in these areas (Smith et al. 1994).

5.3. Integrate management of multiple species.

Management of ungulate and carnivore populations should be integrated on an ecological basis. Separate management plans exist at a statewide level for each of Washington's ungulate species and two other carnivores (cougar, black bear; WDFW 1995, 2003) and at the herd level for eight of the state's 10 elk herds (WDFW 2001b, 2002a, b, c, d, 2005, 2006a, b). Achieving management goals for all of these species will be enhanced if the plans are considered collectively. Coordination among public agencies, landowners, tribes, and non-governmental organizations is also necessary for meeting management goals.

6. Manage wolf-human interactions to reduce concerns about human safety from wolves, prevent the habituation of wild wolves, decrease the risk of conflicts between domestic dogs and wolves, and build awareness of the risks posed by wolf hybrids and pet wolves.

6.1. Provide information and training to hunters, trappers, rural landowners, outdoor recreationists, outfitters and guides, forest workers and contractors, and others who might encounter wolves on the low risk of attacks on humans by wolves, how to prevent and react to wolf attacks, and other concerns.

6.2. Reduce the chances that wolves will become habituated to humans by educating the public on the risks of habitation and the actions that can be taken to prevent it from occurring.

A number of recommendations exist for people to prevent the habituation of wolves (see Chapter VII, Section A).

6.3. Respond to human safety concerns.

Attacks on humans by healthy wild wolves are extremely rare events. However, when necessary, WDFW or a cooperating agency will take action if the continued presence of a wolf or wolves poses an immediate threat to human safety, consistent with existing guidelines established for black bears and cougars.

6.3.1. Respond to reported wolf-human interactions in a timely manner.

Reports of wolf-human interactions will receive a high priority and be investigated by WDFW and USDA Wildlife Services. Reported wolf-human safety concerns will be verified and evaluated on a case-by-case basis before management actions are initiated, unless circumstances necessitate immediate action, including lethal control.

6.3.2. Develop WDFW response protocols for reported wolf-human conflicts.

Protocols similar to those used in responding to human safety concerns involving cougars and black bears will be prepared and implemented. Non-lethal

methods will be deployed first unless the situation dictates a more aggressive response.

6.3.3. Relocate wolves as needed for management purposes.

As described in Chapter III, Section B, relocation would occur when a wolf or wolves become inadvertently involved in a situation or are present in an area that could result in conflict with humans or harm to the wolf. For relocations to occur, three criteria apply:

- State or federal personnel must conduct the action.
- Wolves will be relocated to into the nearest suitable remote habitat on public land at the direction of WDFW and in collaboration with responsible land managers.
- The action must be taken to prevent conflict with humans or livestock, or to reduce the possibility of harm to the wolf.

6.4. Manage wolf-pet conflicts.

Situations where wolves and pet dogs (including hunting and service dogs) encounter each other can result in dog mortality. As wolves expand their range in Washington, dog owners must be made aware of the potential risks to their animals and become informed on methods for avoiding interactions with wolves. Such methods include providing information and training to dog owners who live or recreate in wolf habitat about how to prevent and react to wolf attacks on dogs. The public should also be informed and educated regarding the importance of keeping pets vaccinated against rabies, canine parvovirus, and other canid diseases.

6.5. Address issues regarding wolf hybrids and pet wolves.

Ownership of pet wolves is no longer allowed in Washington unless the animal was possessed prior to the passage of state law RCW 16.30 in July 2007.

6.5.1. Provide information to the public on the dangers of keeping wolf hybrids and pure wolves as pets to discourage their ownership.

6.5.2. Provide the public with information about the risks of wolf hybrids and pet wolves to wolf recovery and human safety. Information efforts will be aimed at communities where wolf hybrids and pet wolves might be confused with wild wolves.

6.5.3. Cooperate with counties, cities, state, and federal agencies to strictly regulate and prevent the release of wolf hybrids and pet wolves into the wild.

6.5.4. Explore options for having a voluntary registration of wolf hybrids and pet wolves in Washington, similar to Montana Fish, Wildlife & Park's program. Develop and deliver educational messages for wolf hybrid and pet wolf owners

about the dangers that hybrids and pet wolves pose to wild wolf recovery and human safety.

6.5.5. Support efforts to further regulate wolf hybrids in Washington.

7. Manage conflicts between wolves and listed/candidate species.

Conflicts between wolves and other listed/candidate species may occur in the future. These situations will be evaluated on a case-by-case basis to determine if management responses are needed and, if so, what the responses should be. In some cases, it may be desirable to develop a response plan in advance to address an anticipated conflict. Potential response options include relocation of wolves.

8. Develop and implement a comprehensive outreach and education program to provide accurate and updated knowledge on wolf conservation and management to Washington residents and prepare them to coexist with wolves.

8.1. Seek funding for a full-time position to coordinate implementation of the wolf outreach and education efforts and develop programs and materials appropriate for various user groups.

8.2. Provide information to the public about ongoing wolf conservation and management activities.

8.2.1. Enhance public awareness about wolves as a native wildlife species and their status and threats.

8.2.2. Maintain information on wolf identification, biology, habitat use, and history in Washington on the WDFW website.

8.2.3. Create and maintain maps and associated information about current wolf activity in Washington on the WDFW website, as available and appropriate (i.e., information must be non-sensitive). Include links to other government and non-government organizations' websites with additional detail.

8.2.4. Update the WDFW website information about the wolf plan implementation and adaptive management, including public feedback tools such as surveys, blogs, and chatrooms.

8.2.5. Issue news releases to news media and e-subscribers, as needed, about significant wolf activity or implementation steps, including any field activities, new research, management responses, and public conduct advisories, and coordinate follow-up responses for complete coverage.

8.2.6. Disseminate information on wolf conservation and management activities through other WDFW outlets, including wildlife and habitat program quarterly newsletters.

8.3. Develop and provide training, information, and education programs to address concerns over wolf-livestock conflicts.

8.3.1. Provide livestock producers with training in methods for preventing, reducing, and responding to wolf-livestock conflicts or depredations, using USDA Wildlife Services staff in Washington and the experience of USDA Wildlife Services field staff in Idaho, Montana, and Wyoming.

8.3.2. Inform livestock producers on how to report suspected wolf depredations.

8.3.3. Directly contact public and private land managers about wolf activities on their lands. Provide ongoing wolf monitoring information to livestock producers as needed.

8.4. Develop and provide information and education programs for hunters, wildlife viewers, and others to address wolf-related concerns over ungulate management.

8.4.1. Provide accurate and up-to-date information on ungulate population status and trends and the findings of studies examining wolf diet and impacts on ungulate abundance in Washington and other states and provinces.

8.4.2. Use postings on the WDFW wolf and "Living with Wildlife" webpages; presentations to the WDFW Game Management Advisory Council and hunter groups; direct mailings to hunters, hunter organizations, wildlife viewers, and wildlife viewing organizations; news releases about new research results; and information in WDFW hunter education course materials.

8.5. Develop and provide informational material about wolves and co-existing with them for use in school classrooms, environmental learning centers, and other appropriate outlets.

8.5.1. Develop and distribute K-12 classroom lesson plan kits that include sets of materials and activities for students to learn about wolves (identification, biology, behavior, habitat use, history in state, etc.), using WDFW education webpages and as many already-established wolf education resources as available and appropriate.

8.5.2. Coordinate the use of already-established presentations on wolves for classroom and organization meetings, including speakers with live captive wolves, if available and appropriate.

8.5.3. Develop a wolf education webpage to assist with lesson planning and presentations, serve as a clearinghouse for approved and appropriate links to more wolf education materials, and provide online learning games and activities.

8.5.4. Enlist and train volunteers with a variety of backgrounds and interests (e.g., from urban environmentalists to rural 4-H or Future Farmers of America participants)

to deliver balanced presentations about co-existing with wolves to K-12 classrooms and other groups.

8.6. Develop and provide training, information, and education programs for the public on how to co-exist with wolves.

8.6.1. Produce and distribute informational materials and give presentations and workshops on how to safely live, work, and recreate in areas occupied by wolves. When possible, integrate training and educational opportunities about wolves with information about living with other carnivores in Washington, such as cougars, bears, and coyotes. A similar program that has been conducted in Washington, Oregon, and Idaho is the "Living with Carnivores" program. Such programs can be sponsored cooperatively by multiple agencies and organizations.

8.6.2. Post signs at backcountry trailheads with information on wolf identification, behavior, dealing with wolf encounters, methods for avoiding wolf habituation, and the potential for negative interactions with domestic dogs.

8.6.3. Distribute information at other appropriate outlets on wolf identification and behavior, dealing with wolf encounters, methods for avoiding wolf habituation, and the potential for interactions with domestic dogs.

8.6.4. Develop a speaker's bureau, using WDFW and other government and non-governmental organization staff and volunteers, to make presentations to groups such as livestock producers, rural landowners, sportsmen, environmentalists, and local governments about co-existing with wolves. Target communities closest to the most wolf activity and conduct town hall meetings, open houses, or other events to teach co-existence with wolves.

A potential model for community outreach is the Grizzly Bear Outreach Project (GBOP), a non-governmental organization (http://www.bearinfo.org). The project engages community members in a process of education and multi-party dialogue and provides a non-advocacy setting for the involvement of all stakeholder groups. The approach includes:

- Assessing the knowledge and attitudes of community members prior to implementing education components, including interviews with representatives of stakeholder groups and follow-up telephone surveys with randomly selected residents.
- One-on-one meetings between project staff and community members to gauge concerns and share information.
- Small focus group meetings to discuss grizzly bear issues with 4–6 people at a time in informal settings.
- A coalition of community members to provide a local information source and extend the reach of project staff.
- A project brochure containing information about grizzly bear ecology, and sanitation and safety tips for the home, ranch, and campsite for distribution to hikers, horse packers, hunters, fishers, and communities.

- A modular slide show paralleling the content of the brochure.
- A project website for distribution of information and solicitation of comments from the public.

A similar program for wolves could be developed for selected local communities.

8.7. Develop information and education programs to minimize human-caused mortality of wolves.

8.7.1. Use hunting, fishing, and trapping regulation pamphlets and other means to provide educational messages and identification materials about wolves, including how to avoid accidental shooting during legal hunting seasons.

8.7.2. Provide information on precautions to take to minimize the risk of human-caused mortality of wolves resulting from habituation, misidentification, and other human-related factors.

8.7.3. Use programs similar to "Living with Carnivores" to communicate information about the dangers of feeding wildlife and how it can contribute to human-caused mortality of wolves through habituation to people.

8.8. Work with other agencies and organizations to promote wolf outreach.

WDFW can benefit from the assistance of other agencies (e.g., U.S. Forest Service, U.S. Fish and Wildlife Service, National Park Service, U.S. Customs and Border Patrol) and a variety of non-governmental organizations in conducting effective information and education programs about living, recreating, and working with wolves in Washington. These entities will be encouraged to assist in developing and presenting wolf education materials to the public.

9. Coordinate and cooperate with public agencies, landowners, tribes, and non-governmental organizations to help achieve wolf conservation and management efforts.

9.1. Maintain coordination and communication with other government agencies, tribes, adjacent states and British Columbia, counties, non-governmental organizations, and willing landowners regarding wolf conservation and management.

Implementation of this plan will require coordination and communication with numerous stakeholders in order to share resources, reduce costs, and avoid potential duplication of effort. In some instances, memoranda of understanding or cooperative agreements will be needed to spell out roles and responsibilities and to ensure that certain actions are conducted in a timely manner.

Coordination with the following agencies and entities will be important: USDA Wildlife Services; U.S. Fish and Wildlife Service; U.S. Forest Service; National Park Service; Bureau of Land Management; tribal governments; Washington Department of Natural Resources; Washington Department of Agriculture; Washington Department of

Transportation; other Washington state agencies; county governments; private landowners; law enforcement entities including the U.S. Fish and Wildlife Service, U.S. Forest Service, and county sheriff departments; natural resource agencies in neighboring states and British Columbia; and non-governmental organizations such as the Defenders of Wildlife, Washington Cattlemen's Association, Washington Sheep Producers, Washington Farm Bureau, and hunting organizations.

9.2. Cooperate with other entities to secure funding for wolf conservation and management.

Recovery of wolves in Washington through the conservation and management activities described in this plan will be expensive and require long-term funding from new sources. WDFW will seek funding from a variety of sources, including special state or federal appropriations, private foundations, and other private sources. Coordination with other agencies and non-governmental organizations will ensure the optimal use of resources devoted to wolf conservation and management.

9.3. Evaluate the state's Forest Practices Act Critical Habitats Rule for the gray wolf and determine if it should be revised.

The critical habitat rule protecting the den sites of wolves from disturbance or possible adverse impacts of forest practice activities under the Washington State Forest Practices Act Critical Habitats Rule for threatened and endangered species (WAC 222-16-080) was established in 1992. Since that time, a great deal of information and data on these concerns has been collected on wolves Idaho, Montana, and Wyoming. This information should be used to evaluate whether the rule is still appropriate or changes should be recommended.

10. Conduct research on wolf biology, conservation, and management in Washington.

10.1. Determine wolf population status, pack sizes and distribution, mortality rates and causes, productivity, rates of recolonization, dispersal behavior, and disease/health status in Washington.

Long-term research will be conducted on pack establishment, home ranges and movements of packs and lone animals, diet, habitat use, population dynamics, sources of mortality, diseases, and related topics. Threats to wolves and other factors limiting the reestablishment of populations will be identified. Data from these studies and monitoring efforts will then be used to model the estimated size, viability, and habitat use of the state's wolf population, as well as identify information gaps for additional surveys and research.

Wolf research will rely on extensive radio-collaring of animals and will begin as packs become established within the state. Transmitters with satellite capability will be used whenever possible to obtain continuous monitoring of individuals and packs.

10.2. Determine the genetic relationships of recolonizing and established wolves to assess rates of gene flow, genetic diversity, risk of inbreeding, and possible sources of recolonizing individuals.

10.3. Determine the impacts of wolves on prey and other carnivore populations as wolves become reestablished.

Predator-prey relationships are inherently complex, especially in systems with multiple species of prey and predator, as will be the case with wolves and their ungulate prey in Washington. These studies will require baseline data on prey and carnivore populations prior to wolf recolonization to help assess the impacts of wolves during and after their reestablishment. Such studies should also examine landscape-level effects.

10.3.1. Determine the prey selection of wolves in Washington.

The year-round food habits of wolves will be identified in multiple regions of the state. Elk and/or deer are expected to comprise the vast majority of prey in most locations, but the contribution of other species (e.g., moose, bighorn sheep, mountain goats) is also of interest. Prey selection will likely vary with season, location, and species availability. Age and sex of prey should also be investigated and compared with availability.

10.3.2. Investigate the dynamics of ungulate populations in areas occupied by wolves.

Ungulate populations in areas occupied by wolves will be investigated in greater detail to obtain improved information on abundance, demographic parameters, and sources of mortality. This information will provide a strong foundation for determining the extent that wolves affect prey populations and for making sound management decisions.

10.4. Conduct research on wolf depredation of livestock and domestic animals.

As wolves become reestablished, investigations will be needed on the levels and effects of depredation on livestock and other domestic animals, and the factors influencing depredation. Improved baseline data on depredation levels by other carnivores prior to wolf recolonization will be necessary to assess the impacts of wolves during and after their reestablishment. There is also a strong need to conduct research on non-lethal control methods to reduce wolf depredation on livestock.

10.5. Conduct research on the broader ecological impacts that wolves have on plant and wildlife communities.

As noted at Yellowstone National Park, wolves have the potential to affect ecosystems through regulation of ungulate abundance, thereby benefiting a variety of plants and animals. These types of ecological interactions should be investigated in Washington as wolves become reestablished.

10.6. Determine public attitudes towards wolves and recovery in the state.

Public attitude surveys will be conducted throughout the state to determine current perceptions about wolves and needs for information and education. Follow-up surveys will be made to determine the effectiveness of outreach programs relating to wolves and to make any adaptive management changes needed for the outreach programs.

11. Report on and evaluate implementation of the plan.

11.1. Centralize data collected during the wolf monitoring program.

WDFW will maintain a centralized database of wolf monitoring data and results to ensure accurate and consistent information is shared with wolf co-managers and the public. WDFW maintains a centralized database (Wildlife Resource Data System) and will retain copies of data collected during annual monitoring activities.

11.2. Publish an annual report summarizing information from wolf conservation and management activities.

Because of the intense interest in wolves and the implementation of this plan, WDFW will produce an annual report summarizing all the activities and results of wolf conservation and management that occurred in Washington during the previous year. The first report will be written one year after adoption of this plan. Reports will be similar to those produced by other western states (e.g., USFWS et al. 2008) and will provide summaries of monitoring results with information on population status, distribution, reproduction, population growth, and mortality; documented depredation on domestic animals and management responses; law enforcement; research; outreach; and other activities pertinent to wolves.

The annual report will be available to the public on the WDFW agency website and provided to the Washington Fish and Wildlife Commission, elected officials, and any others requesting copies to keep them informed of Washington's results. Upon request, the Commission and Legislature will be briefed and updated regarding the plan's implementation.

11.3. Evaluate WDFW's effectiveness in meeting the wolf plan goals, objectives, and strategies.

11.3.1. Develop measures to track progress toward meeting the objectives of this plan.

Measures to track progress might include: estimates and trends over time in numbers of successful breeding pairs, packs, and total wolves; distribution of the species in the state; levels of depredation on domestic animals; levels of interactions with humans; and extent of impacts on ungulate populations.

11.3.2. Review the effectiveness of the plan's implementation every five years.

WDFW will evaluate the status of Washington's wolves and the effectiveness of implementing the conservation and management plan every five years, with the first review expected in 2014. Measures identified under Task 11.3.1 will be used to assess progress in implementing the plan's objectives and areas where improvements and adaptive management are needed. The Wolf Interagency Committee (Task 11.4) will be asked to assist with the evaluation.

11.4. Use a Wolf Interagency Committee to help oversee implementation and monitoring of the wolf plan.

The committee could include the following: biologists from the WDFW Endangered and Threatened Species Section, WDFW regions with wolves, USDA Wildlife Services, USFWS, USFS, tribes, National Park Service, and WDNR; WDFW enforcement officers from regions with wolves; a WDFW outreach and education specialist; a WDFW veterinarian; a WDFW research scientist; and WDFW public affairs staff. The committee should prepare an annual report of its findings and contribute to the five-year evaluations assessing the effectiveness of the wolf plan's implementation.

11.5. Form a Citizen Stakeholders Group to provide public feedback on wolf conservation and management.

A citizen stakeholders group will be formed to assist WDFW in assessing and responding to public feedback on implementation of the conservation and management plan. It could include representatives of organizations and other members of the general public interested in wolf conservation and management, and will provide a balanced spectrum for public concerns about wolves. Other public involvement techniques will also be used to encourage people interested in wolves to participate in discussions and have the opportunity to make their viewpoints known.

The stakeholders group should meet at least once a year with the Wolf Interagency Committee to assess conservation activities pertaining to wolves, review depredation control activities, assess the impacts of outreach and education, review problems, and determine needs for new adaptive management procedures.

XIII. BUDGET ESTIMATES FOR IMPLEMENTATION

This section includes very preliminary estimates of the annual costs to WDFW that may be associated with wolf conservation and management in Washington during the first eight years (four state biennial funding cycles). Adequate funding for the implementation of these activities is key to the long-term success of the overall plan.

Implementation of the Wolf Conservation and Management Plan will begin after approval by the Washington Fish and Wildlife Commission. Estimated annual costs to WDFW for implementing the plan over the next eight years are listed in Table 9. Overall program costs are expected to be smaller during the initial years of wolf reestablishment when there are fewer wolves to monitor and few claims for compensation of livestock losses, and are expected to expand over time. Costs are estimated to total about $500,000 per year early in the program, but could expand to about $1,000,000 within a decade.

Costs include two statewide wolf specialist positions that would focus on data collection, monitoring wolves and wolf packs, and managing chronic conflicts in the field. Conflict management will include coordination with WDFW enforcement and USDA Wildlife Services on depredation activities, follow-up activity after WDFW enforcement/USDA Wildlife Services responses to reported depredations, public educational messages, and ensuring consistent messages and responses. These positions will serve as WDFW statewide experts on wolves. WDFW enforcement officers will provide the first line of contact for responding to and investigating wolf depredation reports in areas where wolves are federally delisted. In the first years of wolf recolonization in Washington, WDFW enforcement will need some increased staff support to respond to conflicts, with larger increases as the state's wolf population grows. Research and outreach activities will also require significant amounts of funding. A onetime cost to develop an outreach plan is expected prior to or in the first year of implementation. It should be noted that some conservation groups have expressed a willingness to assist with funding or labor on some of the activities listed in Table 9 (e.g., translocation and monitoring), which would lower overall costs to WDFW.

WDFW will explore the establishment of a memorandum of understanding with USDA Wildlife Services to assist in the management of wolf-livestock conflicts (including evaluation of depredations, implementation of non-lethal deterrents, and conducting lethal control) in areas of Washington that become federally delisted. For areas that remain federally listed, USDA Wildlife Services will remain the lead agency for responding to wolf-livestock conflicts.

Table 9. Estimated annual costs of recovery and management tasks to implement the Washington Wolf Conservation and Management Plan over the next eight years (four state biennial funding cycles).

Task	Comments	Estimated Cost per Year
Coordinate wolf conservation and management	Cost of two WDFW wolf specialist positions specializing in wolf management.	$150,000-250,000
Monitor wolves in Washington	Cost of vehicles and mileage, radio collars, flight time for radio tracking, lab fees, training, and office supplies.	$100,000
Support for enforcement activities	Cost of staff time, plus supplies and travel.	$125,000-250,000
USDA Wildlife Services assistance	Assistance for federally delisted portions of Washington would initially come through a memorandum of understanding. If fulltime support was needed it might include one staff position, with other program costs included.	$10,000-90,000
Compensation funding	Cost expected to be small initially, and increase as wolves become more common.	$6,000-40,000
Develop wolf outreach plan	Onetime cost to write the plan, conduct public attitude surveys, and develop materials.	$50,000 (onetime)
Translocation	Onetime costs to include preparation of a feasibility assessment and SEPA documentation; capture, transport, and release of wolves; and monitoring	$TBD
Implement wolf outreach plan	Cost of full-time staff position, plus supplies, travel, and cost of materials.	$80,000
Research	Research may not be initiated in the first few years. Cost will depend on research topics, cooperators, and state role.	$0-200,000
Total estimated annual costs		$521,000-1,010,000

XIV. ECONOMIC ANALYSIS

This chapter focuses on economic values and impacts associated with wolf conservation and management, with particular emphasis on livestock, hunting, the forest products industry, and wildlife viewing values. The main objectives of the chapter are to describe and assess potential economic impacts (both negative and positive) to specific sectors as wolves become reestablished in Washington.

Values of wildlife are reflected in social attitudes and actions associated with wildlife use and management. Until recently the negative economic impacts of wolves, such as livestock depredation and wild game losses, dominated social perceptions of the species. Yet, economic activities and their relative importance change as social norms and practices change. This chapter provides recent data on a number of pertinent topics, including 1) economic activity in Washington, 2) statewide livestock production, 3) wolf depredation in neighboring states, 4) big game status and hunting in Washington, 5) WDFW license revenues and hunting tag sales, 6) wildlife watching in the state, 7) wolf viewing in other states, and 8) the forest products industry in Washington. This background information comes from many sources, but primarily from economic evaluations of wolf reintroductions in other states (e.g., MFWP 2003, Kroeger et al. 2005, Unsworth et al. 2005, Duffield et al. 2006, 2008), other literature on wolves from elsewhere in the United States, published and unpublished data from WDFW and other state and federal agencies, and interviews and correspondence with state and federal officials, especially state wolf managers in Idaho and Montana, and others such as the president of the Washington Outfitters and Guides Association. Data limitations have required that some information be presented on a broader statewide or subregional basis rather than on a county level, where wolf-related impacts are most likely to be felt.

Both (negative) costs and (positive) benefits that could result from the presence of wolves are included in this discussion. This chapter does not make use of multiplier values because they have not been reliably estimated for many of the economic sectors discussed. Multipliers reflect the total spending impact throughout an economy that can be expected from a specific activity through resulting "ripple effects" or spin-off activities.

A. Washington's Population and Economy

Washington had an estimated human population of 6.49 million people in 2007, which is the second largest of any western state (OFM 2007a, USCB 2007). Seventy-eight percent of the population, or about 5.07 million people, live in western Washington, whereas 22%, or about 1.42 million people, reside in eastern Washington. Total population size has expanded 10.2% since 2000 and is projected to grow another 33% by 2030, reaching 8.64 million people. Current overall human density (97.5 people per square mile) is higher than in any other state in the West aside from California. Average density is substantially higher in western Washington (204.9 people per square mile) than in eastern Washington (34.0 people per square mile). Average human density for the state is expected to reach 129.8 people per square mile by 2030 (OFM 2006a).

Median household income in Washington was $53,439 in 2004-2006, which was 10.9% greater than in the nation as a whole (ERFC 2007a). The state's median household income increased at a faster

rate than the U.S. median in most years since 1996. In 2006, mean per capita personal income for the state was $38,067, which ranked 16th in the nation. Growth in per capita income has increased steadily over the past decade at 3.0% annually and is also above the national average. Total personal income in the state was $243.5 billion in 2006.

Washington ranks fairly high nationally in most categories pertaining to quality of life (ERFC 2007a). It ranks well above the national averages for air and water quality, various health indices, availability and use of state parks and recreation areas, and public library service, and ranks well below the national averages for rates of violent crime, homicide, and amounts of environmental toxins released. However, the state rates relatively poorly for cost of housing in urban areas and funding for the arts. Washington also ranks in the upper half of the country in educational skills and accomplishments of its residents (ERFC 2007a).

B. Livestock Production

A concern about the reestablishment of wolves in Washington is their potential to kill, injure, or stress cattle, sheep, and other domestic animals. Financial losses may result directly from wolf depredation whether confirmed or not, and indirect financial losses may accumulate because of increased management activities or changes to ranching and farming operations. These financial hardships would accrue to individual producers and may be significant to them.

Overview of Livestock Production in Washington

The total value of agricultural production for all crops and livestock in Washington was $6.67 billion in 2006 (NASS 2007a), representing an estimated 2.3% of the state's economic output. Livestock accounted for 23% of the value of all farm products sold (NASS 2007a). Farm income comprised 0.5% of the total personal income in the state (ERFC 2007b).

Production value of cattle and milk totaled $1.28 billion and accounted for 82% of all livestock-related output in Washington in 2006. Estimated inventories of cattle and calves in the state have remained relatively stable at about 1.1-1.2 million head during the past decade (NASS 2004, 2007a). These estimates include both beef and dairy cattle, as well as about 300,000 cattle confined to feedlots. Surveys from 2002, the most recent year for which full data are available, reveal that cattle inventories per county are generally largest in counties along the Cascade Mountains and in the Columbia Basin (Table 10). Most of the state's cattle operations are categorized as extra small (1-49 head; 80% of total), whereas 13% of operations hold 100 or more head (Table 11). The three geographic regions where wolves are most likely to first reestablish (i.e., northeastern Washington, southeastern Washington, and the Cascades) held about 669,000 cattle and 6,100 cattle ranching and farming operations in 2002, or 61% and 63% of the state's totals in these categories, respectively (Tables 11, 12). Within these regions, cattle numbers were largest in Yakima, Whatcom, and Okanogan counties and smallest in Skamania and Chelan counties (Table 10).

Washington's sheep industry is far smaller than its cattle industry, with the statewide production value of sheep and wool totaling $3.9 million in 2006 and accounting for 0.3% of all livestock-related output. Historic sheep production peaked in the early 1900s, when more than 800,000 head were present, but has declined greatly since then. Estimated numbers have fluctuated between 46,000 and 58,000 head during the past decade (NASS 2007a). In 2002, the last year for which full

data are available, sheep inventories totaled 58,000 head statewide and were largest in Yakima, Okanogan, Grant, and Whitman counties (Table 10). Most sheep operations in the state are categorized as extra small (1-24 head; 71% of total), whereas 5% of operations held 100 or more head (Table 11). The three geographic regions where wolves are most likely to first reestablish (i.e., northeastern Washington, southeastern Washington, and the Cascades) held about 35,000 sheep and 960 sheep ranching operations in 2002, or 60% and 56% of the state's totals in these categories, respectively. Among the counties in these regions, sheep numbers were largest in Yakima and Okanogan counties and smallest in Skamania, Pend Oreille, Garfield, Columbia, and Asotin counties (Table 10).

Table 10. Inventories of livestock and farmland in Washington's 39 counties in 2002 (NASS 2004).

	Number of animals					Total farmland (acres)[d]	% of county in farmland
	Cattle[a]	Sheep[b]	Horses	Goats[c]	Llamas		
Washington total	1,100,181	58,470	75,951	23,217	12,701	15,318,008	36.0
Average per county	28,210	1,499	1,947	595	326	392,769	33.0
Northeastern Washington							
Ferry	8,891	511	1,259	9	136	799,435	56.7
Okanogan	43,602	3,490	5,084	925	196	1,241,316	36.8
Pend Oreille	5,001	209	640	D[e]	59	61,239	6.8
Stevens	30,009	2,244	3,437	693	265	528,402	33.3
Average	22,626	1,614	2,605	542	164	657,598	33.4
Southeastern Washington							
Asotin	9,939	537	431	181	5	280,393	69.0
Columbia	5,709	384	326	94	D[e]	294,661	53.0
Garfield	10,520	376	273	51	-	312,425	68.7
Average	8,723	432	343	109	3	295,826	63.6
Columbia Basin							
Adams	36,462	981	508	115	37	1,067,079	86.6
Benton	28,513	2,116	2,434	1,855	144	607,963	55.8
Douglas	11,389	154	742	311	42	878,867	75.4
Franklin	43,745	1,477	1,221	558	143	664,875	83.6
Grant	156,999	3,369	2,929	956	169	1,074,074	62.6
Lincoln	22,706	940	1,412	814	14	1,233,377	83.4
Spokane	25,821	2,430	5,623	1,033	1,306	643,377	57.0
Walla Walla	24,358	1,131	1,356	910	208	700,560	86.2
Whitman	15,721	3,213	908	527	83	1,328,337	96.1
Average	40,635	1,757	1,904	787	238	910,945	76.3
Cascades							
Chelan	1,404	D[e]	836	104	105	112,023	6.0
Clark	16,068	1,993	3,433	1,362	1,396	70,694	17.6
Cowlitz	4,546	824	1,066	117	178	39,582	5.4
King	22,529	1,780	5,227	423	1,054	41,769	3.1
Kittitas	31,415	2,284	3,749	369	6	230,646	15.7

Klickitat	22,719	2,669	1,525	1,429	315	606,794	50.6
Lewis	31,917	1,658	2,891	660	442	130,950	8.5
Pierce	14,090	2,013	4,621	1,146	683	57,224	5.3
Skagit	36,059	766	1,394	403	294	113,821	10.2
Skamania	626	157	142	64	31	5,712	0.5
Snohomish	32,165	1,676	4,907	1,536	584	68,612	5.1
Whatcom	112,417	691	2,350	1,069	408	148,027	10.9
Yakima	230,275	10,786	5,616	3,130	685	1,678,984	61.1
Average	42,787	2,275	2,904	909	475	254,218	15.4
Other Western Washington Counties							
Clallam	5,744	1,071	929	304	493	22,372	2.0
Grays Harbor	10,543	574	808	141	281	53,594	4.4
Island	5,217	388	707	102	846	15,018	11.3
Jefferson	3,306	442	385	110	142	12,274	1.1
Kitsap	1,300	682	1,837	341	323	16,094	6.4
Mason	1,552	188	502	240	75	21,641	3.5
Pacific	7,108	D[e]	321	D[e]	D[e]	51,824	8.7
San Juan	2,333	2,731	347	148	820	17,145	15.3
Thurston	23,928	860	3,639	868	687	74,442	16.0
Wahkiakum	3,535	558	136	104	D[e]	12,386	7.3
Average	6,457	833	961	262	458	29,679	7.6

[a] Includes cattle and calves for both beef and dairy cattle. Total numbers in the state for 2007 were estimated at 1,140,000 head (NASS 2007a).
[b] Includes sheep and lambs. Total numbers in the state for 2007 were estimated at 51,000 head (NASS 2007a).
[c] Includes angora, milk, and meat goats. Total numbers in the state for 2007 were estimated at 33,200 head (NASS 2007a).
[d] Farms are defined as any location from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year.
[e] Figures are withheld in USDA (2004) to avoid disclosing data for individual farming operations.

Other livestock that are vulnerable to wolf predation include goats, llamas, and horses. Inventories of these animals in Washington in 2002 were as follows: horses, nearly 76,000 head, most numerous in Spokane, Yakima, King, and Okanogan counties; goats, about 23,200 head, most numerous in Yakima, Benton, and Snohomish counties; and llamas, 12,700 head, most numerous in Clark, Spokane, and King counties (Table 10). Goats are the only livestock species to have significantly expanded in abundance over the past decade, with numbers more than doubling from 16,000 head in 1997 to 33,200 goats in 2007 (NASS 2004, 2007a). Horses, goats, llamas, and other livestock are kept mainly by hobby owners rather than for commercial production. Statewide sales figures totaled $18.6 million for horses (combined with small numbers of ponies, mules, burros, and donkeys) in 2002 (NASS 2004), but do not exist for goats and llamas. Swine are excluded from this discussion because they have not been depredated by wolves in neighboring states and are therefore not considered at risk.

Many livestock producers in Washington rely entirely on private land for their annual operations, whereas some depend on a combination of private land and public land grazing leases. In these latter cases, animals are typically kept on private land during the winter, with most calving and lambing occurring in late winter or early spring. During the warmer months, livestock are taken to grazing allotments on public lands, many of which occur in more remote locations with rougher topography and natural vegetative cover. Livestock are then gathered in the fall, with young shipped to market and breeding stock returned to private land for winter.

Table 11. Numbers of cattle and sheep operations by size category and geographic region for Washington's 39 counties in 2002 (NASS 2004).

	Numbers of cattle operations[a,b]					Numbers of sheep operations[b,c]				
	Total operations	Extra small (<50 head)	Small (50-99 head)	Medium (100-499 head)	Large (≥500 head)	Total operations	Extra small (<25 head)	Small (25-99 head)	Medium (100-999 head)	Large (≥1,000 head)
Washington total	12,215	9,711	866	1,273	365	1,709	1,221	405	79	4
Percent of total	100%	80%	7%	10%	3%	100%	71%	24%	5%	<1%
Average no. per county	313	249	22	33	9	44	31	10	2	<1
Northeastern Washington										
Ferry	101	72	8	18	3	17	5	11	1	-
Okanogan	451	324	41	59	6	74	44	27	2	1
Pend Oreille	147	123	12	11	1	15	11	4	-	-
Stevens	569	441	66	60	2	53	38	13	1	1
Average	317	240	32	37	3	40	25	14	1	1
Southeastern Washington										
Asotin	101	55	16	27	3	7	4	2	1	-
Columbia	97	73	10	12	2	13	10	3	-	-
Garfield	71	38	11	16	6	11	6	4	1	-
Average	90	55	12	18	4	10	7	3	1	-
Columbia Basin										
Adams	172	114	15	29	14	20	13	4	3	-
Benton	468	422	23	18	5	68	48	15	5	-
Douglas	95	59	10	23	3	7	5	2	-	-
Franklin	211	137	17	32	25	36	17	16	3	-
Grant	516	353	43	82	38	66	41	15	10	-
Lincoln	211	115	37	53	6	28	17	11	-	-
Spokane	649	546	46	52	5	93	77	12	4	-
Walla Walla	239	192	24	18	5	54	41	12	1	-
Whitman	238	165	37	30	6	67	43	20	3	1
Average	311	234	28	37	12	49	34	12	3	-
Cascades										
Chelan	66	57	5	4	-	11	10	1	-	-
Clark	693	648	24	15	6	83	55	24	4	-
Cowlitz	261	247	8	4	2	29	21	6	2	-

King	418	351	19	36	12	89	65	23	1	-
Kittitas	339	242	30	55	12	64	47	15	2	-
Klickitat	267	168	36	58	5	61	43	10	8	-
Lewis	756	645	46	59	6	81	59	19	3	-
Pierce	629	594	17	14	4	90	74	14	2	-
Skagit	402	296	25	63	18	32	25	5	2	-
Skamania	35	30	4	1	-	6	4	2	-	-
Snohomish	561	485	12	45	19	73	51	20	2	-
Whatcom	813	502	66	183	62	58	52	6	-	-
Yakima	916	697	66	88	65	97	78	14	4	1
Average	472	382	28	48	16	60	45	12	2	-
Other Western Washington Counties										
Clallam	186	160	10	15	1	37	27	7	3	-
Grays Harbor	271	233	19	16	3	66	41	15	10	-
Island	166	152	6	4	4	25	20	5	-	-
Jefferson	76	57	10	7	2	11	5	4	2	-
Kitsap	168	166	2	-	-	49	39	10	-	-
Mason	73	65	3	5	-	16	16	-	-	-
Pacific	130	103	13	12	2	2	2	-	-	-
San Juan	81	72	3	6	-	77	41	30	6	-
Thurston	485	439	19	20	7	60	49	11	-	-
Wahkiakum	91	73	7	11	-	12	4	6	2	-
Average	173	152	9	10	2	36	24	9	2	-

[a] Includes cattle and calves for both beef and dairy cattle.
[b] An operation is defined as any location from which $1,000 or more of livestock-related products were produced and sold, or normally would have been sold, during the census year.
[c] Includes sheep and lambs.

About 2.2 million acres in 155 active grazing allotments currently exist on national forests in Washington (Table 12). This coverage represents about 24.0% of all national forest lands in the state. By far the most allotments occur in the eastern Washington and are assigned for cattle. Considerable variation exists in the percent of land designated as allotments within each national forest, ranging from a high of 52.7% in Colville National Forest to 0% in Mt. Baker-Snolqualmie and Olympic National Forests (Table 12). Numbers of active allotments have declined substantially over the past 15 years primarily because of economic and social reasons (W. Gaines, pers. comm.).

Producers can lose livestock to a variety of natural and non-natural causes, including disease, weather, birthing problems, and predation. In Washington, death losses from all causes totaled 44,000 cattle and calves in 2005 and 5,000 sheep and lambs in 2004 (Table 13). These represented 4.1% of all cattle and calves and 10.9% of all sheep and lambs raised in the state. Ninety-four percent of cattle and calf death losses were non-predator related and were valued at $28.7 million (Table 13). For sheep and lambs, 54% of death losses were non-predator related and were valued at $293,000. Predators (primarily coyotes and cougars) killed an estimated 2,500 cattle and calves worth $1.53 million and 2,300 sheep and lambs worth $192,000 (Table 13).

Wolf Depredation on Ranch Animals

Background information on this topic appears in Chapter IV, Sections A and B.

Compensation Programs for Wolf-Related Losses and Deterrence

Several compensation programs currently exist or are under consideration in the western United States to help producers recover some of the costs associated with wolf predation. These are described in Chapter IV, Section C.

Economic Concerns of Washington's Ranching Industry over Wolves

The reestablishment of wolves in Washington could affect some ranchers living in or near wolf-occupied areas through impacts to their livestock and/or property management (Unsworth et al. 2005). Concerns about possible economic impacts that have been expressed by ranchers include:

1) Depredation of ranch animals, including possible deaths and injuries of cattle, sheep, dogs, and other ranch animals resulting from wolf attacks.

2) Non-lethal physiological impacts on ranch animals, including possible weight loss, stress, and lower birth rates in ranch animals resulting from the presence of wolves nearby.

3) Changes in forage use, if ranchers needed to move livestock more often or had to move them to alternative grazing sites to avoid depredation.

4) Need for additional labor, if they had to increase supervision of ranch animals and invest time in reporting depredation losses.

Table 12. Numbers and acreages of active grazing allotments by livestock category on national forests in Washington in 2004-2007 (J. Begley, U.S. Forest Service, unpubl. data)[a].

National Forest	Cattle		Sheep		Unassigned by species		Total		Percent of National Forest[b]
	No.	Acreage	No.	Acreage	No.	Acreage	No.	Acreage	
Okanogan	69	770,563	-	-	1	11,427	70	781,990	45.1
Colville	52	714,990	-	-	1	2,333	53	717,323	52.7
Wenatchee	14	147,937	10	266,108	-	-	24	414,045	16.4
Gifford Pinchot	3	188,531	-	-	-	-	3	188,531	13.8
Umatilla	5	85,010	-	-	-	-	5	85,010	27.3
Total	143	1,907031	10	266,108	2	13,760	155	2,186,899	-

[a] Two other national forests, Mt. Baker-Snolqualmie and Olympic, no longer have active grazing allotments.
[b] Allotment coverage as a percent of the total land area of each National Forest. For Umatilla National Forest, this represents land coverage within Washington only.

Table 13. Annual death losses of livestock from different causes and their monetary values for Washington in 2004-2005 (NASS 2005, 2006).

Causes of losses	Cattle[a,b]	Calves[a]	Sheep[a]	Lambs[a]
Non-predator losses (no. of head)				
Digestive problems	4,000	5,200	200	100
Respiratory problems	3,000	8,500	200	200
Metabolic Problems	2,600	300	100	100
Mastitis	1,400	-	-	-
Other diseases	1,200	400	-	-
Calving/lambing problems	1,300	3,200	200	-
Lameness/injury	2,400	300	-	-
Weather-related	300	800	-	-
Old age	-	-	800	-
Theft	300	-	-	-
Poisoning	100	-	-	-
Other non-predator[c]	1,400	700	400	100
Unknown non-predator[d]	2,100	2,000	200	100
Total non-predator losses	20,100	21,400	2,100	600
Value of all non-predator losses ($)	20,703,000	8,025,000	258,000	35,000
Predator losses (no. of head)				
Coyotes	-	600	500	1,000
Dogs	-	-	100	300
Cougars and bobcats	200	600	200	-
Bears	-	-	-	100
Other predators	300	300	100	-
Unknown predators[e]	400	100	-	-
Total predator losses	900	1,600	900	1,400
Value of all predator losses ($)	927,000	600,000	111,000	81,000
Losses from all causes (no. of head)	21,000	23,000	3,000	2,000
Value of all losses ($)	21,630,000	8,625,000	369,000	116,000

[a] Data for cattle and calves are from 2005; data for sheep and lambs are from 2004. Cattle include beef and dairy cattle as well as cattle in feedlots.
[b] Cattle are defined here as all cows, bulls, steers, and heifers weighing over 500 pounds.
[c] Includes accidents, fire, starvation, dehydration, etc.
[d] Exact cause of death was unidentifiable.
[e] Species of predator was not determined.

5) Increased expenditures on supplies, including purchasing of replacement stock and proactive non-lethal control measures, such as herding and guarding dogs, fencing, fladry, and noise deterrents, as well as increased wear on vehicles and fuel use.

6) That ranches affected disproportionately by wolves might go out of business or experience reduced market values.

Additionally, positive impacts could result from wolf presence. These could include reducing populations of coyotes and other predators, thereby reducing predation on livestock by those species. Improved forage conditions for livestock could result if elk and deer populations were redistributed off ranch properties by wolves; however, if elk and deer were moved onto grazing land by wolf presence, then there could be negative impacts to livestock forage availability.

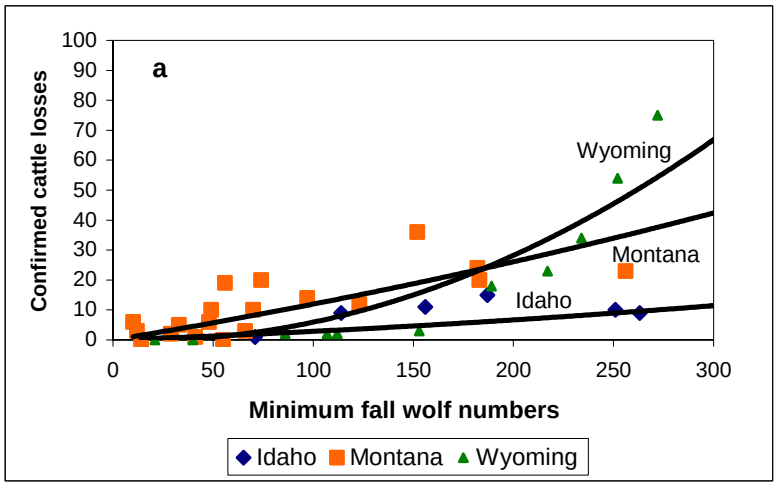
Predicted Losses of Ranch Animals in Washington Due to Wolves

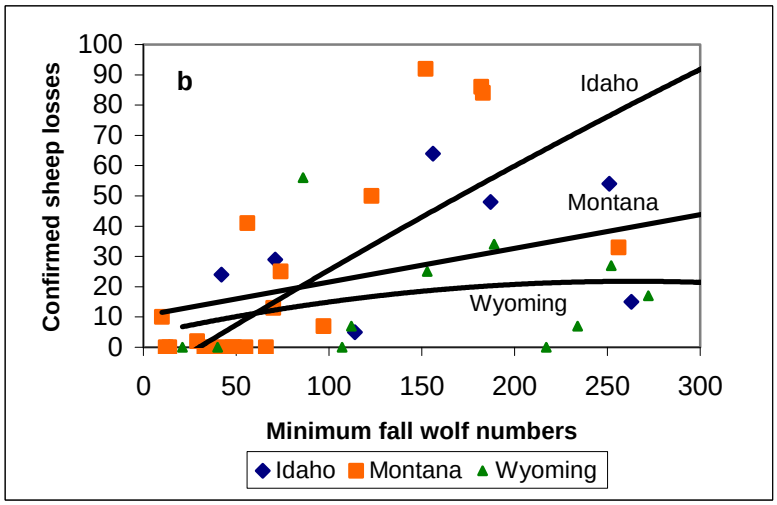
Predicting the numbers of ranch animals that might be killed annually in Washington as wolves become reestablished is difficult because of the many uncertainties over where and how many wolves will eventually inhabit the state, the frequency that they will interact with livestock, problems in determining actual versus confirmed numbers of livestock killed, and ongoing improvements in the adaptive management responses of ranchers and wildlife agencies. Nevertheless, this section presents some rough estimates of confirmable losses and their monetary value that might be expected to occur based on analyses of depredation data from Idaho, Montana, and Wyoming for 1987 to 2007 (Table 3). To obtain these estimates, separate regression lines were fitted to the loss data for cattle, sheep, and dogs from each state (Figure 12). Low and high estimates of losses for Washington were then derived for four population size categories (50, 100, 200, and 300) of wolves using the shallowest and steepest of the three regression lines for Idaho, Montana, and Wyoming, respectively. These population size categories roughly correspond to the following numbers of packs and successful breeding pairs, as described in Table 14: 50 wolves, 5-8 packs, and 5-7 successful breeding pairs; 100 wolves, 9-16 packs, and 8-13 successful breeding pairs; 200 wolves, 18-33 packs, and 12-21 successful breeding pairs; 300 wolves, 27-49 packs, and 19-34 successful breeding pairs.

The projections of depredations presented here assume that interactions between livestock and wolves in Washington will be similar to those in neighboring states. However, this assumption must be viewed cautiously because of differences in livestock numbers (especially sheep) and distribution, husbandry practices, availability of natural prey, land use, and human densities. In addition, these projections represent average expected losses per year and do not demonstrate the annual variation in depredations that commonly occurs in Idaho, Montana, and Wyoming.

Low and high predictions of confirmable annual losses of ranch animals for Washington are presented in Table 14 for each of four population size categories of wolves. Total populations of 50 and 100 wolves are expected to depredate very small numbers of livestock. Fifty wolves may kill about 1-6 cattle and 7-16 sheep per year, with annual take perhaps doubling for 100 wolves. Larger wolf populations will likely kill greater numbers of livestock, with projections of 6-28 cattle and 20-60 sheep killed annually by 200 wolves, and 12-67 cattle and 22-92 sheep killed annually if 300 wolves became reestablished (Table 14). However, sheep losses are expected to be on the low end

Figure 12. Relationships between confirmed losses of (a) cattle, (b) sheep, and (c) dogs and minimum fall wolf numbers in Idaho, Montana, and Idaho through 2007 (plotted from data in Table 3).





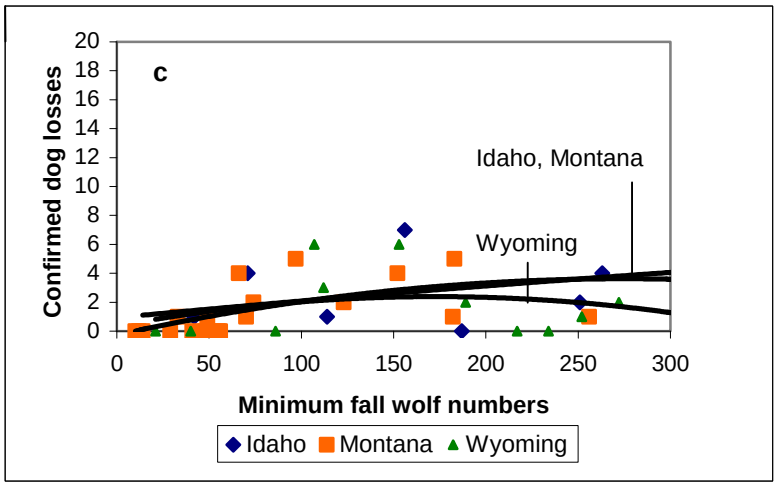


Table 14. Projected numbers of packs, successful breeding pairs, lone wolves, and annual levels of confirmed depredations of livestock and domestic dogs and their estimated monetary values (in current dollars for 2007) for four different population size categories of wolves in Washington. Because of the absence of biological and depredation data on wolves living in Washington, numbers presented here should be considered as very rough approximations.

	Population size category			
Number of wolves present[a]	50	100	200	300
Estimated no. of packs[b]	5-8	9-16	18-33	27-49
Estimated no. of successful breeding pairs[c]	5-7	8-13	12-21	19-34
Estimated no. of lone animals[d]	5-8	10-15	20-30	30-45
Estimated no. of confirmed cattle depredations per year[e]	1-6	2-12	6-28	12-67
Total value of losses per year[f]	$1,120-6,720	$2,240-13,440	$6,720-31,360	$13,440-75,040
Estimated no. of confirmed sheep depredations per year[e]	7-16	14-35	20-60	22-92
Total value of losses per year[f]	$960-2,190	$1,920-4,795	$2,740-8,220	$3,010-12,600
Estimated no. of confirmed horse and other livestock depredations per year[e]	0-1	0-1	0-2	0-2
Total value of losses per year[f]	$0-1,775	$0-1,775	$0-3,550	$0-3,550
Estimated no. of confirmed dog depredations per year[e]	1-2	2	2-3	1-4
Total value of losses per year[f]	$625-1,250	$1,250	$1,250-1,875	$625-2,500
Total value of all confirmed losses per year	$2,705-11,935	$5,410-21,260	$10,710-45,005	$17,075-93,690

[a] Includes animals living in packs and alone.
[b] Number ranges are based on averages of 5.5 and 9.3 wolves per pack in Montana and the greater Yellowstone area, respectively (see Chapter II).
[c] Number ranges are based on the ratio of successful breeding pairs to packs in Idaho during periods of similar population size (USFWS et al. 2007:110). Successful breeding pair numbers are typically smaller than pack numbers because of the logistical difficulties in confirming breeding for all packs, especially as pack numbers become larger. The estimates presented here assume that the same monitoring effort will be expended in Washington as in Idaho.
[d] Number ranges are based on lone wolves comprising 10-15% of most populations (Fuller et al. 2003).
[e] Numbers represent the estimated confirmed numbers of livestock and dogs killed annually by different sizes of wolf populations. Confirmed losses are those determined by USDA Wildlife Services, WDFW, or another authorized entity. Unconfirmed kills are excluded from these estimates.
[f] Numbers represent the combined estimated monetary value of all losses annually per category in current dollars for 2007. Average values per species are described in the text.

of these estimates because sheep numbers are much smaller in Washington than in Idaho, Montana, and Wyoming (see NASS 2004). Even at a population of 300 wolves, these levels of depredations represent 4% or less of the annual predator-caused death losses experienced by Washington cattle and sheep producers. Depredations on horses, other livestock, and guarding/herding dogs are expected to be minor for each of the four wolf population size categories.

The annual monetary worth of ranch animals confirmed as being killed by wolves in Washington is estimated in Table 14. To determine this value, average monetary values (in current dollars for 2007) of livestock and dogs were assigned as follows:

- **Cattle** - $1,120 per head, based on the average value of cattle sold across all size and weight classes in Washington (NASS 2007c). This represents the earning potential of the animal rather than its value at the time of death.

- **Sheep** - $137 per head, based on the average value of sheep sold across all size and weight classes in Washington in 2007 (NASS 2007c). This represents the earning potential of the animal rather than its value at the time of death.

- **Horses** - $1,775 per animal, based on an average value in 2004 of $1,620 for ranch horses reported by Unsworth et al. (2005) and converted to current dollars for 2007.

- **Dogs** - $625 per animal, based on the approximate cost of a 6-month-old guarding dog (Great Pyrenees, Akbash, or Great Pyrenees-Akbash cross) in Idaho, Montana, and Wyoming in 2008 (J. Timberlake, Defenders of Wildlife, pers. comm.).

For smaller populations of 50 and 100 wolves, the annual monetary value of confirmed losses of livestock and ranch dogs is expected to range from about $2,700-11,900 and $5,400-21,300, respectively. Monetary losses are expected to increase as wolf populations become larger and are projected to reach an estimated $17,075-93,690 for about 300 wolves. As noted above, these values are probably slightly overestimated because sheep losses are expected to be at the lower end of the range of estimates presented here. Overall, most of the monetary value of losses is expected to result from cattle deaths, especially when larger wolf populations are present.

Physiological Impacts on Livestock

In addition to depredation, the presence of wolves near livestock may cause behavioral changes in livestock that result in physical effects. Livestock may lose weight because wolves force them away from suitable grazing habitat and water sources or because of greater energy expenditures due to wolf-related agitation. These problems may also lower birthrates by reducing conception levels and causing miscarriages. Although these outcomes are possible, their occurrence has not yet been verified under field conditions. These same problems can result from other causes, such as poor forage or weather conditions, making it difficult to measure the true impacts of wolves. Because of these uncertainties, this analysis does not attempt to quantify the economic impacts of such outcomes.

Changes in Grazing Practices

Some ranchers may feel compelled to modify their grazing practices in an effort to avoid problems with wolves. This could involve herding or hauling livestock to different portions of grazing allotments, which in some instances may result in penalties from land management agencies for violating allotment grazing plans. Avoidance of wolves may lead some ranchers to bring livestock off the range prematurely or to provide supplemental feeding to delay turn-out. Estimates of the extent and frequency of these activities do not exist for other areas with wolves, such as Idaho,

Montana, and Wyoming. Therefore, this analysis does not attempt to quantify the economic impacts of modifying grazing activities in response to the reestablishment of wolves in Washington.

Need for Additional Ranch Labor

Ranchers and their employees frequently spend additional time managing livestock operations to avoid depredations by wolves. This can include increased supervision of herds, moving livestock to different grazing areas, implementing non-lethal techniques to reduce conflicts, treating injured livestock, and checking animals for pregnancy that may have aborted due to wolves (Unsworth et al. 2005). These activities may require that less time be spent on other important activities such as ranch maintenance and improvement. Some ranchers may hire additional employees specifically to herd livestock when wolves are in the area. Estimates of the extent and frequency of these types of responses are not available for neighboring states. Therefore, this analysis does not attempt to quantify these future costs for Washington.

To receive compensation for depredations, ranchers also spend time contacting wildlife agents, waiting for them to inspect a kill, completing the necessary paperwork, and conducting any further correspondence or negotiations to ensure payment. Thompson (1993) estimated that for each confirmed and probable kill, this process required an average of 10 hrs of time by a rancher or an employee. Based on hourly wage rates of $11.07 for livestock workers in Washington (NASS 2007b), each confirmed or probable wolf kill would require that a rancher spend on average $110 preparing compensation claims. However, this figure is an underestimate for two reasons (Unsworth et al. 2005). First, it does not consider the higher wages of ranch managers, who are probably more likely to fill out compensation claims. Second, it does not consider time spent by ranchers investigating unconfirmed kills, although these would require less time because they do not qualify for compensation and therefore do not result in claims being filed.

Additional Expenditures on Ranch Supplies

Some ranchers may devote extra resources to protecting their livestock from wolves. Non-lethal control methods may require the purchasing of fencing, non-lethal munitions, electronic hazing devices, fladry, or other equipment (Bangs et al. 2006, Shivik 2006), as well as additional herding and guarding dogs and associated supplies. Increased efforts to inspect livestock on ranges with wolves, haul livestock to different grazing sites, and remove livestock carcasses likely require greater use of fuel and increased wear on ranch vehicles. Ranchers may need to buy camping equipment to outfit herdsmen or range riders for remaining on the range with livestock. Livestock agitated by wolves may damage fencing, which then needs to be repaired. Cost estimates for these types of expenditures do not exist for other areas with wolves, such as Idaho, Montana, and Wyoming. Therefore, this analysis does not attempt to calculate the economic costs for material acquisitions and costs.

Property Value Impacts

Some ranchers believe that ranches disproportionately affected by wolf depredation may be forced out of business and that the market values of ranches experiencing wolf impacts will be reduced because of the perception that these properties are of lower desirability (Unsworth et al. 2005). There is no confirmed evidence of either of these situations occurring in Idaho, Montana, or

Wyoming (S. Nadeau, IDFG, pers. comm.; C. Sime, MFWP, pers. comm., M. Jimenez, WGFD, pers. comm.), therefore neither is expected to occur in Washington. Furthermore, the presence of wolves has not resulted in the implementation of any endangered species-related restrictions on the uses of private land in Idaho, Montana, or Wyoming that might result in lowered land values. Such restrictions are also not expected to occur in Washington.

Positive Impacts from Wolf Reestablishment

Most of the potential economic impacts from wolves represent costs to ranchers and farmers. However, wolves may also benefit some livestock operations by reducing the abundance of coyotes, thereby lowering coyote predation on livestock. Coyotes were responsible for 40% of the confirmed calf death losses (valued at $225,000), 56% of the sheep death losses ($62,000), and 71% of the lamb death losses ($58,000) in Washington in 2004 or 2005 (Table 13). A second possible benefit could come from wolves redistributing elk and deer on ranchlands and grazing allotments, potentially resulting in reduced use of grass and other forage and thereby leaving more food for livestock. Both of these scenarios have been detected in natural habitats at Yellowstone National Park (see Chapter VI) and could possibly occur in Washington. However, neither benefit has been quantified in economic terms for any location, making it difficult to place a value on these benefits. Many coyote-caused losses probably occur in parts of the state that are unlikely to be recolonized by wolves. The benefits from these two impacts would probably be localized and relatively minor.

Summary

Reestablishment of wolves in Washington will likely result in differing costs for livestock producers living in or near occupied wolf range, with some producers more affected than others. Financial impacts to individual producers will depend not only on the numbers of depredations experienced but also on non-lethal physiological impacts on livestock, increased expenditures on ranch supplies, and additional labor needs. This analysis provides cost approximations only for confirmed losses of ranch animals and time spent preparing compensation claims. For populations of 50-300 wolves, these costs together could range from several thousand dollars to possibly more than $90,000 annually for producers as a whole in the state. Costs of other impacts are not quantified in this analysis due to a lack of adequate information. These costs would be partially offset by compensation payments for confirmed and probable wolf-caused livestock deaths through the Defenders of Wildlife's Bailey Wildlife Foundation Wolf Compensation Trust for areas where wolves remain federally listed or other sources, such as the state of Washington. The Bailey Wildlife Foundation Proactive Carnivore Conservation Fund, also operated by Defenders of Wildlife, will remain available to help defray the costs of non-lethal deterrents for small numbers of producers in Washington if federal delisting occurs. In addition, there may be a state compensation program developed in Washington in the future.

Wolf numbers between 50 and 100 animals should pose little detriment to the state's livestock industry as a whole. At these population levels, the vast majority of producers will probably experience few if any annual costs, whereas a few individual producers could be more affected. As wolf populations become larger and more widely distributed, financial impacts are likely to accrue to more producers.

C. Big Game Hunting

Healthy and abundant prey populations are important for maintaining hunting opportunities that contribute to many local economies in Washington, especially in more rural regions. The challenge for wildlife managers is to manage for healthy ungulate population levels that also sustain wolves, other carnivores, harvest opportunities for the public, and subsistence and ceremonial needs of treaty tribes.

Big Game Hunting Statistics for Washington

Hunting, especially for big game, is an important recreational activity in Washington. The 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, which is based on household interviews nationwide, estimated that 187,000 residents of Washington, or 3.8% of the state's population aged 16 years old and older, were hunters (for either big or small game, or both; USFWS and USCB 2008). This is below the national average of 5.5% of the population aged 16 years and older. An estimated 182,000 hunters hunted in Washington in 2006, with an estimated 179,000 residents and 3,000 non-residents participating. Hunters spent nearly 2.13 million days hunting for all species in the state in 2006. Washington residents spent an additional 285,000 hunting days, or 12% of their total effort, hunting outside of the state. These numbers are slightly lower than those derived from WDFW's data files, which indicate that about 196,000 residents and 4,900 non-residents bought hunting licenses, special permits, and special hunt applications in 2006. However, these figures include buyers who did not actually participate in hunting during the year.

Big game hunting represents some of the most highly valued hunting in Washington, with an estimated 90% of hunters hunting ungulates and large carnivores in 2006 (USFWS and USCB 2008). By comparison, only an estimated 23% and 11% of hunters sought small game and migratory birds, respectively. Seventy-nine percent of total hunter days involved big game hunting, 14% small game hunting, and 7% migratory birds in 2006.

Deer and elk hunting are the predominate forms of big game hunting in Washington, both in terms of the number of hunters participating and total days spent hunting. Numbers of deer hunters and deer hunting days have averaged about 141,500 and 845,000 per year, respectively, during the past decade (WDFW 1997-2006). Despite some sizeable yearly increases and decreases, deer hunter numbers remained almost stable (increase of 0.7%) from 1997 to 2006, whereas hunting days decreased 18.8% (Figures 13, 14). Deer harvest has remained robust, averaging 38,100 deer annually during the past decade, which included a 47% increase from 1998 to 2004 (Figure 15). Hunter success rates (i.e., combined for general and special permit seasons, all weapon types, and antlered and antlerless harvest) closely tracked harvest trends during this decade, with success averaging 27.0% and strongly increasing from 1998 (20.3%) to 2004 (30.4%) (Figure 15). Annual harvest data for each type of deer are available only from 2001 to 2006, when an average of 14,082 black-tailed deer, 13,709 white-tailed deer, and 12,584 mule deer were killed per year. During the past decade, combined deer harvests were highest in WDFW's eastern (30% of the statewide harvest) and southwestern (25%) regions, and lowest in the south-central (9%) and North Puget Sound (6%) regions (Figures 16, 17).

For elk, numbers of hunters and hunting days have averaged about 74,400 and 412,400 per year, respectively, during the past decade in Washington. Both figures have shown net increases of 15.4%

and 19.0%, respectively, during this period, although both have been in gradual decline since 2000 (Figures 13, 14). Despite these declines, elk harvest has remained strong, averaging 7,390 animals annually over the past decade. Harvests were lowest in 1997 (4,919 elk) and 1998 (5,858 elk), but have varied between about 7,100 and 8,700 animals since then, with a 48.6% increase occurring between 1998 and 2003 (Figure 15). Overall hunter success rates (i.e., combined for general and special permit seasons, all weapon types, and antlered and antlerless harvest) tracked harvest trends during this decade, with success averaging 10.1% overall and increasing from an average of 8.4% in 1997-1999 to an average of 10.8% in 2000-2006 (Figure 15). Elk harvests were highest in WDFW's south-central (37% of the statewide harvest) and southwestern (37%) regions, and lowest in the North Puget Sound (2%) and north-central (1%) regions (Figures 16, 17).

Hunting opportunities for moose, bighorn sheep, and mountain goats in Washington are far more limited than for deer and elk. All three species are hunted only through special permit drawings, with fewer than 100 licenses issued annually for each (Figure 18). Numbers of licenses issued since 1997 have increased for moose and sheep, but have decreased for goats. Numbers of hunter days per species are also small, totaling fewer than 900 days per year for moose with an increasing trend over the past decade, fewer than 300 days per year for goats and declining, and fewer than 200 days per year for sheep and increasing (Figure 19). During the past decade, annual harvests have numbered fewer than 100 moose and are increasing, fewer than 40 sheep and are increasing, and fewer than 40 goats and are decreasing (Figure 20). Hunter success rates have reached 80-100% for all three species in nearly every year since 1997 (Figure 21).

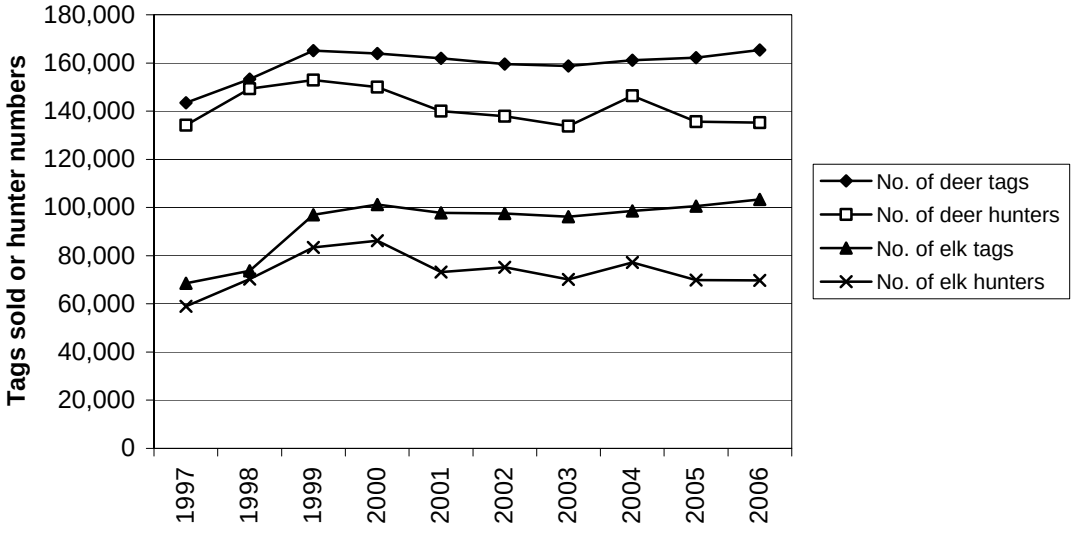


Figure 13. Trends in numbers of tags sold and hunters participating in general deer and elk seasons (all weapons) statewide in Washington, 1997-2006.

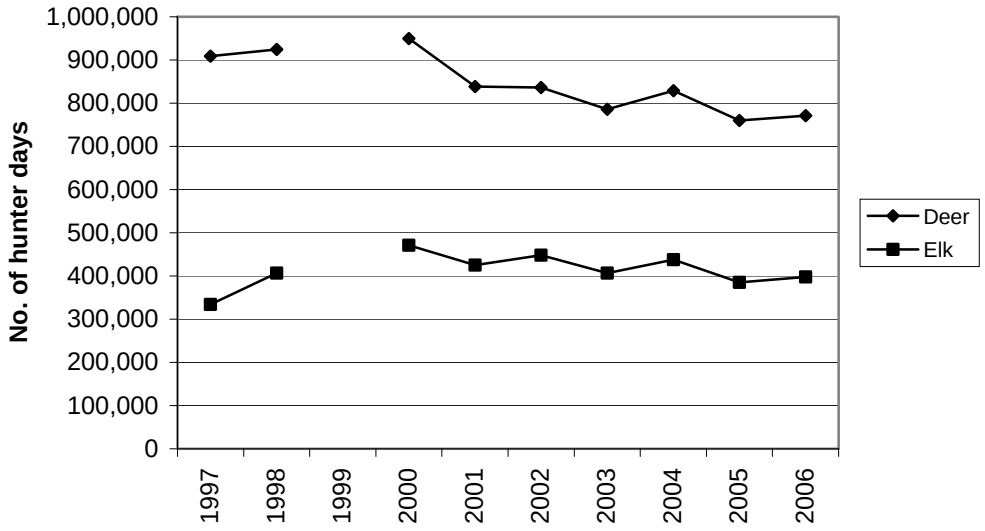


Figure 14. Trends in numbers of hunter days during general deer and elk seasons (all weapons) statewide in Washington, 1997-2006 (excluding 1999).

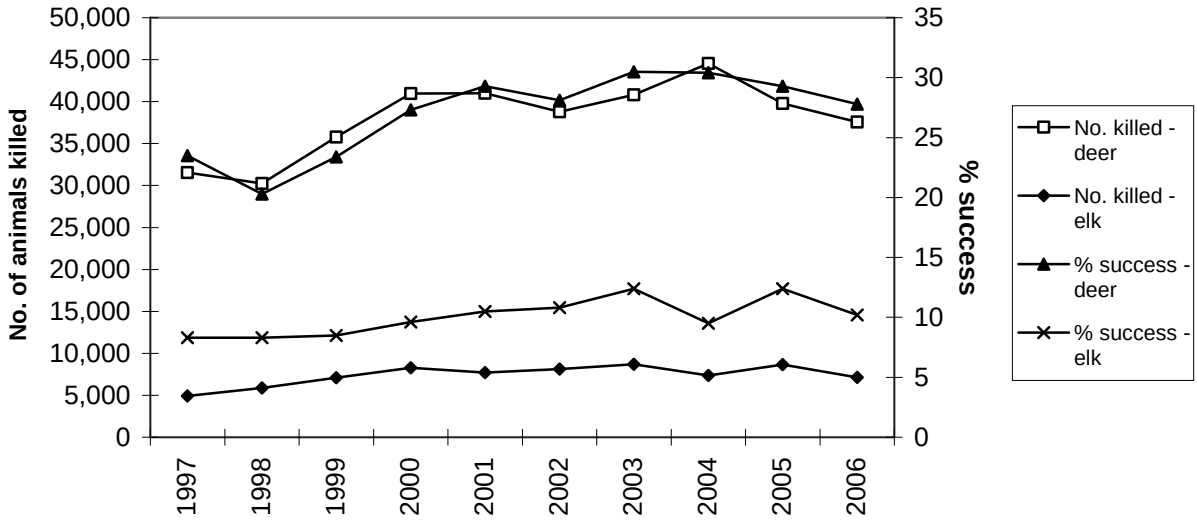


Figure 15. Trends in statewide numbers of deer and elk killed and hunter success during general and permit seasons (all weapons) combined in Washington, 1997-2006.

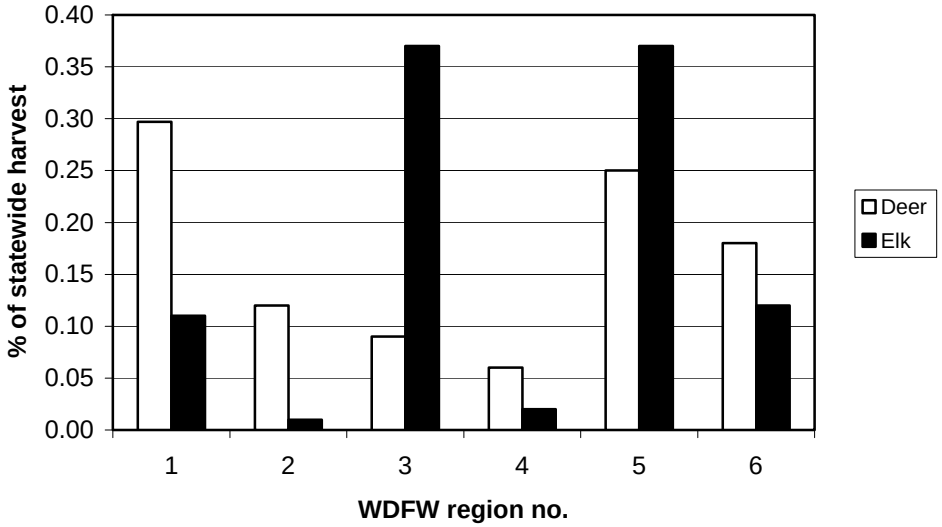


Figure 16. Percent of statewide deer and elk harvest (all weapons) according to WDFW region number, 1997-2006. Region boundaries are depicted in Figure 17.

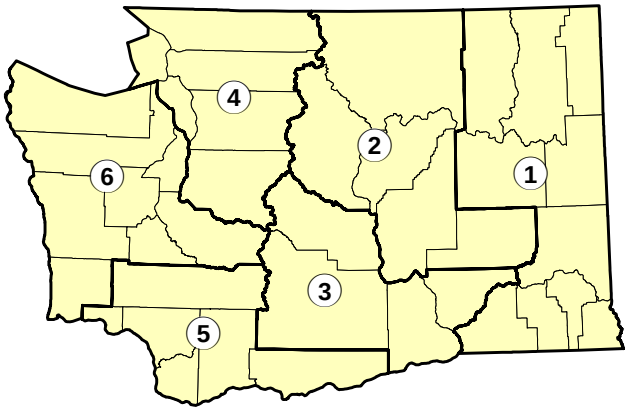


Figure 17. Map of WDFW's six administrative regions. Map numbers correspond to designated region numbers.

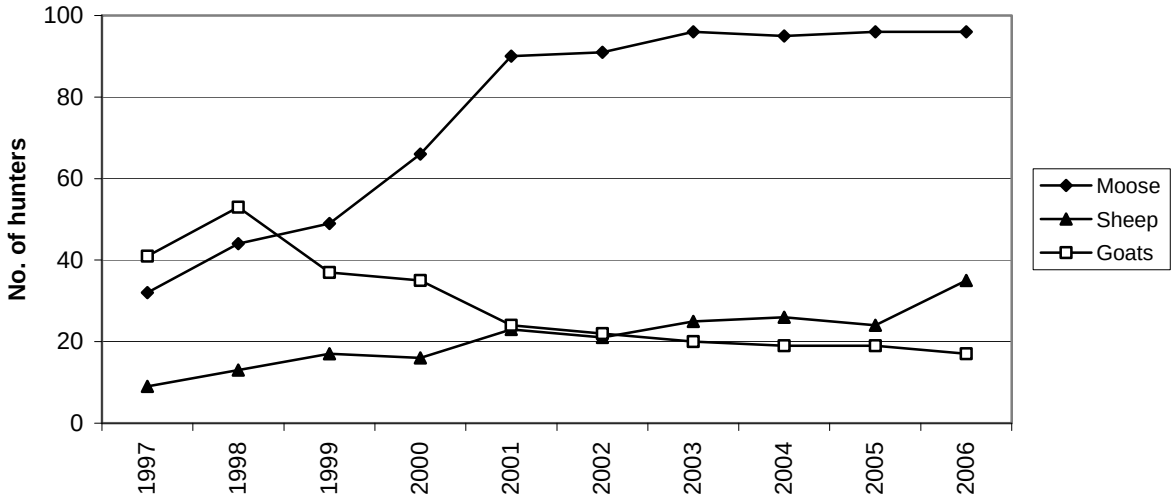


Figure 18. Trends in hunter numbers for moose, bighorn sheep, and mountain goats in Washington, 1997-2006.

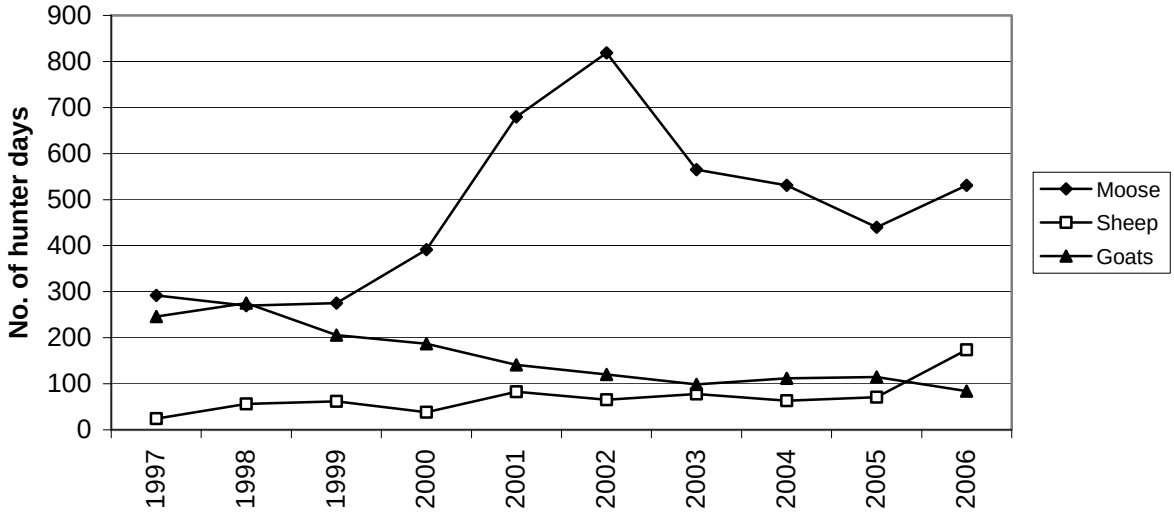


Figure 19. Trends in numbers of hunter days for moose, bighorn sheep, and mountain goats in Washington, 1997-2006.

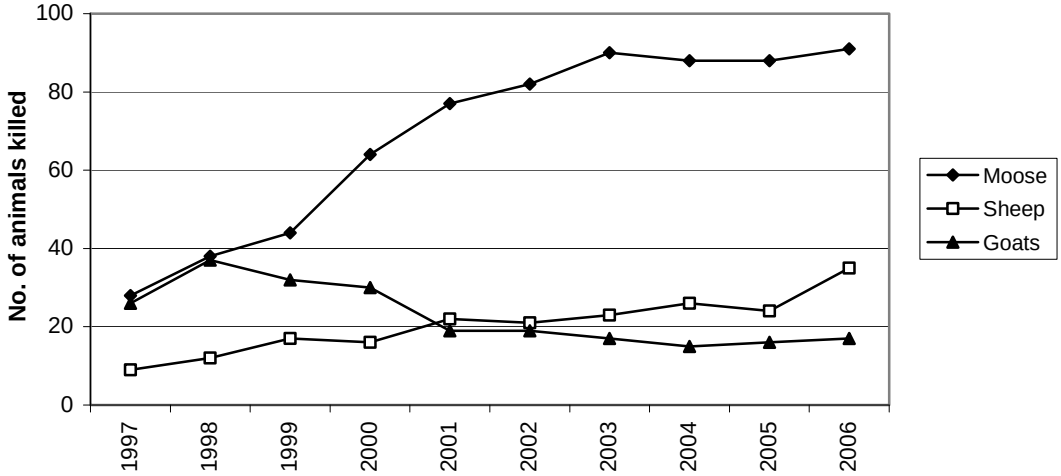


Figure 20. Trends in hunter harvest of moose, bighorn sheep, and mountain goats in Washington, 1997-2006.

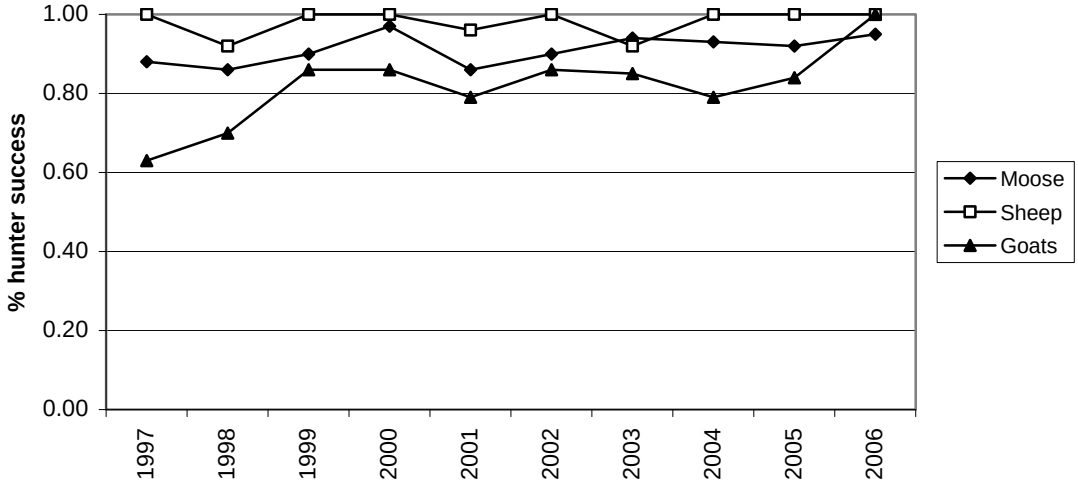


Figure 21. Trends in hunter success for moose, bighorn sheep, and mountain goats in Washington, 1997-2006.

Hunter Expenditures in Washington

Washington's hunting community spent an estimated $313 million annually on hunting-related expenses in 2006 (Table 15; USFWS and USCB 2008). This corresponds to an average of $1,598 per hunter per year or about $147 per hunter day. Equipment and trip-related costs accounted for about 60% and 24% of all expenses, respectively (Table 15). Hunting-related expenditures in 2006 were strongly skewed toward big game (86% of total expenditures), with smaller amounts for small game (5%), migratory birds (4%), and others (USFWS and USCB 2008).

Washington attracts few out-of-state hunters compared with nearby states. Non-resident hunters comprise fewer than 2% of the hunters and about 0.1% of the hunter days expended in Washington, whereas in 10 other western states (excluding California and Hawaii), non-residents comprise on average 28% (range = 8-51%) of the hunters and 20% (range = 3-48%) of the hunter days expended (Figure 22; USFWS and USCB 2007). Washington's non-resident license fees are competitive with other states and the state has no special restrictions limiting the number of out-of-state hunters. However, out-of state big-game hunters are more likely to visit other western states such as Idaho, Colorado, Wyoming, and Montana, where larger ungulate populations, land mass, and lower human populations allow for more opportunity, higher success rates, and better overall hunting value. As a result, non-resident hunters contribute less to Washington's economy than they do to other western states' economies.

Table 15. Estimated total expenditures by hunters and average expenditures per hunter for all types of hunting combined in Washington in 2006 (from USFWS and USCB 2008).

Category of expenditure	Total amount	Average amount per hunter[a]
Food and lodging	$33,083,000	$169
Transportation	36,528,000	186
Other trip costs (land use fees, guide fees, heating and cooking fuel, other)	4,622,000	24
Total trip related	74,233,000	379
Hunting equipment (guns, ammunition, bows, dogs, other)	66,625,000	340
Auxiliary equipment (clothing, processing and taxidermy, optics, camping equipment, other)	44,120,000	225
Special equipment (boats, campers, cabins, trail bikes, other)	77,994,000	398
Total equipment	188,739,000	963
Other items (land leasing and ownership, licenses, other)	50,163,000	256
Total expenditures	$313,134,000	$1,598

[a] Based on an estimated total of 196,000 resident and non-resident hunters hunting each year in Washington. This number presumably includes some people who spent money on hunting activities and equipment, but did not actually hunt.

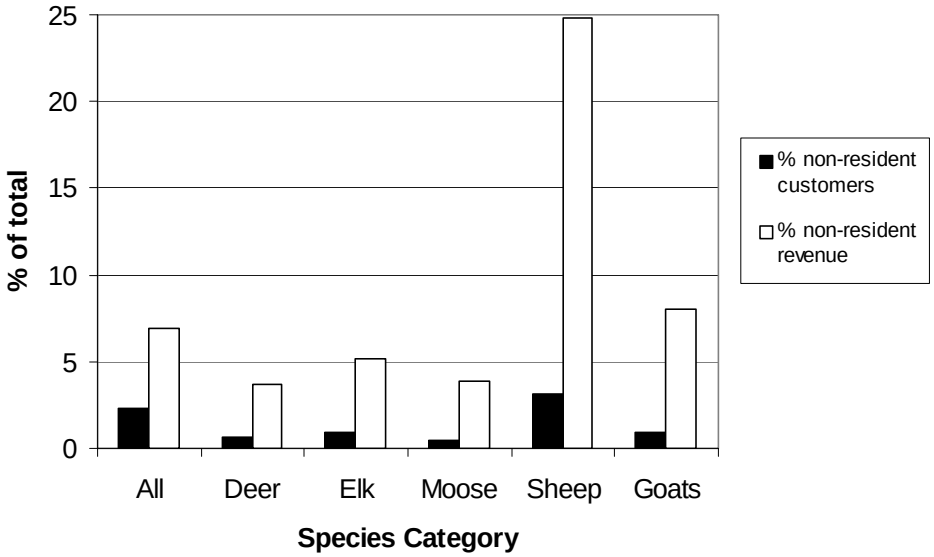


Figure 22. Representation of non-resident hunters as a percentage of total hunting customers in Washington and their contribution to WDFW hunting revenues, according to species and averaged for fiscal years 2002-2007. Customers are defined as anyone buying a hunting license or applying for a special permit, with no individual counted more than once. Some customers may not have hunted during the year. Revenue figures are based on fees collected for licenses, permits, and applications, but exclude monies from auctions and raffles.

Hunting Revenue for WDFW

Revenues generated by WDFW's hunting program totaled about $13.3 million in fiscal year 2007 and have expanded 9.8% (without adjustments for inflation) since 2002 (Figure 23). License and other sales involving deer and elk are the two largest sources of hunting-related revenue for the agency and have also gradually increased since 2002 (6.8% for deer, 11.4% for elk; Figure 23). The existence of multi-species combination licenses makes it difficult to determine revenue generated by each species, but estimates based on the full cost of each license type involving these species indicate that deer hunting provides WDFW with more revenue than elk hunting (Figure 23). Revenues associated with both species have gradually increased since 2002. The agency derives considerably smaller amounts of revenue from the hunting of bighorn sheep, moose, and mountain goats (Figure 24). Revenues have been expanding for each of these species since 2002, especially for sheep.

About 7% of total WDFW hunting revenues comes from non-resident hunters (Figure 22). For big game species, non-resident hunters contribute about 4% (for deer and moose) to 25% (for bighorn sheep) of the hunting revenues gathered per species by the agency.

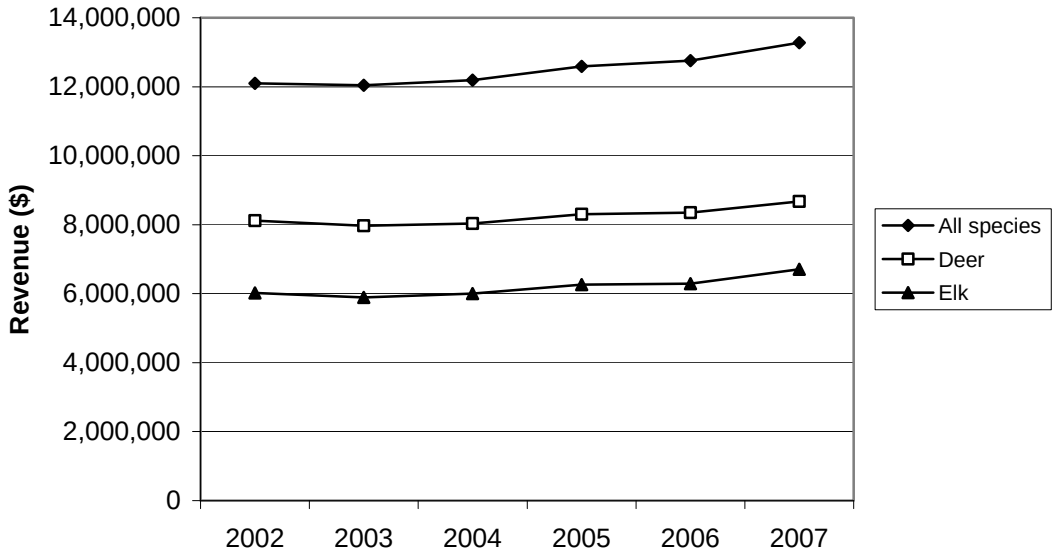


Figure 23. Trends in hunting revenues generated by the WDFW hunting program for all species combined (i.e., big game, small game, and migratory birds) and separately for deer and elk for fiscal years 2002-2007. Revenue figures come from both general and special permit seasons, and include monies collected from license fees, permit fees, application fees, raffles, and auctions. Revenues for deer and elk hunting overlap because they are summed from the full values of all license types (including multi-species combination licenses) involving each particular species. Dollar values presented here are expressed in current dollars and have not been adjusted for inflation.

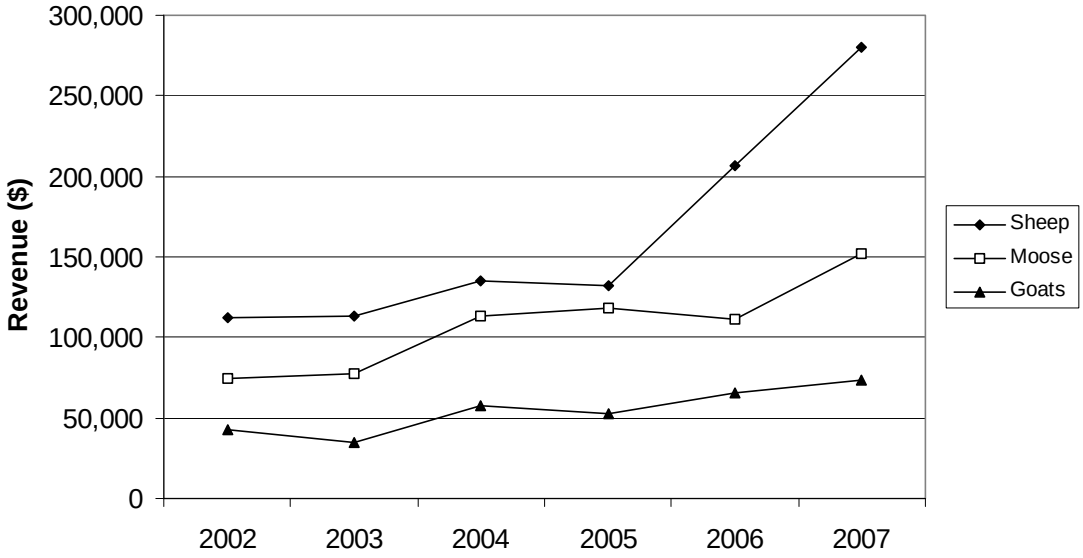


Figure 24. Trends in hunting revenues generated by WDFW for bighorn sheep, moose, and mountain goats for fiscal years 2002-2007. Revenue figures include monies collected from permit fees, application fees, raffles, and auctions. Dollar values presented here have not been adjusted for inflation.

Outfitted Hunting

Commercial outfitters are primarily small independently owned businesses offering a variety of guided services (e.g., river running, fishing, hunting, camping, trail riding, packing, hiking, biking, climbing, and outdoor photography trips) to paying clients. Lodging is also provided by some outfitters. Outfitted trips usually qualify as a form of sustainable tourism because of their low impact on the environment and local culture, while helping to generate income and employment and benefiting the conservation of local ecosystems.

Washington's outfitter industry is considerably smaller than in some neighboring states such as Montana (see Nickerson et al. 2007) and Idaho, but quantified information on the size and economic contributions of outfitting in Washington is lacking. Detailed information is also lacking on the industry's client base, types of services rendered, and use of public versus private lands.

The Washington Outfitters and Guides Association (WOGA) represents a number of outfitting companies in the state, with membership currently totaling 29 companies (WOGA 2007). Nearly all members market multiple activities to clients, including 26 companies offering non-fishing and non-hunting activities, 12 offering hunting (mostly big game), 11 offering fishing, and nine offering river running and other water-related activities. Outfitter activities in general tend to be concentrated in eastern Washington (G. Ulin, WOGA president, pers. comm.). Among WOGA outfitters, north-central Washington (northeastern Cascades and the Okanogan), south-central Washington (southeastern Cascades), and Puget Sound are the three main regions of operation (WOGA 2007). Washington residents are thought to represent the majority, perhaps 60-67%, of the customer base for in-state outfitters (G. Ulin, WOGA president, pers. comm.). The establishment of several new companies during the past few years suggests that the industry as a whole is slowly growing.

Summer trips offering fishing, packing, camping, and other family- or group-related outdoor activities are the largest source of revenue for most land-based outfitters in Washington (G. Ulin, WOGA president, pers. comm.). Hunting trips are of lower importance as a source of income for most outfitters.

Hound Hunting

An estimated 500-700 hunters participate in hound hunting in Washington (D. Martorello, pers. comm.). Use of hounds is currently restricted to three game species (see Chapter VII), with cougars being the most popular quarry. Cougar hunting with hounds is largely limited to five northeastern counties (Pend Oreille, Stevens, Ferry, Okanogan, and Chelan) in the state. Hound hunters typically employ two to five dogs per party. Hounds can be either registered purebreds (e.g., Black & Tan, Walker, Redbone) or of mixed ancestry. Monetary values per dog range from several hundred dollars to more than $5,000, but average about $2,500 (D. Martorello, pers. comm.). In Idaho, Montana, and Wyoming, losses of hunting hounds to wolves are not reimbursed by Defenders of Wildlife or any other compensation program.

Recent Impacts of Wolves on Big Game Hunting in Neighboring States

To date, wolves have not resulted in any sizable losses of hunter opportunity in Montana, although seasons for antlerless elk in some locations have been reduced to compensate for mortality from

multiple sources including wolves (MFWP 2007a; C. Sime, pers. comm.). In southwestern Montana, some of the most liberal opportunities for elk harvest over the past three decades are currently being offered in two-thirds of the region's hunting districts, all of which support wolves. However, lethal wolf control in many of these areas to reduce conflicts with livestock may keep local wolf densities low enough to minimize impacts on elk herds. Recently, Montana Fish, Wildlife & Parks has reduced hunting limits for antlerless elk in the northern Yellowstone herd, which has undergone a substantial decline since the mid-1990s due to a large past antlerless harvest, drought, and predation by wolves and other predators (Eberhardt et al. 2007). This is designed to enhance adult female elk survival and to decrease the removal of animals with the highest reproductive potential. Wolf impacts on deer and other ungulates have not been detected to date (C. Sime, pers. comm.). In the northern Yellowstone area, no reductions in hunting permits, harvest size, or hunter success for mule deer or moose have occurred as a result of wolves (White et al. 2005). Montana Fish, Wildlife & Parks has not experienced any declines in hunting generated revenue, license sales, or hunter success on a statewide level because of wolf presence (C. Sime, pers. comm.).

Wolf impacts on big game hunting in Idaho have not been well quantified. IDFG (2008) reported that wolf predation may be causing reductions in the harvestable surplus of elk in some parts of the state, even if elk populations are not declining. The Lolo region, where experimental wolf control is proposed, has experienced a significant reduction in elk abundance, but this trend began in the mid-1980s well before wolves became common (IDFG 2006). The extent that wolves have contributed to this decline in recent years is unknown but perhaps significant. IDFG (2008) has also reported that wolves are possibly reducing success rates for some hunters in parts of the state by changing the behavior and habitat use of elk during the hunting season. As observed in the greater Yellowstone ecosystem (Creel and Winnie 2004, Mao et al. 2005), Idaho's elk may now be spending more time in forested areas, on steeper slopes, and at higher elevations than before wolf reintroductions, making it more difficult for hunters to find animals. Other ungulates have not been impacted by wolves in Idaho, with the possible exception of moose (S. Nadeau, pers. comm.). Declines in moose in some areas are poorly understood and may in fact be related to habitat changes or other causes.

Big game revenue and tag sales to resident and non-resident hunters have remained stable in recent years for the Idaho Department of Fish and Game (B. Compton, pers. comm.; S. Nadeau, pers. comm.). Some hunters have indicated that they would not return to their hunting areas because of real or perceived impacts of wolves, but whether this has produced significant changes in hunter activity has been difficult to assess. Hound hunting permit sales have also remained level or slightly increased in the state (S. Nadeau, pers. comm.).

In Wyoming, at present, there are no definitive data showing decreased hunter harvest or opportunity due to wolf predation on elk or moose (WGFC 2007).

Mexican gray wolves were reintroduced to a portion of western New Mexico and eastern Arizona beginning in 1998 and numbered 44-50 animals by 2004 and 2005. Unsworth et al. (2005) reported that this level of abundance caused no measurable changes in elk harvest or outfitter income between 1998 and 2004, and that numbers of elk and deer hunters and hunter days to the area actually increased. Elk and deer populations declined in the area during this period, but this was likely due to changes in forage conditions and game management decisions rather than predation by wolves.

Summary

The possible impacts of wolf predation on ungulate populations are debated by both the general public and the scientific community. Big game hunters in Washington are concerned that wolves will cause declining ungulate populations and opportunities for hunting. As described in Chapter V, many factors affect the population sizes and trends of elk, deer, and other big game species, including habitat quantity and quality, severe weather, levels of hunter harvest, predation, and disease. Thus, it is inappropriate in most cases to single out wolf predation as the main influence driving ungulate populations and hunter success.

It is very difficult to predict with confidence the impacts that different population sizes of wolves will have on ungulate populations and hunter harvest in Washington. This is due largely to the many uncertainties involving where and how rapidly wolves become reestablished, their eventual abundance and diet composition, prey species behavior and population changes, hunter responses, and other influences. For these reasons, the effects of wolf predation on ungulate populations are highly situation-specific (Garrott et al. 2005).

Keeping these limitations in mind, some general approximations of wolf predation levels are presented in Table 16 using dietary information from neighboring states. Total populations of 50 and 100 wolves are expected to have minor overall impacts on Washington's ungulate populations. Fifty wolves may kill about 500 elk and 900 deer per year, with annual take doubling for 100 wolves (see Table 16 for an explanation of these estimates). These levels of predation could impart

Table 16. Projected numbers of packs, successful breeding pairs, lone wolves, and ungulate prey for four different population size categories of wolves in Washington. Because of the absence of biological data on wolves living in Washington, numbers presented here should be considered as very rough approximations.

	Population size category			
Number of wolves present[a]	50	100	200	300
Estimated no. of packs[b]	5-8	9-16	18-33	27-49
Estimated no. of successful breeding pairs[c]	5-7	8-13	12-21	19-34
Estimated no. of lone animals[d]	5-8	10-15	20-30	30-45
Estimated total no. of prey killed per year[e]	1,405	2,810	5,620	8,430
Estimated no. of elk killed per year[e]	525	1,050	2,100	3,150
Estimated no. of deer killed per year[e]	880	1,760	3,520	5,280

[a] Includes animals living in packs and alone.
[b] Number ranges are based on averages of 5.5 and 9.3 wolves per pack in Montana and the greater Yellowstone area, respectively (see Chapter II).
[c] Number ranges are based on the ratio of successful breeding pairs to packs in Idaho during periods of similar population size (USFWS et al. 2007:110). Successful breeding pair numbers are typically smaller than pack numbers because of the logistical difficulties in confirming breeding for all packs, especially as pack numbers become larger. The estimates presented here assume that the same monitoring effort will be expended in Washington as in Idaho.
[d] Number ranges are based on lone wolves comprising 10-15% of most populations (Fuller et al. 2003).
[e] Numbers represent the estimated numbers of prey killed by different sizes of wolf populations based arbitrarily on a diet of 60% elk and 40% deer by biomass (see Table 2). Because of the large differences in body weight between elk and deer (Chapter V), fewer elk than deer are expected to be killed. Estimates given here are based on an average annual kill rate of 10.5 elk and 17.6 deer, or about 28 ungulates total, per wolf.

noticeable localized effects on elk and deer abundance in some of the relatively few areas occupied by wolf packs, but would not have broad-scale impacts. These levels of loss potentially represent 1-2% of the state's elk population and much less than 1% of the combined deer population. With larger populations of wolves, greater numbers of ungulates would be removed annually, with perhaps 2,100-3,150 elk and 3,500-5,300 deer taken if 200-300 wolves became reestablished (Table 16). Predation levels on moose are highly speculative, but would probably be significant if wolves became numerous in northeastern Washington. Wolf take of bighorn sheep and mountain goats is expected to be minor.

The estimates presented above come with many caveats. For example, wolf expansion may result in lowered coyote and cougar populations, thereby reducing ungulate losses caused by these predators. Changes in harvest strategies (e.g., reduced antlerless take, shortened hunting seasons, etc.) and further efforts to manage habitat for elk and deer may be necessary to offset some wolf-related losses and keep game populations at their intended management objectives. In areas without severe winter snowpack and without full protection for wolves, Garrott et al. (2005) has suggested that wolf impacts on elk may be lower than expected.

Populations of 50 to 100 wolves should have few negative effects on big game hunting in Washington, as demonstrated by the relatively small estimated take of ungulates described above. As in the Yellowstone region (Creel and Winnie 2004, Mao et al. 2005), wolves may also cause some redistribution of game, which could make these species somewhat less vulnerable to harvest. However, these impacts together would be restricted to the relatively few areas occupied by packs during these recovery stages and would probably not reduce statewide harvests of elk and deer by more than 1-3%. If these outcomes discouraged a similar proportion of hunters from hunting, then big game-related hunting expenditures in the state, including the revenues generated by WDFW, could decrease by a comparable amount. Whether or not the loss of a small percent of the state's elk and deer would affect hunter participation and by how much is unknown. Some outfitters catering to hunters would perhaps be negatively affected, but because this industry is small in Washington, the overall financial impact will be small. Perceived reductions in hunting opportunities could discourage some non-resident hunters from visiting Washington, but this segment of the elk and deer hunting community is currently quite small (Figure 22). Losses of hunting hounds to wolves are not expected to exceed one or two animals per year, as noted in Idaho and Montana (S. Nadeau, pers. comm.; C. Sime, pers. comm.), where much larger wolf populations exist.

Larger wolf populations would be expected to have greater impacts on game and hunting opportunity, but such impacts become increasingly difficult to predict. To accommodate larger elk and deer losses from wolves, reductions in antlerless take and perhaps other restrictions such as shortened hunting seasons or reduced availability of special permits may be needed in some areas where wolves become common. Given the stable or increasing numbers of hunters, tag sales, numbers of animals killed, levels of hunter success, and amount of revenue generated in association with elk and deer hunting in Washington during the past decade (Figures 13, 15, 23), there appears to be some capacity for the state to absorb the game losses caused by wolves.

In the future, there could be revenue generated for WDFW if wolves recover to the point that they are delisted and eventually become a hunted species. Revenue could be generated through special

permit application sales, auctions, and raffles. It is unknown how much revenue would be generated from these sources. Such sales might be similar to those obtained for bighorn sheep, moose, and mountain goats during most of the past decade (Figure 24), an estimated $50,000 to $150,000 per year, but could be substantially lower at $10,000 to $50,000 (D. Ware, WDFW, pers. comm.).

D. Wildlife Tourism

Ecotourism, or travel to natural areas for environmentally responsible outdoor experiences, is one of the fastest growing segments of the overall world tourism industry. Wildlife viewing is a large part of this business and is hugely popular in the United States.

According to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, more than 71 million Americans 16 years old and older (31% of the U.S residents in this age bracket) participated in wildlife watching activities (i.e., observing, feeding, photographing, etc.; includes fish viewing) in 2006 (USFWS and USCB 2007). Of these, almost 23 million people took trips more than one mile from their homes specifically to see wildlife. Participation in wildlife viewing increased 8% nationally from 2001 to 2006, in contrast to fishing and hunting, which fell 12% and 4%, respectively. Wildlife watchers spent nearly $46 billion in 2006, or about $650 per participant, with trip-related expenditures increasing 38% between 2001 and 2006. Seventy percent (16.2 million people) of the wildlife watchers traveling away from home observed, fed, or photographed land mammals, with 56% (12.8 million people) specifically interested in large mammals such as deer, bears, and coyotes. Eighty-three percent of wildlife watchers traveling away from home did so in their home state; 33% visited other states.

In Washington during 2006, an estimated 2.33 million people 16 years old and older participated in some form of wildlife watching, which ranked the state 11th in the nation for participation (USFWS and USCB 2007, 2008). About 2.00 million participants were state residents (40% of the state's total population in this age group), with the remainder being non-residents. An estimated 628,000 residents and 331,000 non-residents in this age group traveled more than one mile away from home to view wildlife in Washington during the year. Residents spent an estimated 8.0 million days (88% of the total; average of 12.7 days per person) and non-residents spent an estimated 1.1 million days (12%; average of 3.4 days per person) watching wildlife away from home in the state during the year. Washington residents spent an additional 1.48 million days watching wildlife in other states in 2006. Overall, wildlife watchers outnumbered hunters and anglers combined by nearly three times in Washington.

Annual spending in Washington by resident and non-resident wildlife watchers on travel, food, lodging, equipment, and other goods and services totaled an estimated $1.5 billion in 2006, ranking the state seventh in the nation behind California, Florida, Texas, Michigan, Georgia, and New York (USFWS and USCB 2007, 2008). About $595 million was spent during the year on equipment, $442 million on trip-related costs, and $466 million on other costs (Table 17). Annual spending by wildlife watchers in the state rose 53% from 2001 to 2006 (USFWS and USCB 2003, 2007, 2008). Participants spent an average of $645 per person in 2006 (Table 17). Wildlife viewing generated an estimated 22,439 jobs in Washington in 2001 (USFWS 2003).

Table 17. Estimated total expenditures and average expenditures per participant for all types of wildlife-watching activities in Washington in 2006, including both those around the home and away from home (from USFWS and USCB 2007, 2008). Estimates are for state residents and non-residents combined.

Category of expenditure	Total amount	Average amount per participant[a]
Food and lodging	$227,721,000	$98
Transportation	157,045,000	67
Other trip costs (boating costs, guide/outfitter fees, public and private land use fees, equipment rental, other)	56,886,000	24
Total trip related	441,652,000	189
Wildlife-watching equipment (wildlife feed, cameras, binoculars, hiking equipment, other)	262,335,000	113
Auxiliary equipment (camping equipment, other)	29,797,000	13
Special equipment (off-road vehicles, campers, boats, other)	302,574,000	130
Total equipment	594,706,000	255
Other items (land leasing and ownership, plantings around homes that benefit wildlife, membership dues, contributions, literature, other)	465,953,000	200
Total expenditures	$1,502,311,000	$645

[a] Based on an estimated total of 2,331,000 wildlife-watching participants in Washington.

Wolf-Related Ecotourism in North America

Commercial wolf watching has grown in significance in North America over the past several decades, especially in the lower 48 states, and has resulted in regional economic benefits. Yellowstone National Park has become the premier wolf viewing location on the continent, with a thriving and rapidly growing wolf-watching business since the species was reintroduced in 1995 and 1996. Visitor surveys in 2005 showed that the opportunity to see or hear wolves increased annual rates of park visitation by almost 4% and spending on lodging, food, and other services by an estimated $35.5 million among people coming from outside Wyoming, Montana, and Idaho (Duffield et al. 2006, 2008). Wolves have joined grizzly bears as the marquee species most sought after at Yellowstone, with about 44% of visitors hoping to see wolves (Duffield et al. 2008). Many wolf-watchers at the park are repeat visitors. Even visitors who fail to see wolves are often satisfied with their experiences through hearing wolves, seeing their tracks and scat, or simply knowing that wolves were nearby (Montag et al. 2005). Duffield et al. (2008) estimated that more than 300,000 visitors saw wolves at the park in 2005 alone.

National Park Service officials had originally expected Yellowstone's wolves to be far more secretive and less visible, as at Isle Royale (Michigan) and Denali (Alaska) National Parks, and therefore never anticipated these levels of recreational and economic impacts. However, the park's wolves quickly became accustomed to roads, traffic, and people, and readily occupied more open terrain. The local tourism industry and business community seized the opportunity by offering guided trips to find wolves. Guides explain wolf behavior and biology, and increase the likelihood of visitors seeing wolves. More than 50 organizations now offer wolf trips (Kirkwood 2006) and at least one tour

company advertises a 97% success rate in seeing animals. Wolves are more easily observed from fall through spring and therefore help attract visitors to the region during the months of lowest visitation. Most Greater Yellowstone Area wolf watching remains within the national park itself. Outfitters and guides in outlying areas, where wolves are also thriving on both public and private lands, haven't been as successful in organizing as many wolf-watching trips.

In other parts of North America, wolf-related tourism has expanded in different ways:

- The International Wolf Center in Ely, Minnesota, brings about $3 million per year to the area and creates as many as 66 jobs in tourism-related businesses and other industries (Schaller 1996). The center, which specializes in wolf education and tourism, opened in 1993 on the edge of the Boundary Waters Canoe Area Wilderness in the heart of the largest wolf population in the lower 48 states. A 2004 survey showed that a third of all tourists to northeastern Minnesota visited the center, resulting in a major economic benefit for the surrounding two-county area. Visitation totaled 42,000 people in 2005.

- After red wolves were reintroduced to northeastern North Carolina in 1987 and grew to an estimated population of 100 by 2005, a study found interest in developing a fledgling wolf tourism business (Lash and Black 2005). Weekly wolf howling tours at the Alligator River National Wildlife Refuge drew about 900 visitors from across the country in 2005. A planned Red Wolf Visitor and Education Center, partnered with existing ecotourism activities (e.g., hiking, fishing, other wildlife viewing) in the Outer Banks region is estimated to potentially attract over 25,000 households annually, boost tourism by up to 19%, and bring in about $37.5 million in direct and indirect tourist spending to North Carolina (Lash and Black 2005).

- Wolf howling expeditions in Algonquin Provincial Park in Ontario, Canada, where dense forest cover makes wolves more likely to be heard than seen, have drawn more than 2,000 participants every summer since 1963, contributing almost $1.9 million to Ontario's yearly economy (Bowman and Eagle 2004).

- The 1998 reintroduction of Mexican gray wolves to eastern Arizona and western New Mexico, including the Gila and Apache National Forests, has triggered wolf-related tours by the Arizona Heritage Alliance, Grand Canyon Chapter of the Sierra Club, and other private parties (Unsworth et al. 2005). The lack of comprehensive annual visitation estimates for the area's national forests prior to the arrival of wolves makes it impossible to measure wolf-related increases in tourist numbers and expenditures.

- Wolf-related ecotourism has the potential to succeed in central Idaho (Druzin 2007), but remains in the very early stages of development. Hunting outfitters have teamed up with environmental interpreters to give visitors glimpses of wolves in the Frank Church River of No Return Wilderness and the Sawtooth National Recreation Area. One outfitter (M. Branson, Wind River Outfitters) who guides hunters north of the Salmon River in the Wilderness believes that wolves have made it harder to hunt elk, but that their presence adds to the mystique of the Idaho wilderness that his customers are willing to pay for (Barker 2008). According to this outfitter, some hunters find wolf encounters to be the high point of their trips. Wolves have also made this company's summer pack trips more popular.

- Several private landowners have shown recent interest in developing small-scale wolf watching at locations in western Montana away from Yellowstone and Glacier National Parks (C. Sime, pers. comm.). In these cases, landowners have the potential to attract high paying clients by offering opportunities to see wolves and enjoy the outdoors away from the more crowded conditions of the national parks. If successful, these enterprises would broaden the economic benefits of viewing wolves to a larger geographic portion of the state.

Summary

As with the other economic outcomes discussed in this chapter, Washington's ability to develop a viable wolf-related tourism industry will depend on where and how many wolves eventually become reestablished in the state, their behavior, and human behavior in response to them. However, Washington appears to have potential for receiving at least modest economic benefits from wolf watching for the following reasons:

1) Wildlife watching is already a highly popular activity among Washington's residents and visitors, as shown by the number of participants and money generated (USFWS and USCB 2007, 2008). As a result, the state has one of the larger wildlife-watching constituencies in the nation. Specific interest in viewing wolves is demonstrated by a 2008 telephone survey of 805 Washington residents 18 years old and older that found that 54% of respondents would travel to see or hear wild wolves in the state (Appendix E; Duda et al. 2008a).

2) As noted in locations such as Yellowstone National Park, wolves undoubtedly would be highly popular among wildlife watchers in Washington, providing that animals can be seen or heard, or that other evidence (tracks, scat) of their presence can be encountered on a fairly reliable basis.

3) Large population centers in the greater Seattle, Portland, Vancouver, B.C., and Spokane areas provide nearby sources of tourists. Each is within several driving hours of at least one area where wolf recovery is expected to occur (i.e., the northern Cascades, southern Cascades, northeastern Washington, and the Blue Mountains) and within a day's driving distance of the entire state. Depending on the quality of viewing, visitors from outside the Pacific Northwest will also likely come to Washington to see wolves.

4) Washington includes large amounts of public land administered primarily by the U.S. Forest Service, National Park Service, and other federal and state agencies. Not only are these lands conducive to wolf recovery, but as seen elsewhere in North America, public land ownership lends itself to wolf-related tourism much better than private land ownership.

5) Outfitting and guiding businesses in Washington already include wildlife-viewing recreational activities that provide the infrastructure needed to expand into commercial wolf viewing and listening.

6) Washington offers many high quality outdoor activities (e.g., fishing, hunting, hiking, camping, river running, viewing of other wildlife, and visiting national parks, national forests,

and federal and state wildlife areas) in a scenic setting that would be complementary to wolf watching and help attract visitors to areas supporting wolves.

Although difficult to estimate, the experiences of Minnesota and Ontario (where money values have been calculated) suggest that Washington could reasonably expect to derive economic benefits of at least several million dollars annually from wolf-related activities by the time the species could be delisted. Larger wolf populations in the state would likely expand viewing opportunities and economic benefits. Depending on the extent to which communities and wildlife-viewing guiding businesses use these opportunities, Washington could conceivably develop a sizable wolf-related tourist industry.

The economic gain from wolf tourism has the potential to offset or exceed the combined costs of livestock depredation and reduced hunting opportunities. Monies generated by wolf watching would largely go to the counties where wolf recovery is most likely to occur, such as those in northeastern and southeastern Washington and those along the Cascades. This would benefit many of the more rural counties among these that have lower median household incomes and higher unemployment than elsewhere in the state (see OFM 2007b, WSDOT 2008).

To achieve this potential, Washington will need to have some areas where wolves are safe from harassment, and are therefore less afraid of people and more likely to use open terrain. The state has at least two locations that could potentially offer good wolf viewing. Mt. St. Helens National Volcanic Monument features a large open volcanic plain created by the 1980 eruption of Mt. St. Helens. The plain and its sizable elk herd are easily viewed from various places along Johnson Ridge (including the Forest Service's Johnson Ridge Observatory) and elsewhere. The Methow Valley in Okanogan County supports large wintering deer herds in open habitats on both public and private lands, and could attract wolves at that time of the year. Both of these locations are already popular tourist destinations, so it may be difficult to quantify the economic benefits from wolf viewing.

In other less open areas of the state where wolf populations are expected to reestablish, wolf tourism could be developed in other innovative ways, such as through the use of remote cameras and websites, tracking and howling trips, or even development of a wolf visitor center similar to that in Minnesota, where deeply wooded terrain also makes wolves difficult to see.

Offsetting these projected benefits to tourism, wolf presence may possibly scare some visitors away from visiting national forests and other wildland areas through fears over personal safety. However, this problem has not been reported in other localities with wolves in the lower 48 states. Additionally, any substantial wolf-related declines in the viewability of elk, deer, and other ungulates, caused either by changes in behavior or population declines, could possibly lower the viewing opportunities for these species in some localized areas. The extent of lost revenues from this impact is difficult to project.

E. Forest Products Industry

Overview of the Forest Products Industry in Washington

The total value of Washington's forest products industry (including lumber, wood products, paper, and wood-related manufacturing production) was $15.9 billion in 2006 (WFPA 2007), which

represented an estimated 5.4% of the state's economic output. Washington is the second largest producer of softwood lumber in the nation, accounting for 13% of total U.S. production.

More than half (52%, 22.1 million acres) of Washington is forested (WFPA 2007). Sixty-four percent (14.3 million acres) of the state's forestlands are managed by federal, state, tribal, county, and municipal concerns, with the U.S. Forest Service being by far the largest holder (58%, 8.2 million acres) among these. The rest (36%, 7.9 million acres) are privately owned, of which 59% (4.6 million acres) are considered industrial forestlands. In total, 73% (16.2 million acres) of the state's forests are used commercially. From 2000 to 2005, 71% of the timber harvested in Washington came from private forestland, whereas just 2% originated from federal land (WFPA 2007). About 7 billion board feet of lumber were harvested annually in the late 1980s, but this figure has declined to about 4 billion board feet since the mid-1990s due to federal and state policy changes. Based on timber tax revenues, the 15 largest timber-producing counties in the state in 2006 were (in order) Lewis, Grays Harbor, Pacific, Cowlitz, Clallam, Pierce, Stevens, Mason, Jefferson, Thurston, Klickitat, Skagit, King, Snohomish, and Clark counties (WSDOR 2007). Thirteen of these counties are located in western Washington.

Summary

Wolves are habitat generalists, but in the western United States occur most frequently in forests (USFWS 2008). Wolves are also fairly tolerant of moderate amounts of human disturbance, even in the vicinity of active wolf dens (Frame et al. 2007). Hence, restrictions on land use practices have not been necessary to achieve wolf conservation in Idaho, Montana, and Wyoming (USFWS 2008). For these reasons, wolf reestablishment in Washington is not expected to result in any land use restrictions to protect and conserve wolves other than those that occasionally may be needed to protect den sites from malicious or careless destruction during the denning period (see Chapter VIII).

In neighboring states with wolves, no restrictions have been placed on the forest products industry with regard to timber management and logging to protect wolves. On private forestlands in Washington, no restrictions are anticipated with the possible exception of delaying timber harvests near occupied den sites until after the completion of the denning season. The Washington Department of Natural Resources currently has a provision under the Washington State Forest Practices Act Critical Habitats Rule for threatened and endangered species (WAC 222-16-080) for gray wolves. Forest practices on state and private land where harvesting, road construction, or site preparation is proposed within 1 mile of a known active wolf den, documented by WDFW, between the dates of March 15 and July 30, or 0.25 mile from the den at other times of the year, are designated as a Class IV-Special and require an extra 14 days of review, and are subject to State Environmental Policy Act (SEPA) review. The rule was established in 1992, but much has been learned since then about habitat issues involving wolves in neighboring states. This newer information suggests that the rule should be reviewed and perhaps modified to reflect current knowledge.

On public forestlands, WDFW has no legal authority to implement timber harvest and other land use restrictions on land it does not manage; land management agencies can and may adopt seasonal or area restrictions independently from WDFW. However, experience in Idaho, Montana, and

Wyoming has shown that no restrictions, other than those occasionally needed to temporarily prevent excessive disturbance of occupied den sites, have been necessary to conserve wolves.

In summary, wolf reestablishment in Washington is anticipated to have minimal impact on the state's forest products industry.

F. Other Potential Economic Impacts

In addition to concerns over potential hunting-related impacts, commercial outfitters in Washington have expressed concern that agency-dictated area closures related to wolf presence (especially during the denning period) may preclude access to or through some desirable areas on federal and state lands (G. Ulin, pers. comm.). Even temporary closures under this scenario could result in significant financial impacts to effected outfitters. As described elsewhere in this plan (Chapter VIII; Chapter XIV, Section E), very few area closures of this type have occurred in Idaho, Montana, or Wyoming, thus few if any are expected in Washington. However, WDFW has no legal authority over land it does not manage; land management agencies can and may adopt seasonal or area restrictions independently from WDFW. Thus, there is minor potential for wolf-related area closures to occur in the state. However, if this should occur, the number of areas affected would likely be very small, hence few outfitting companies are expected to be impacted.

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GLOSSARY OF TERMS

For the purposes of this conservation and management plan, the following definitions apply:

Breeding pair – see Successful Breeding Pair.

Chronic wolf depredation – the killing of livestock by a wolf pack on two or more separate confirmed occasions during a 12-month period, as determined by WDFW or USDA Wildlife Services. The attacks can have occurred on one or more properties.

Classify – to list or delist wildlife species to or from endangered, or to or from the protected wildlife subcategories threatened or sensitive.

Compensation – monetary payment to offset or replace the economic loss for a death or injury to livestock or guarding animals due to wolf activity.

Confirmed non-wolf depredation – any depredation where there is clear physical evidence that the predator was another species, such as a coyote, black bear, cougar, bobcat, domestic dog, wolf hybrid, or pet wolf, as determined by USDA Wildlife Services, WDFW, or an authorized agency representative.

Confirmed wolf depredation – any depredation where there is clear physical evidence that an animal was actually attacked and/or killed by one or more wolves, as determined by USDA Wildlife Services, WDFW, or an authorized agency representative.

Delist – to change the classification of endangered, threatened, or sensitive species to a classification other than endangered, threatened, or sensitive.

Depredation – any death or injury of livestock, as defined in this plan, caused by a predator.

Dispersal – generally refers to the natural movement of an animal from one area to another.

Distinct population segment – A discrete and significant subgroup within a species that is treated as a species for purposes of listing under the federal Endangered Species Act.

Downlist – to change the classification of an endangered or threatened species to a lower classification (e.g., from endangered to threatened, or from threatened to sensitive).

Elk herd – defined as a population within a recognized boundary as described by a combination of Game Management Units established by WDFW. Ten defined elk herds occur in the state.

Endangered – as defined by Washington law, any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state.

Extinct – a wildlife species that no longer exists anywhere; it has died out entirely, leaving no living representatives.

Extirpated – a wildlife species that no longer occurs in the wild in Washington, but exists elsewhere.

Fladry – a method of non-lethal wolf deterrent that involves attaching numerous strips of flagging material along a fence or other device for the purpose of keeping wolves out of an area occupied by livestock.

Game animal – a wildlife species that can only be hunted as authorized by the Washington Fish and Wildlife Commission.

Guarding animals - any dog or llama actively used to defend livestock from predators.

Guarding dog – any dog actively used to defend livestock from predators.

Habituation – for wolves, this refers to individuals that have lost their natural fear of humans and human activities, which allows them to live in proximity to humans. This often occurs through repeated exposure to humans in non-threatening situations, especially where food has been made available.

Herding dog – any dog actively used to herd livestock.

Heterozygosity – refers to the desirable condition of maintaining genetic variation in populations through the retention of two different alleles at loci on chromosomes.

Hybrid – the offspring of a mating between a wolf and a dog, a wolf and a hybrid, a dog and a hybrid, or two hybrids.

In the act of attacking – actively biting, wounding, or killing.

Intraspecific – occurring within a species or involving members of one species.

Lethal control – management actions that result in the death of a wolf.

List – to change the classification status of a wildlife species to endangered, threatened, or sensitive.

Livestock – cattle, calf, hog, pig, horse, mule, sheep, lamb, goat, guarding animals, and herding dogs.

Metapopulation – a set of partially isolated populations belonging to the same species. The populations are able to exchange individuals and recolonize sites in which the species has recently become extinct.

Native – any wildlife species naturally occurring in Washington for the purposes of breeding, resting, or foraging, excluding introduced species not found historically in the state. Native species are presumed to have been present in the state prior to the arrival of Euro-Americans.

Non-lethal control – management actions designed to frighten or threaten wolves, but that do not result in the death of a wolf.

Pack of wolves – a group of wolves, usually consisting of a male, female, and their offspring from one or more generations. For purposes of monitoring, a pack is defined as a group of four or more wolves traveling together in winter.

Proactive management – non-lethal husbandry practices implemented to minimize the potential for wolf-livestock conflicts. These may include, for example, modified husbandry practices, light and noise scare devices, non-lethal munitions, fencing, fladry, guarding animals, and greater use of herders/riders.

Probable wolf depredation – any depredation where the carcass is missing or physical evidence from a carcass is inconclusive as to the predator's identity, but good evidence of wolf presence exists. This may include, but is not limited to, a characteristic kill site, blood trails, wolf tracks and scat in the immediate vicinity, a baseline history of depredation rates, and known presence of wolves and/or a history of wolf depredations in the area, as determined by USDA Wildlife Services, WDFW, or an authorized agency representative.

Reintroduction – capturing and moving animals from one area to another, usually for the purpose of establishing a new population in an area that was formerly occupied. For this plan, reintroduction implies moving wolves from locations outside of Washington to a site(s) inside Washington.

Relocation – a management tool to move animal from one area to another to immediately resolve a localized situation or problem.

Rendezvous site – a specific resting and gathering area occupied by wolf packs during summer and early fall after the natal den has been abandoned. A wolf pack will usually move from the natal den site to the first rendezvous site when the pups are 6-10 weeks of age (late May-early July). The first rendezvous site is usually within 1-6 miles of the natal den site. A succession of rendezvous sites are used by the pack until the pups are mature enough to travel with the adults (usually September or early October).

Residence – the actual house where a landowner/family lives.

Sensitive – as defined by Washington law, any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats.

Significant portion of its range – that portion of a species' range likely to be essential to the long-term survival of the population in Washington.

Species – as defined by Washington law, any group of animals classified as a species or subspecies as commonly accepted by the scientific community.

Successful breeding pair – an adult male and an adult female wolf with at least two pups surviving to December 31 of a given year. This term was formerly known simply as "breeding pair," but Mitchell et al. (2008) recommended use of "successful breeding pair" as a more precise term to indicate that successful rearing of young had occurred.

Threatened – as defined by Washington law, any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.

Translocation – capturing and moving animals from one area to another, usually for the purpose of establishing a new population.

Unconfirmed depredation – any depredation where the predator responsible cannot be determined.

Unknown loss – with respect to compensation, the loss of livestock from an area with known wolf activity without a carcass as evidence. This would be based on historical records of livestock return rates prior to wolf presence/wolf depredation in the area.

Ungulate – any wild species of hoofed mammal, including deer, elk, moose, bighorn sheep, mountain goat, and caribou. Cattle, sheep, pigs, horses, and llamas are also ungulates, but are referred to as domestic livestock in this plan.

Viable population – one that is able to maintain its size, distribution, and genetic variation over time without significant intervention requiring human conservation actions.

Wildlife – as defined by Washington law, "wildlife" means all species of the animal kingdom whose members exist in Washington in a wild state. This includes but is not limited to mammals, birds, reptiles, amphibians, fish, and invertebrates. The term "wildlife" does not include feral domestic mammals, old world rats and mice of the family Muridae of the order Rodentia, or those fish, shellfish, and marine invertebrates classified as food fish or shellfish by the director of WDFW. The term "wildlife" includes all stages of development and the bodily parts of wildlife members.

Wolf recovery/conservation region – any of three broad designated regions in Washington where wolves need to become reestablished to meet the conservation goals of this plan. The regions are illustrated in Figure 3.

Working dog – any dog actively used to guard, herd, or otherwise manage livestock (i.e., guarding dogs, herding dogs).

Appendix A. Washington laws: Washington Administrative Code 232-12- 011. Wildlife classified as protected shall not be hunted or fished; Washington Administrative Code 232-12- 014. Wildlife classified as endangered species; Washington Administrative Code 232-12-297. Endangered, threatened and sensitive wildlife species classification; and Revised Code of Washington 77.15.120. Endangered fish or wildlife – unlawful taking – penalty.

WAC 232-12-011 Wildlife classified as protected shall not be hunted or fished.

Protected wildlife are designated into three subcategories: threatened, sensitive, and other.

(1) Threatened species are any wildlife species native to the state of Washington that are likely to become endangered within the foreseeable future throughout a significant portion of their range within the state without cooperative management or removal of threats. Protected wildlife designated as threatened include:

Common Name	**Scientific Name**
Mazama pocket gopher	*Thomomys mazama*
western gray squirrel	*Sciurus griseus*
Steller (northern) sea lion	*Eumetopias jubatus*
North American lynx	*Lynx canadensis*
ferruginous hawk	*Buteo regalis*
marbled murrelet	*Brachyramphus marmoratus*
green sea turtle	*Chelonia mydas*
loggerhead sea turtle	*Caretta caretta*
greater sage-grouse	*Centrocercus urophasianus*
sharp-tailed grouse	*Phasianus columbianus*

(2) Sensitive species are any wildlife species native to the state of Washington that are vulnerable or declining and are likely to become endangered or threatened in a significant portion of their range within the state without cooperative management or removal of threats. Protected wildlife designated as sensitive include:

Common Name	**Scientific Name**
gray whale	*Eschrichtius gibbosus*
common Loon	*Gavia immer*
peregrine falcon	*Falco peregrinus*
bald eagle	*Haliaeetus leucocephalus*
Larch Mountain salamander	*Plethodon larselli*
pygmy whitefish	*Prosopium coulteri*
margined sculpin	*Cottus marginatus*
Olympic mudminnow	*Novumbra hubbsi*

(3) Other protected wildlife include:

Common Name	**Scientific Name**
cony or pika	*Ochotona princeps*
least chipmunk	*Tamius minimus*
yellow-pine chipmunk	*Tamius amoenus*
Townsend's chipmunk	*Tamius townsendii*
red-tailed chipmunk	*Tamius ruficaudus*
hoary marmot	*Marmota caligata*
Olympic marmot	*Marmota olympus*
Cascade golden-mantled ground squirrel	*Spermophilus saturatus*
golden-mantled ground squirrel	*Spermophilus lateralis*
Washington ground squirrel	*Spermophilus washingtoni*
red squirrel	*Tamiasciurus hudsonicus*
Douglas squirrel	*Tamiasciurus douglasii*
northern flying squirrel	*Glaucomys sabrinus*
wolverine	*Gulo gulo*
painted turtle	*Chrysemys picta*
California mountain kingsnake	*Lampropeltis zonata*

All birds not classified as game birds, predatory birds or endangered species, or designated as threatened species or sensitive species; all bats, except when found in or immediately adjacent to a dwelling or other occupied building; mammals of the order Cetacea, including whales, porpoises, and mammals of the order Pinnipedia not otherwise classified as endangered species, or designated as threatened species or sensitive species. This section shall not apply to hair seals and sea lions which are threatening to damage or are damaging commercial fishing gear being utilized in a lawful manner or when said mammals are damaging or threatening to damage commercial fish being lawfully taken with commercial gear.

[Statutory Authority: RCW 77.12.047, 77.12.020. 08-03-068 (Order 08-09), § 232-12-011, filed 1/14/08, effective 2/14/08; 06-04-066 (Order 06-09), § 232-12-011, filed 1/30/06, effective 3/2/06. Statutory Authority: RCW 77.12.047, 77.12.655, 77.12.020. 02-11-069 (Order 02-98), § 232-12-011, filed 5/10/02, effective 6/10/02. Statutory Authority: RCW 77.12.047. 02-08-048 (Order 02-53), § 232-12-011, filed 3/29/02, effective 5/1/02; 00-17-106 (Order 00-149), § 232-12-011, filed 8/16/00, effective 9/16/00. Statutory Authority: RCW 77.12.040, 77.12.010, 77.12.020, 77.12.770. 00-10-001 (Order 00-47), § 232-12-011, filed 4/19/00, effective 5/20/00. Statutory Authority: RCW 77.12.040, 77.12.010, 77.12.020, 77.12.770, 77.12.780. 00-04-017 (Order 00-05), § 232-12-011, filed 1/24/00, effective 2/24/00. Statutory Authority: RCW 77.12.020. 98-23-013 (Order 98-232), § 232-12-011, filed 11/6/98, effective 12/7/98. Statutory Authority: RCW 77.12.040. 98-10-021 (Order 98-71), § 232-12-011, filed 4/22/98, effective 5/23/98. Statutory Authority: RCW 77.12.040 and 75.08.080. 98-06-031, § 232-12-011, filed 2/26/98, effective 5/1/98. Statutory Authority: RCW 77.12.020. 97-18-019 (Order 97-167), § 232-12-011, filed 8/25/97, effective 9/25/97. Statutory Authority: RCW 77.12.040, 77.12.020, 77.12.030 and 77.32.220. 97-12-048, § 232-12-011, filed 6/2/97, effective 7/3/97. Statutory Authority: RCW 77.12.020. 93-21-027 (Order 615), § 232-12-011, filed 10/14/93, effective 11/14/93; 90-11-065 (Order 441), § 232-12-011, filed 5/15/90, effective 6/15/90. Statutory Authority: RCW 77.12.040. 89-11-061 (Order 392), § 232-12-011, filed 5/18/89; 82-19-026 (Order 192), § 232-12-011, filed 9/9/82; 81-22-002 (Order 174), § 232-12-011, filed 10/22/81; 81-12-029 (Order 165), § 232-12-011, filed 6/1/81.]

WAC 232-12-014 Wildlife classified as endangered species. Endangered species include:

Common Name	**Scientific Name**
pygmy rabbit	*Brachylagus idahoensis*
fisher	*Martes pennanti*
gray wolf	*Canis lupus*
grizzly bear	*Ursus arctos*
sea otter	*Enhydra lutris*
sei whale	*Balaenoptera borealis*
fin whale	*Balaenoptera physalus*
blue whale	*Balaenoptera musculus*
humpback whale	*Megaptera novaeangliae*
black right whale	*Balaena glacialis*
sperm whale	*Physeter macrocephalus*
killer whale	*Orcinus orca*
Columbian white-tailed deer	*Odocoileus virginianus leucurus*
woodland caribou	*Rangifer tarandus caribou*
American white pelican	*Pelecanus erythrorhynchos*
brown pelican	*Pelecanus occidentalis*
sandhill crane	*Grus canadensis*
snowy plover	*Charadrius alexandrinus*
upland sandpiper	*Bartramia longicauda*
spotted owl	*Strix occidentalis*
Streaked horned lark	*Eremophila alpestris strigata*
western pond turtle	*Clemmys marmorata*
leatherback sea turtle	*Dermochelys coriacea*
mardon skipper	*Polites mardon*
Oregon silverspot butterfly	*Speyeria zerene hippolyta*
Taylor's checkerspot	*Euphydryas editha taylori*
Oregon spotted frog	*Rana pretiosa*
northern leopard frog	*Rana pipiens*

[Statutory Authority: RCW 77.12.047, 77.12.655, 77.12.020. 06-04-066 (Order 06-09), § 232-12-014, filed 1/30/06, effective 3/2/06. Statutory Authority: RCW 77.12.047, 77.12.655, 77.12.020. 02-11-069 (Order 02-98), § 232-12-014, filed 5/10/02, effective 6/10/02. Statutory Authority: RCW 77.12.040, 77.12.010, 77.12.020, 77.12.770, 77.12.780. 00-04-017 (Order 00-05), § 232-12-014, filed 1/24/00, effective 2/24/00. Statutory Authority: RCW 77.12.020. 98-23-013 (Order 98-232), § 232-12-014, filed 11/6/98, effective 12/7/98; 97-18-019 (Order 97-167), § 232-12-014, filed 8/25/97, effective 9/25/97; 93-21-026 (Order 616), § 232-12-014, filed 10/14/93, effective 11/14/93. Statutory Authority: RCW 77.12.020(6). 88-05-032 (Order 305), § 232-12-014, filed 2/12/88. Statutory Authority: RCW 77.12.040. 82-19-026 (Order 192), § 232-12-014, filed 9/9/82; 81-22-002 (Order 174), § 232-12-014, filed 10/22/81; 81-12-029 (Order 165), § 232-12-014, filed 6/1/81.]

WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.

PURPOSE

1.1 The purpose of this rule is to identify and classify native wildlife species that have need of protection and/or management to ensure their survival as free-ranging populations in Washington and to define the process by which listing, management, recovery, and delisting of a species can be achieved. These rules are established to ensure that consistent procedures and criteria are followed when classifying wildlife as endangered, or the protected wildlife subcategories threatened or sensitive.

DEFINITIONS

For purposes of this rule, the following definitions apply:

2.1 "Classify" and all derivatives means to list or delist wildlife species to or from endangered, or to or from the protected wildlife subcategories threatened or sensitive.

2.2 "List" and all derivatives means to change the classification status of a wildlife species to endangered, threatened, or sensitive.

2.3 "Delist" and its derivatives means to change the classification of endangered, threatened, or sensitive species to a classification other than endangered, threatened, or sensitive.

2.4 "Endangered" means any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state.

2.5 "Threatened" means any wildlife species native to the state of Washington that is likely to become an endangered species within the forseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.

2.6 "Sensitive" means any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats.

2.7 "Species" means any group of animals classified as a species or subspecies as commonly accepted by the scientific community.

2.8 "Native" means any wildlife species naturally occurring in Washington for purposes of breeding, resting, or foraging, excluding introduced species not found historically in this state.

2.9 "Significant portion of its range" means that portion of a species' range likely to be essential to the long term survival of the population in Washington.

LISTING CRITERIA

3.1 The commission shall list a wildlife species as endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available, except as noted in section 3.4.

3.2 If a species is listed as endangered or threatened under the federal Endangered Species Act, the agency will recommend to the commission that it be listed as endangered or threatened as specified in section 9.1. If listed, the agency will proceed with development of a recovery plan pursuant to section 11.1.

3.3 Species may be listed as endangered, threatened, or sensitive only when populations are in danger of failing, declining, or are vulnerable, due to factors including but not restricted to limited numbers, disease, predation, exploitation, or habitat loss or change, pursuant to section 7.1.

3.4 Where a species of the class Insecta, based on substantial evidence, is determined to present an unreasonable risk to public health, the commission may make the determination that the species need not be listed as endangered, threatened, or sensitive.

DELISTING CRITERIA

4.1 The commission shall delist a wildlife species from endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available.

4.2 A species may be delisted from endangered, threatened, or sensitive only when populations are no longer in danger of failing, declining, are no longer vulnerable, pursuant to section 3.3, or meet recovery plan goals, and when it no longer meets the definitions in sections 2.4, 2.5, or 2.6.

INITIATION OF LISTING PROCESS

5.1 Any one of the following events may initiate the listing process.

5.1.1 The agency determines that a species population may be in danger of failing, declining, or vulnerable, pursuant to section 3.3.

5.1.2 A petition is received at the agency from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the classification process.

5.1.3 An emergency, as defined by the Administrative Procedure Act, chapter 34.05 RCW. The listing of any species previously classified under

emergency rule shall be governed by the provisions of this section.

5.1.4 The commission requests the agency review a species of concern.

5.2 Upon initiation of the listing process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the classification process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

INITIATION OF DELISTING PROCESS

6.1 Any one of the following events may initiate the delisting process:

6.1.1 The agency determines that a species population may no longer be in danger of failing, declining, or vulnerable, pursuant to section 3.3.

6.1.2 The agency receives a petition from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may no longer be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the delisting process.

6.1.3 The commission requests the agency review a species of concern.

6.2 Upon initiation of the delisting process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the delisting process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

SPECIES STATUS REVIEW AND AGENCY RECOMMENDATIONS

7.1 Except in an emergency under 5.1.3 above, prior to making a classification recommendation to the commission, the agency shall prepare a preliminary species status report. The report will include a review of information relevant to the species' status in Washington and address factors affecting its status, including those given under section 3.3. The status report shall be reviewed by the public and scientific community. The status report will include, but not be limited to an analysis of:

7.1.1 Historic, current, and future species population trends.

7.1.2 Natural history, including ecological relationships (e.g., food habits, home range, habitat selection patterns).

7.1.3 Historic and current habitat trends.

7.1.4 Population demographics (e.g., survival and mortality rates, reproductive success) and their relationship to long term sustainability.

7.1.5 Historic and current species management activities.

7.2 Except in an emergency under 5.1.3 above, the agency shall prepare recommendations for species classification, based upon scientific data contained in the status report. Documents shall be prepared to determine the environmental consequences of adopting the recommendations pursuant to requirements of the State Environmental Policy Act (SEPA).

7.3 For the purpose of delisting, the status report will include a review of recovery plan goals.

PUBLIC REVIEW

8.1 Except in an emergency under 5.1.3 above, prior to making a recommendation to the commission, the agency shall provide an opportunity for interested parties to submit new scientific data relevant to the status report, classification recommendation, and any SEPA findings.

8.1.1 The agency shall allow at least 90 days for public comment.

8.1.2 The agency will hold at least one public meeting in each of its administrative regions during the public review period.

FINAL RECOMMENDATIONS AND COMMISSION ACTION

9.1 After the close of the public comment period, the agency shall complete a final status report and classification recommendation. SEPA documents will be prepared, as necessary, for the final agency recommendation for classification. The classification recommendation will be presented to the commission for action. The final species status report, agency classification recommendation, and SEPA documents will be made available to the public at least 30 days prior to the commission meeting.

9.2 Notice of the proposed commission action will be published at least 30 days prior to the commission meeting.

PERIODIC SPECIES STATUS REVIEW

10.1 The agency shall conduct a review of each endangered, threatened, or sensitive wildlife species at least every five years after the date of its listing. This review shall include an update of the species status report to determine whether the status of the species warrants its current listing status or deserves reclassification.

10.1.1 The agency shall notify any parties who have expressed their interest to the department of the periodic status review. This notice shall occur at

least one year prior to end of the five year period required by section 10.1.

10.2 The status of all delisted species shall be reviewed at least once, five years following the date of delisting.

10.3 The department shall evaluate the necessity of changing the classification of the species being reviewed. The agency shall report its findings to the commission at a commission meeting. The agency shall notify the public of its findings at least 30 days prior to presenting the findings to the commission.

10.3.1 If the agency determines that new information suggests that classification of a species should be changed from its present state, the agency shall initiate classification procedures provided for in these rules starting with section 5.1.

10.3.2 If the agency determines that conditions have not changed significantly and that the classification of the species should remain unchanged, the agency shall recommend to the commission that the species being reviewed shall retain its present classification status.

10.4 Nothing in these rules shall be construed to automatically delist a species without formal commission action.

RECOVERY AND MANAGEMENT OF LISTED SPECIES

11.1 The agency shall write a recovery plan for species listed as endangered or threatened. The agency will write a management plan for species listed as sensitive. Recovery and management plans shall address the listing criteria described in sections 3.1 and 3.3, and shall include, but are not limited to:

11.1.1 Target population objectives.

11.1.2 Criteria for reclassification.

11.1.3 An implementation plan for reaching population objectives which will promote cooperative management and be sensitive to landowner needs and property rights. The plan will specify resources needed from and impacts to the department, other agencies (including federal, state, and local), tribes, landowners, and other interest groups. The plan shall consider various approaches to meeting recovery objectives including, but not limited to regulation, mitigation, acquisition, incentive, and compensation mechanisms.

11.1.4 Public education needs.

11.1.5 A species monitoring plan, which requires periodic review to allow the incorporation of new information into the status report.

11.2 Preparation of recovery and management plans will be initiated by the agency within one year after the date of listing.

11.2.1 Recovery and management plans for species listed prior to 1990 or during the five years following the adoption of these rules shall be completed within five years after the date of listing or adoption of these rules, whichever comes later. Development of recovery plans for endangered species will receive higher priority than threatened or sensitive species.

11.2.2 Recovery and management plans for species listed after five years following the adoption of these rules shall be completed within three years after the date of listing.

11.2.3 The agency will publish a notice in the Washington Register and notify any parties who have expressed interest to the department interested parties of the initiation of recovery plan development.

11.2.4 If the deadlines defined in sections 11.2.1 and 11.2.2 are not met the department shall notify the public and report the reasons for missing the deadline and the strategy for completing the plan at a commission meeting. The intent of this section is to recognize current department personnel resources are limiting and that development of recovery plans for some of the species may require significant involvement by interests outside of the department, and therefore take longer to complete.

11.3 The agency shall provide an opportunity for interested public to comment on the recovery plan and any SEPA documents.

CLASSIFICATION PROCEDURES REVIEW

12.1 The agency and an ad hoc public group with members representing a broad spectrum of interests, shall meet as needed to accomplish the following:

12.1.1 Monitor the progress of the development of recovery and management plans and status reviews, highlight problems, and make recommendations to the department and other interested parties to improve the effectiveness of these processes.

12.1.2 Review these classification procedures six years after the adoption of these rules and report its findings to the commission.

AUTHORITY

13.1 The commission has the authority to classify wildlife as endangered under RCW 77.12.020. Species classified as endangered are listed under WAC 232-12-014, as amended.

13.2 Threatened and sensitive species shall be classified as subcategories of protected wildlife. The commission has the authority to classify wildlife as protected under RCW 77.12.020. Species classified as protected are

listed under WAC 232-12-011, as amended. [Statutory Authority: RCW 77.12.020. 90-11-066 (Order 442), § 232-12-297, filed 5/15/90, effective 6/15/90.]

RCW 77.15.120 Endangered fish or wildlife – Unlawful taking – Penalty.

(1) A person is guilty of unlawful taking of endangered fish or wildlife in the second degree if the person hunts, fishes, possesses, maliciously harasses or kills fish or wildlife, or maliciously destroys the nests or eggs of fish or wildlife and the fish or wildlife is designated by the commission as endangered, and the taking has not been authorized by rule of the commission.

(2) A person is guilty of unlawful taking of endangered fish or wildlife in the first degree if the person has been:

(a) Convicted under subsection (1) of this section or convicted of any crime under this title involving the killing, possessing, harassing, or harming of endangered fish or wildlife; and

(b) Within five years of the date of the prior conviction the person commits the act described by subsection (1) of this section.

(3)(a) Unlawful taking of endangered fish or wildlife in the second degree is a gross misdemeanor.

(b) Unlawful taking of endangered fish or wildlife in the first degree is a class C felony. The department shall revoke any licenses or tags used in connection with the crime and order the person's privileges to hunt, fish, trap, or obtain licenses under this title to be suspended for two years.

[2000 c 107 § 236; 1998 c 190 § 13.]

Appendix B. WDFW Wolf Working Group members as of May 2, 2008.

Daryl Asmussen
PO Box 417
Tonasket, WA 98855

John Blankenship
Executive Director
Wolf Haven International
3111 Offut Lake Rd
Tenino, WA 98589

Duane Cocking
Board of Directors
Inland Empire Chapter
Safari Club International
8322 N Glenarvon Ln
Newman Lake, WA 99025

Jeff Dawson
Director
Stevens County Cattleman
Cattle Producers of Washington
449 Douglas Falls Rd
Colville, WA 99114

Jack Field
Executive Vice President
Washington Cattlemen's Association
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Raven Wildlife Services
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Derrick Knowles
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Spokane, WA 99201

Colleen McShane
Wildlife Ecologist
Seattle City Light
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Seattle, WA 98103

Ken Oliver
County Commissioner
Pend Oreille County
32371 Le Clerc Rd N
Ione, WA 99139

Tommy Petrie, Jr.
President
Pend Oreille County Sportsmens Club
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Consulting Scientist
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Shelton, Wa 98584

John Stuhlmiller
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Lacey, WA 98509

Arthur Swannack
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Lamont, WA 99017

Bob Tuck
Principal
Eco-Northwest
270 Westridge Rd
Selah, WA 98942

Greta M. Wiegand
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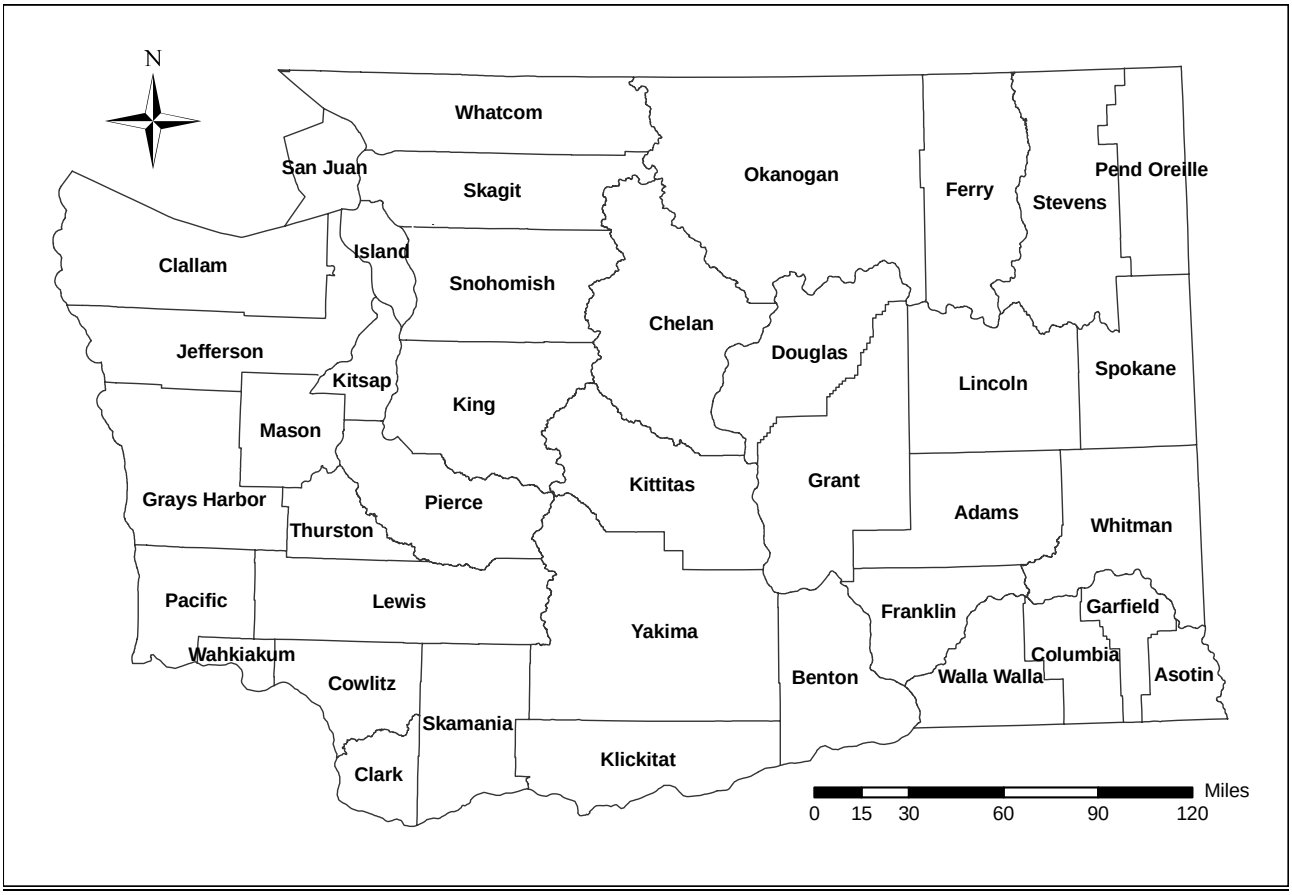
Seattle, WA 98119

Georg Ziegltrum
Supervisor
Washington Forest Protection Association
724 Columbia St NW, Suite 250
Olympia, WA 98501

Appendix C. A map of Washington's 39 counties.

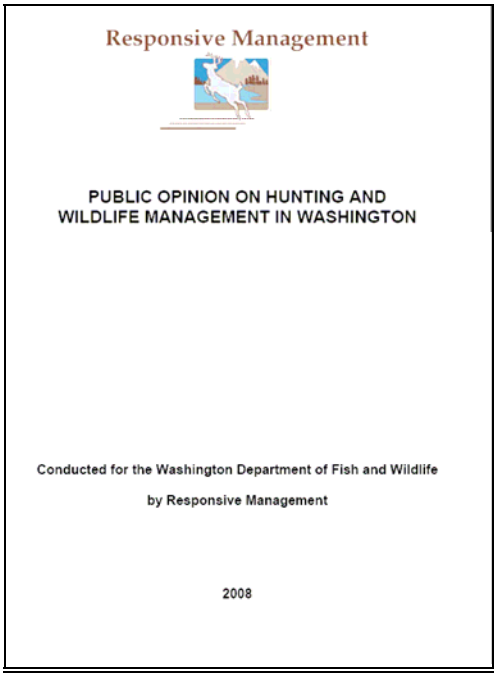


Appendix D. Reports of wolves in Washington received by WDFW from 2000 to 2008. Many of these could not be validated and therefore are considered unconfirmed records. Specific location data exist for each entry, but are not included here.

Date	County	Notes
Feb 15, 2007	Asotin	Tracks
Fall 2007	Asotin/Garfield	Howling heard
Winter 07-08	Asotin/Garfield	Tracks seen on multiple occasions
Feb 2008	Asotin/Garfield	Five animals seen together
Jun 10, 2007	Chelan	One road-killed animal found. Investigation proved it to be a hybrid.
Sept 2007	Chelan	Unconfirmed pack of 6-8 animals. A follow-up site visit did not confirm the presence of the animals.
May 1, 2008	Garfield	Two animals seen
Jun 19, 2003	King	Two animals seen on shoulder of I-90
Jan 10, 2005	Lincoln	One animal seen
May 12, 2008	Lincoln	One "white wolf" seen along Highway 2. Possibly a hybrid.
Jun 21, 2008	Lincoln	Road-killed animal. Genetic testing confirmed it to be a hybrid (J. Pollinger, pers. comm.).
Aug 16, 2000	Okanogan	Tracks
Jan 6, 2001	Okanogan	Tracks
Jan 29, 2001	Okanogan	Five animals seen approaching a deer herd
Oct 3-4, 2006	Okanogan	Howling heard, tracks of perhaps only one animal seen and photographed
Apr 2, 2008	Okanogan	One animal photographed by a remote camera
Apr 26, 2008	Okanogan	One animal photographed by a remote camera
Apr 2008	Okanogan	Tracks
Apr 2008	Okanogan	Four animals seen together; follow-up investigation found tracks at the site
May/Jun 08	Okanogan	One animal photographed by a remote camera
Jun 8, 2008	Okanogan	One animal photographed by a remote camera. Expert examination of photo suggested it was a wolf or hybrid.
Jul 2008	Okanogan	Pack with a minimum of 3 adults and 6 pups recorded, with the alpha male and female trapped and radio-collared. Captures followed earlier reports of sightings, remote camera photos, and responses during a howling survey. A citizen report suggests that the pack was also present in 2007.
Oct 19, 2000	Pend Oreille	One animal seen
Feb 5, 2002	Pend Oreille	One radio-collared wolf seen from air at deer carcass; traveled from northwest Montana into northeast Washington, where it spent several weeks before moving to British Columbia
Feb 13, 2002	Pend Oreille	Same individual as above, seen from air at moose carcass
Nov 30, 2003	Pend Oreille	Four animals seen chasing a deer, tracks seen
Winter 04-05	Pend Oreille	Tracks
Aug 1, 2005	Pend Oreille	One animal seen
Nov 14, 2005	Pend Oreille	Tracks
Winter 05-06	Pend Oreille	Tracks
Winter 05-06	Pend Oreille	At least one animal and tracks seen
Winter 05-06	Pend Oreille	At least one animal and tracks seen
2005-2006	Pend Oreille	Tracks
Mar 13, 2006	Pend Oreille	Tracks of one animal.
Jun 8, 2006	Pend Oreille	Part of one animal photographed by a remote camera
Aug 18, 2006	Pend Oreille	Multiple animals seen. Possible howling heard on Aug 3, 2006
Oct 6, 2006	Pend Oreille	Tracks photographed, howl heard.
Nov 2, 2006	Pend Oreille	Tracks photographed in one area, seen in second area
Winter 06-07	Pend Oreille	At least one animal and tracks seen
Winter 06-07	Pend Oreille	Three animals and tracks seen, howling heard
Winter 06-07	Pend Oreille	At least one animal and tracks seen on more than one occasion
Jan 27, 2007	Pend Oreille	Tracks of probably three animals
Feb 13, 2007	Pend Oreille	Tracks

Mar 6, 2007	Pend Oreille	One animal seen, many tracks in vicinity, including at dead mule deer
Mar 17, 2007	Pend Oreille	Tracks
Jun 13, 2007	Pend Oreille	Part of one animal photographed by a remote camera
Jun 24, 2007	Pend Oreille	One animal photographed by a remote camera
Jun 27, 2007	Pend Oreille	Part of one animal photographed by a remote camera
Aug 10, 2007	Pend Oreille	One animal photographed by a remote camera
Aug 30, 2007	Pend Oreille	One animal photographed by a remote camera
Summer 2007	Pend Oreille	One animal confirmed to be a hybrid
Nov 4, 2007	Pend Oreille	Tracks photographed
Mar 20, 2008	Pend Oreille	One animal seen dragging a deer
Nov 11, 2006	Spokane	Five animals seen
Sep 30, 2000	Stevens	One animal seen
May 14, 2006	Stevens	Five animals seen in vehicle headlights
2006-2008	Stevens	Multiple animals, including pups, seen and photographed on different occasions. WDFW investigation found all were hybrids regularly released by their owner.
Jan 8, 2007	Stevens	Large canid tracks of 2-3 animals with elk kill, carcass eater later. Tracks continuec through Feb 15 in general area, with a deer eaten.
Jan 30, 2007	Stevens	Three animals photographed, one shot and killed on Feb 2. WDFW investigation found all were hybrids regularly released by their owner.
Aug 30, 2007	Stevens	Calf depredation and tracks
Sep 9, 2007	Stevens	Two animals seen
Fall 2007	Stevens	Six hybrids and pet wolves released into the wild and permanently abandoned by their owner
Dec 10, 2007	Stevens	Tracks of two animals
Dec 10, 2007	Stevens	Tracks
Dec 12, 2007	Stevens	Tracks
Jun 5, 2008	Stevens	Road-killed animal. Genetic testing confirmed it to be a pure wolf originating from southern Alberta or northwestern Montana, but did not determine whether it was wild or an escaped captive individual (J. Pollinger, pers. comm.).
May 16, 2007	Whatcom	One animal seen
May 23, 2008	Whatcom	Tracks photographed
Oct 10, 2002	Yakima	One animal seen on highway running between cars

Appendix E. Public opinions on management of wolves, excerpted from a report prepared by Responsive Management (Duda et al. 2008a) for the Washington Department of Fish and Wildlife.


Responsive Management

PUBLIC OPINION ON HUNTING AND WILDLIFE MANAGEMENT IN WASHINGTON

Conducted for the Washington Department of Fish and Wildlife

by Responsive Management

2008

Responsive Management, a professional public opinion and attitude survey research firm specializing in natural resource and outdoor recreation issues, was contracted by WDFW to determine public opinion statewide on a variety of questions pertaining to hunting and wildlife management in Washington, including wolves (Duda et al. 2008a). The study entailed a telephone survey of 805 Washington residents 18 years old and older and was conducted in January 2008. Survey methods are fully described in Duda et al. (2008a). Interviewers were trained according to the standards established by the Council of American Survey Research Organizations. Results were reported at a 95% confidence interval; sampling error was at most plus or minus 3.45 percentage points. Results were weighted so that age groups were represented according to their actual proportion of the state's population. About 72.2% of respondents lived in western Washington, whereas 24.5% lived in eastern Washington and 3.5% did not report their county of residence. Thus, residents of eastern Washington, which comprise about 22.0% of the state's actual population, were slightly overrepresented in the survey. The survey asked six questions about wolves and related issues. Each question and the public's responses to the question are provided on the following pages. The entire survey can be viewed online at the following website: http://www.wdfw.wa.gov/wlm/game/management/2009-2015/hunt_populationreport.pdf.

Appendix E. Continued.

OPINIONS ON MANAGEMENT OF WOLVES

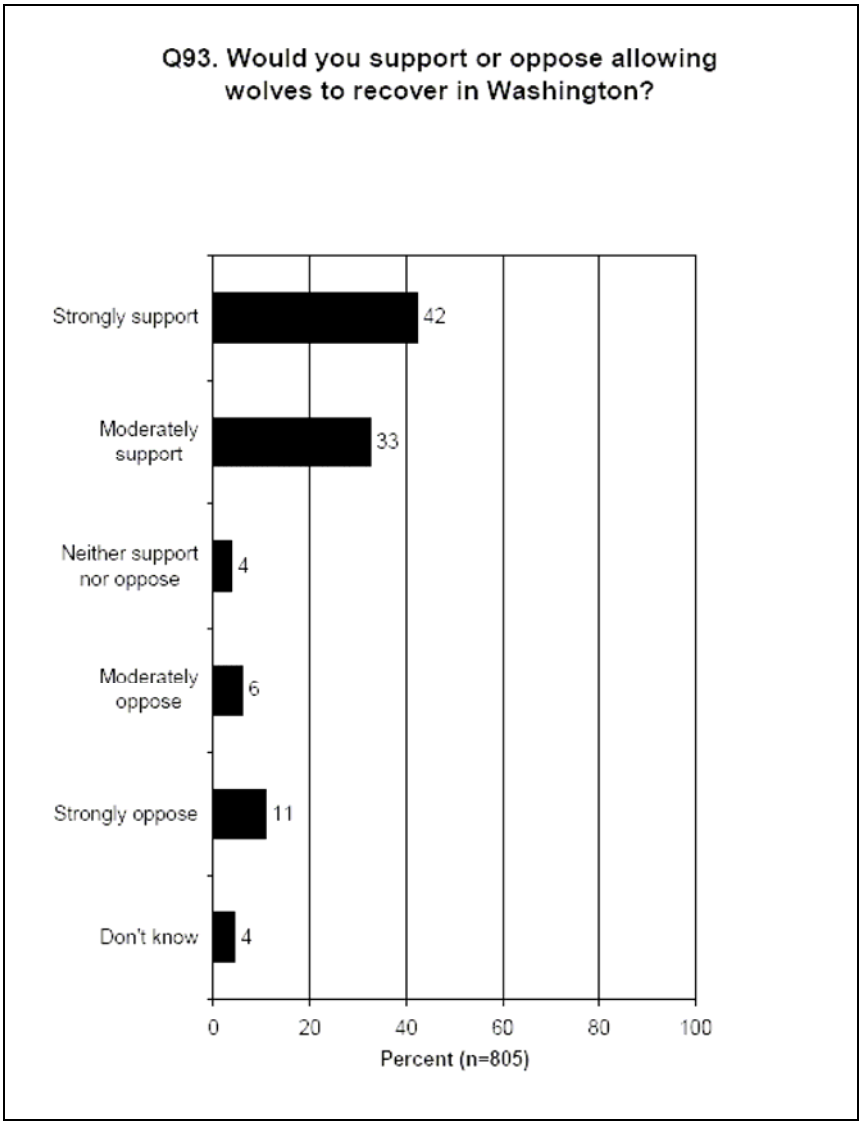
- The large majority of Washington residents (75%) support allowing wolves to recover in Washington; meanwhile, 17% oppose.
  - A crosstabulation found that those who live in urban and suburban areas are more likely to support wolf recovery; while those residing in small city/town or rural area are more likely to oppose. Note that those living on ranches or farms are the most likely to *strongly* oppose.
  - When the stipulation is put on wolf recovery that it could result in localized declines in elk and deer populations, support declines slightly: 61% support wolf recovery if it will result in some localized declines in elk and deer populations, and 28% oppose.

- Most Washington residents (61%) support some level of lethal wolf control to protect at-risk livestock; however, 31% oppose. Additionally, a majority of residents (56%) support having the state pay compensation out of the General Fund to ranchers who have documented losses to livestock from wolves, but 35% oppose.

- When asked how worried, while recreating outdoors, they would be about wolves, respondents most commonly say that they would not be worried at all (39%), and 26% would be only a little worried; in sum, 65% would be only a little worried or not worried at all. On the other hand, 33% would be very or moderately worried, with 11% *very* worried.

- In a question tangentially related to wolf management, the survey found that wildlife viewing specifically of wild wolves would appear to be popular, as 54% of residents say that they would travel to see or hear wild wolves in Washington. (Note that 2% of respondents say that they would not need to travel, as they have wild wolves nearby already.)

Appendix E. Continued.



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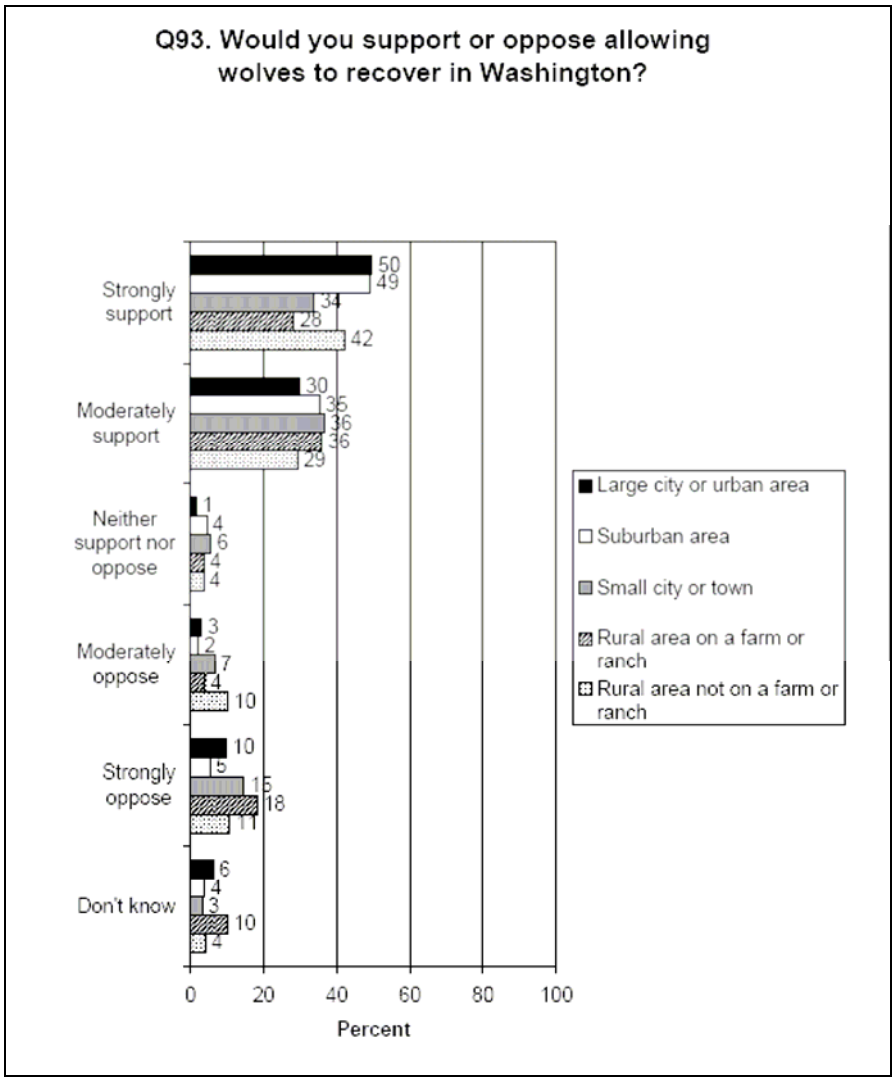

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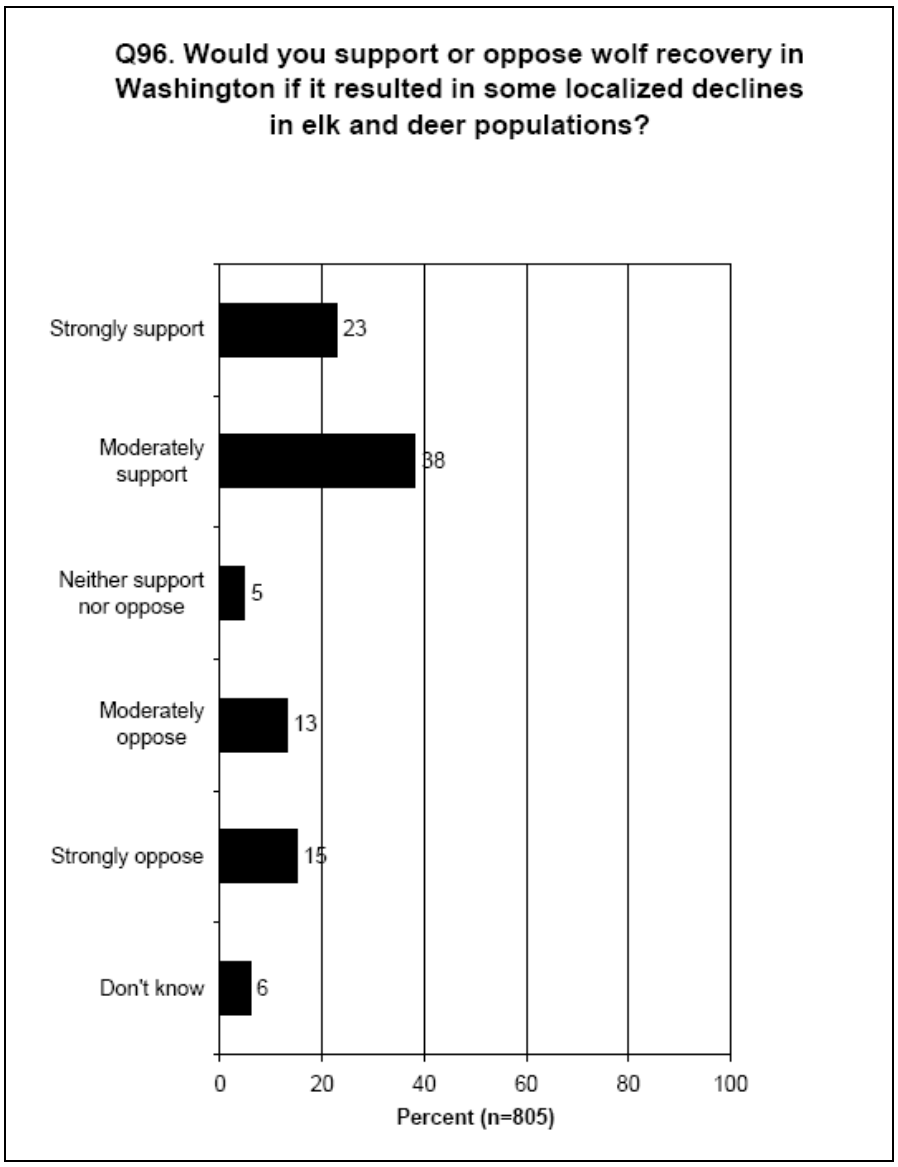

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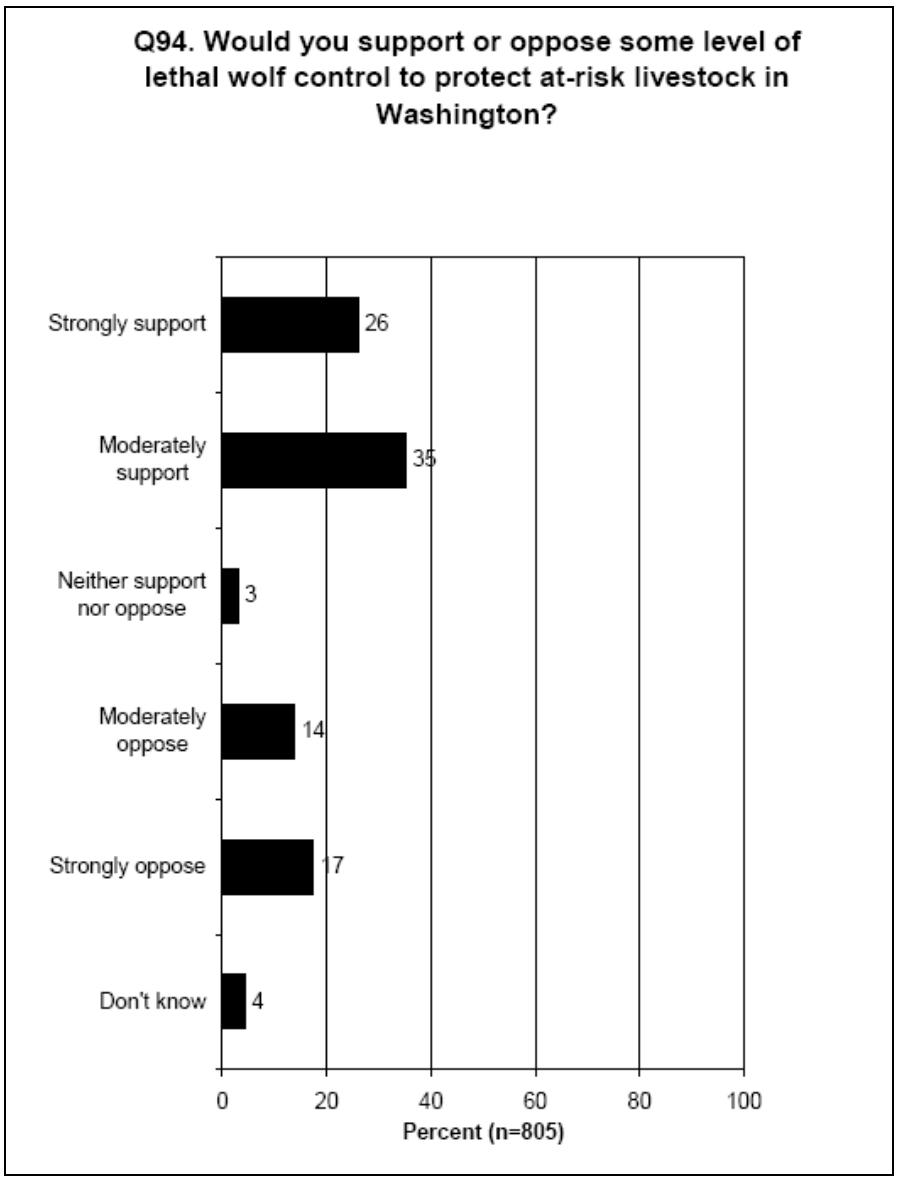

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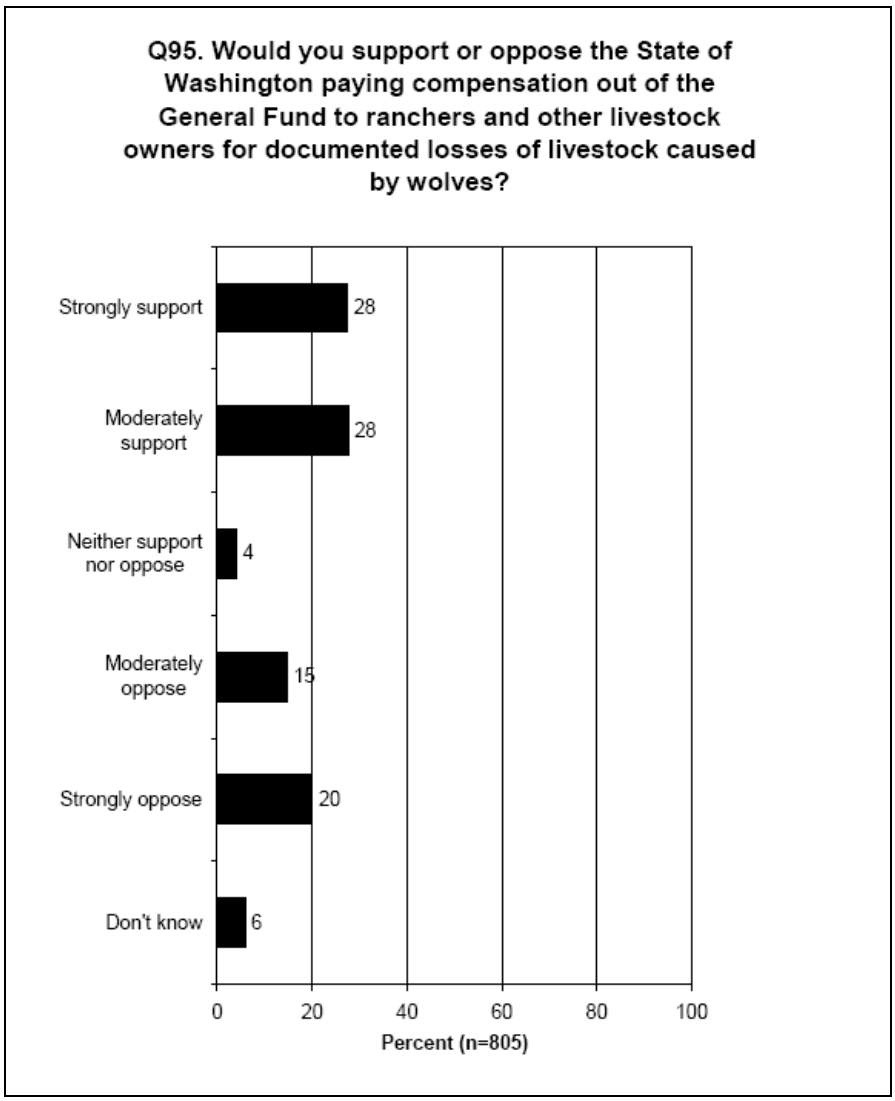

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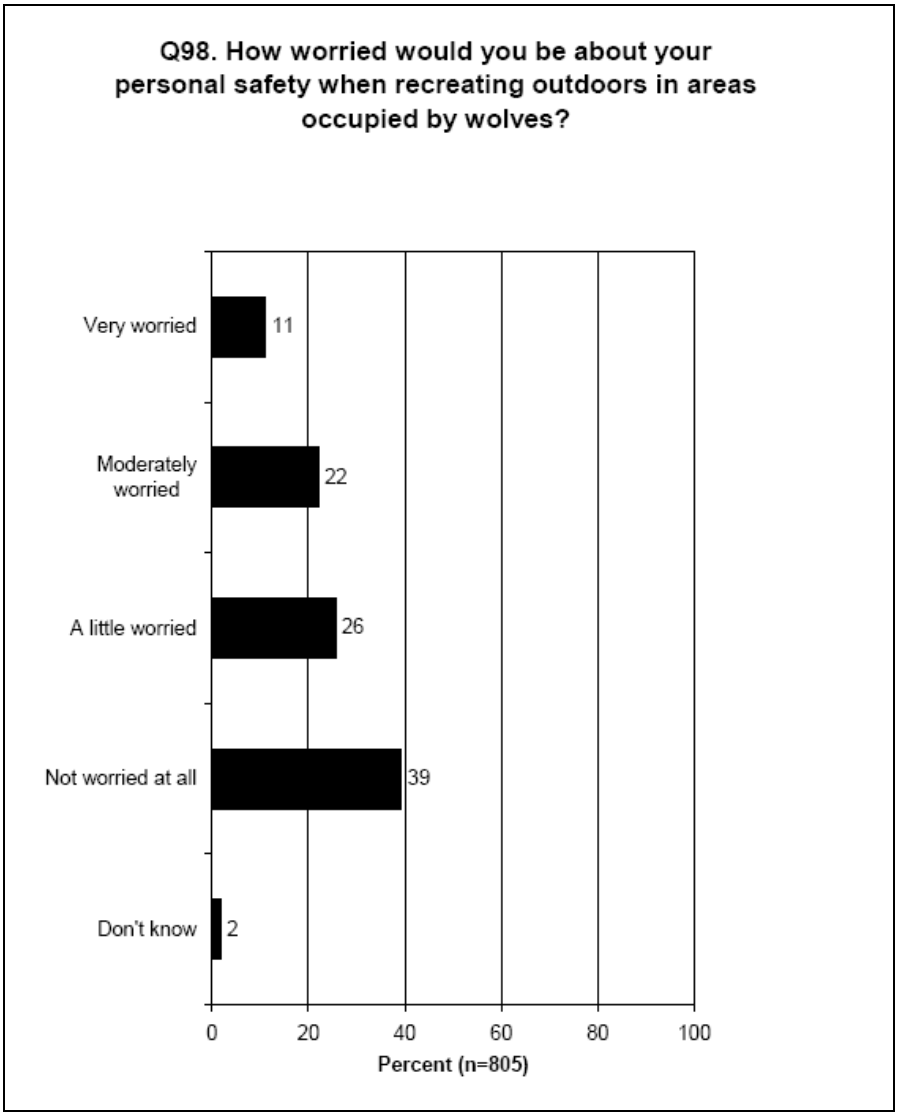

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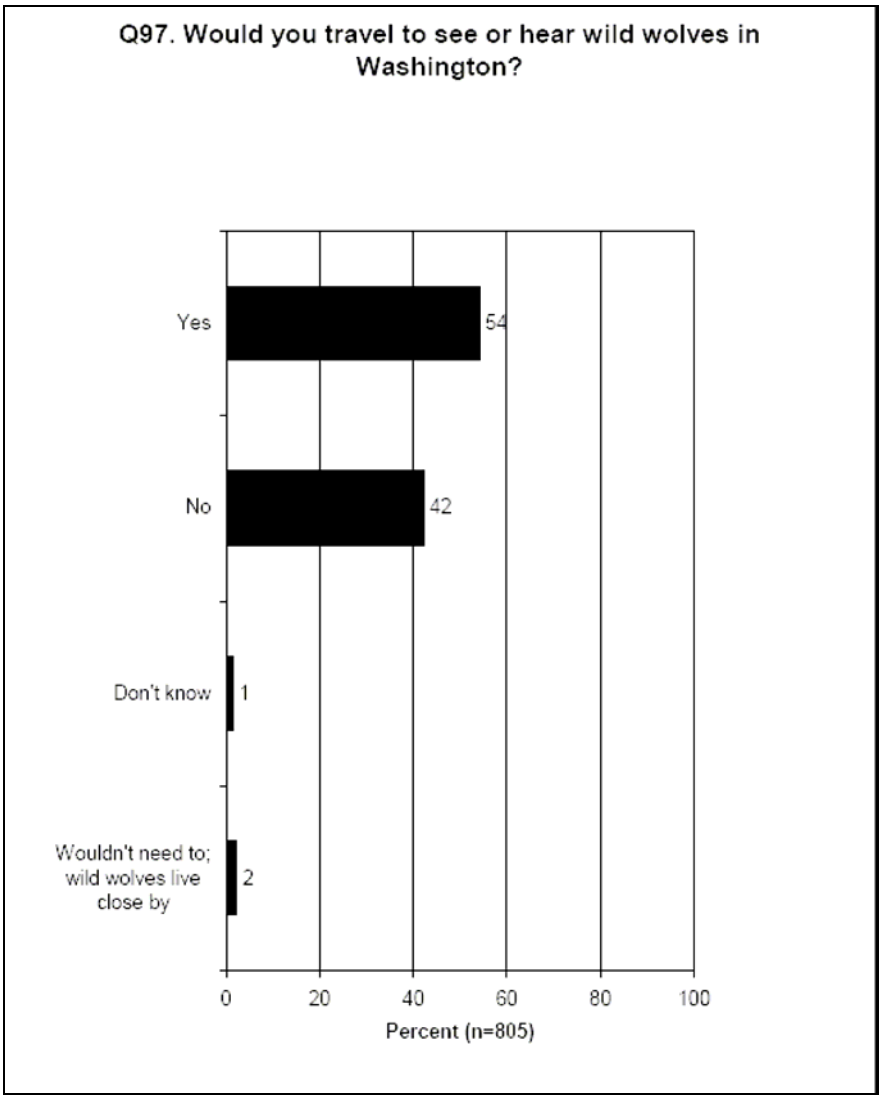
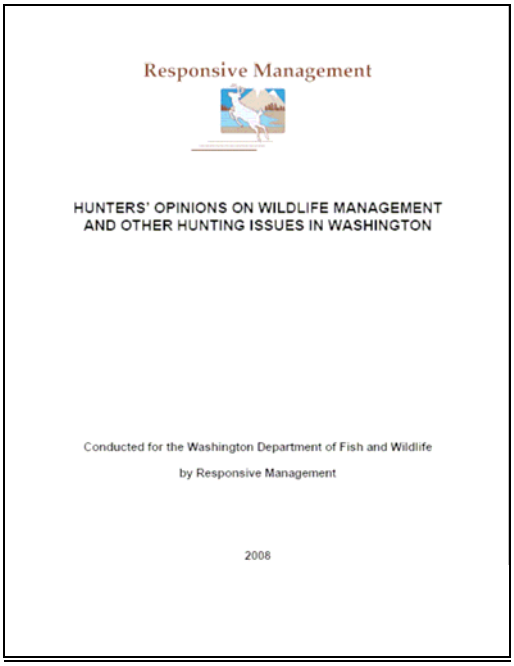


Appendix F. Hunter opinions on management of wolves, excerpted from a report prepared by Responsive Management (Duda et al. 2008b) for the Washington Department of Fish and Wildlife.


Responsive Management

HUNTERS' OPINIONS ON WILDLIFE MANAGEMENT AND OTHER HUNTING ISSUES IN WASHINGTON

Conducted for the Washington Department of Fish and Wildlife

by Responsive Management

2008

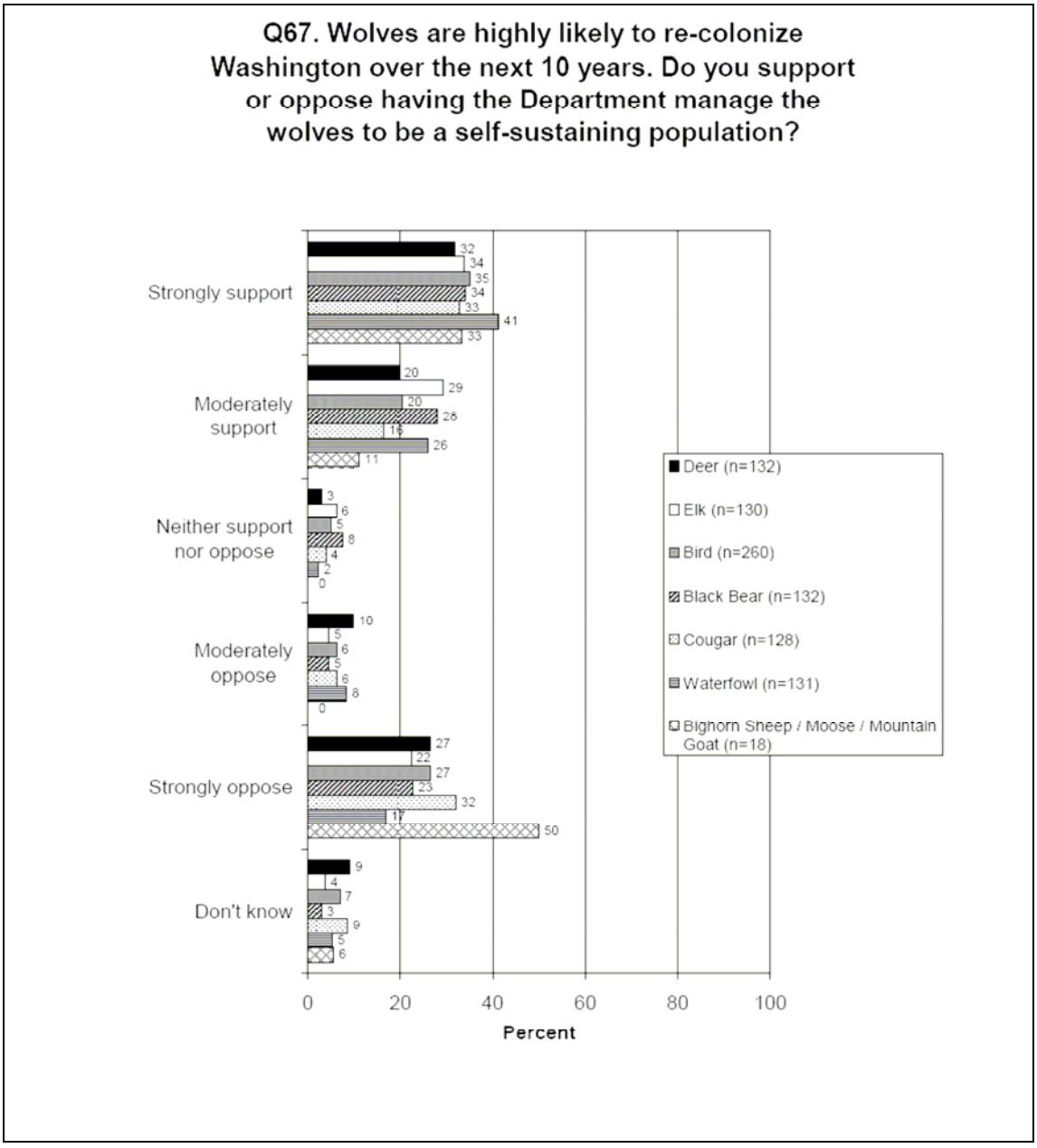
Responsive Management, a professional public opinion and attitude survey research firm specializing in natural resource and outdoor recreation issues, was contracted by WDFW to determine hunters' opinions statewide on a variety of questions pertaining to hunting and wildlife management in Washington, including wolves (Duda et al. 2008b). The study entailed a telephone survey of 931 Washington residents 12 years old and older and was conducted from December 2007 to February 2008. Survey methods are fully described in Duda et al. (2008b). The survey was organized by species type, with questions designed specifically for deer, elk, game birds, waterfowl, black bears, cougars, and bighorn sheep/moose/mountain goats combined. Within the total pool of respondents, about 130 respondents were sampled for each species with two exceptions: first, for game birds, the sample was doubled to about 260 to ensure a large enough sample size for several species within this category, and second, the sample for bighorn sheep/moose/mountain goats was very small (18) because of the few hunters for these species. Interviewers were trained according to the standards established by the Council of American Survey Research Organizations. Confidence intervals and sampling errors for the results were not reported. No attempt was made to weight respondent ages to the actual proportion of hunter ages in the state. The most common hunter age categories in the survey were 45-54 years old and 55-64 years old. About 60% of respondents were permanent residents of western Washington, about 35% were permanent residents of eastern Washington, about 3% lived outside the state, and 3% did not identify their county of residence. The survey asked three questions relating to hunter support or opposition for reestablishment of wolves in Washington. Each question and the public's responses to the question are provided on the following pages. The entire survey can be viewed online at the following website: http://www.wdfw.wa.gov/wlm/game/management/2009-2015/hunter_report.pdf.

Appendix F. Continued.

OPINIONS ON THE MANAGEMENT OF WOLVES

- After being informed that wolves are highly likely to re-colonize Washington over the next 10 years, hunters were asked if they support or oppose having the Department manage wolves to be a self-sustaining population. Support exceeds opposition among every type of hunter except sheep/moose/goat hunters.
  - Common reasons for supporting include that the hunter likes wolves/that all wildlife deserves a chance to flourish, that wolves should be managed and controlled anyway, or that wolves should be managed so that they do not overpopulate.
  - Common reasons for opposing include concerns about potential damage to livestock and/or game and wildlife, that the respondent does not want wolves in the area, or that wolves are not manageable.

Appendix F. Continued.



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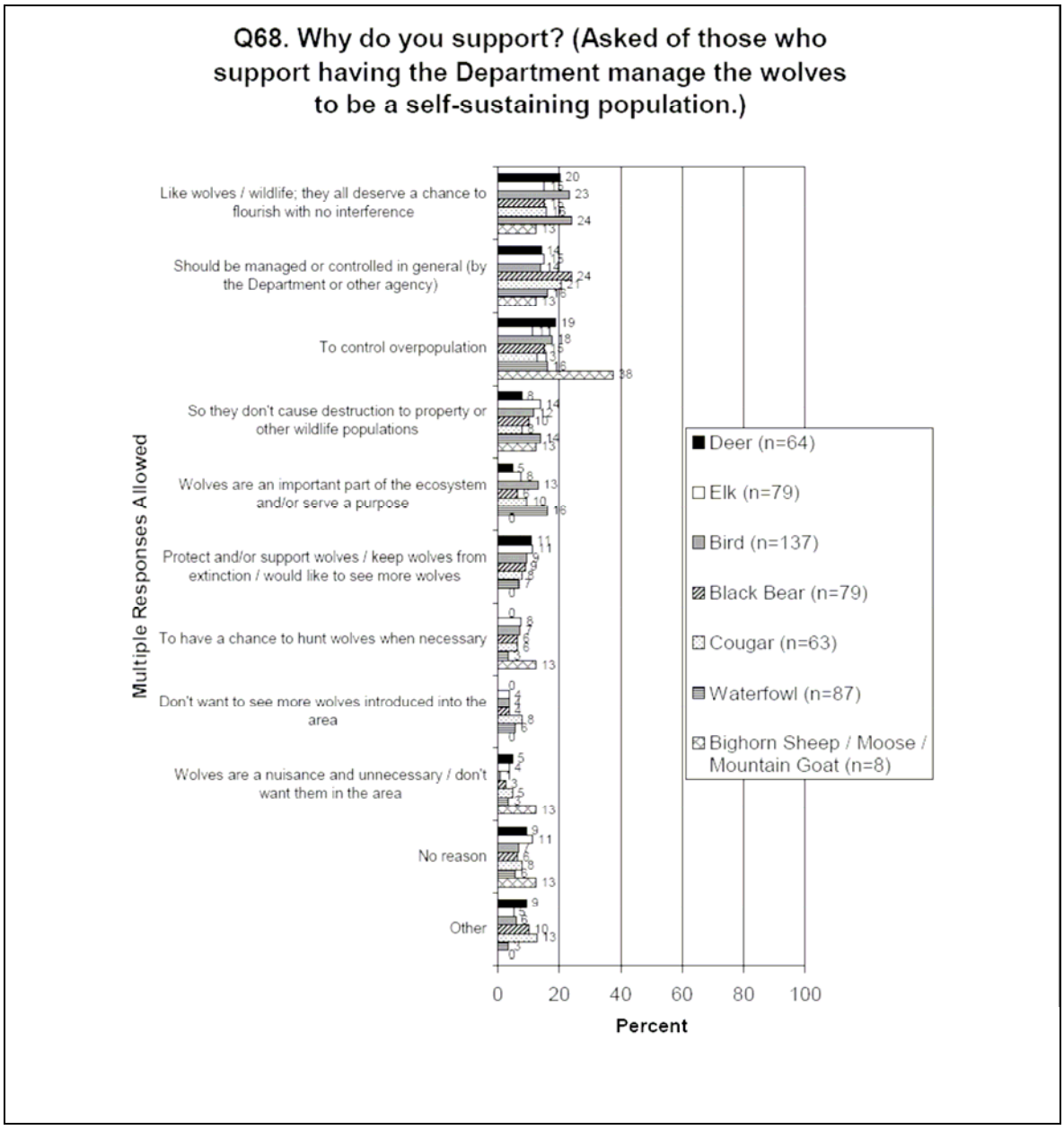

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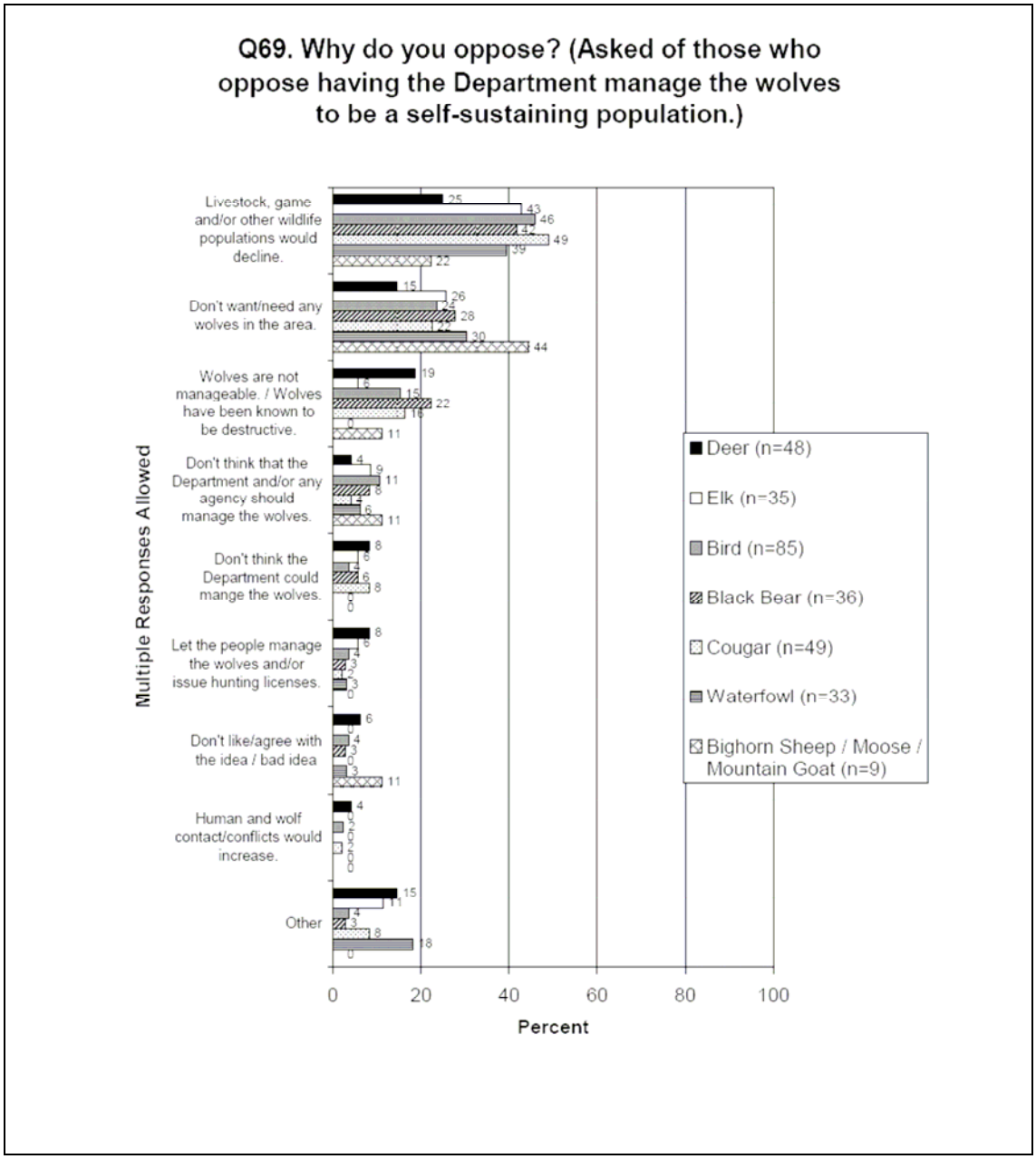

Appendix G. The minority position report on proposed numbers of successful breeding pairs for achieving the downlisting and delisting of wolves in Washington, which was submitted by six members of the state's Wolf Working Group.

May 27, 2008

The following represents a minority position held by the following members of the Wolf Working Group (WWG) Jack Field, Duane Cocking, Tommy Petrie, Daryl Asmussen, Jeff Dawson and Ken Oliver (We) on one critical component of the Wolf Working Group Plan; the number of Breeding Pairs (BP) of wolves that the state can support. We are "unable to live with" the proposed numbers in the WWG Draft Plan. We believe the numbers are too high and will result in direct conflict with the Livestock and Sportsman Communities.

Currently the plan calls for 6 BP's to down list to Threatened, 12 BP's to down list to State Sensitive and at least 15 BP's for 3 years before they can be considered for limited hunting(p. 41 WWG draft). During this time period wolf populations could increase 24% per year (Bangs, conversation). Plus at the end of the 3 year time period, there is a very definite probability of one or more lawsuits as is now occurring after the Federal delisting of wolves in the Northern Rocky Mountain (NRM) area. It is estimated that it will take a minimum of 18 months for these challenges to work their way through the court system.

This same scenario will probably occur in this state. Consequently we could be looking at as many as 28 to 35 BP's before control measures could be taken to control their growth. All of this in a state with Washington's Population of 6,490,000 people and a population density of 97.5 people/ sq mi (WWG Draft Plan). This is 5 to 6 times the human population density of the 3 principle states in the NRM area, MT, ID, and WY. (WA, WY, ID, and MT state web sites). According to the Federal Register, Feb. 8, 2007, Vol.72, number 26, this state has only 297 square miles of suitable wolf habitat in the eastern third of the state (p.6117 Federal Register). It should be noted that this same source shows the following amounts of suitable habitat in each of the states comprising the NRM are, MT. 40924 sq. mi., WY. 29808 sq. mi., ID. 31,586 sq. mi., OR. 2556 sq. mi. and, UT. 1635 sq. mi. This same report indicates that if the 3 major states (ID, MT, and WY) can support 10 BP's for 3 years that the species can be considered to be fully recovered and can be considered for delisting (p.6107 Federal Register). That criteria was met in 2002 (p. 6111 Federal Register).

The amount of suitable wolf habitat in the remaining two thirds of the state as depicted in the "Application of habitat models to wolf recovery planning in WA" by Carroll indicates scattered habitat in small isolated areas of the Okanogan, larger amounts of marginal habitat both North and South of Mt. Rainier, and a large area of habitat in and around the Olympic National Park, an area that strongly opposed wolf reintroduction several years ago.

Therefore we feel that the WWG's desired number of BP's is unrealistic given the lack of suitable habitat and the much higher human population density of this state and that the requirement of 15 BP's for 3 years (50% Higher that the USFW criteria for recovery in WY, MT, and ID,) defies common sense. This is further compounded by a recent recommendation from the Idaho Department of Fish and Game Commissioners to set the limit for a wolf hunt at 2005 levels which could mean 500 wolves could be killed this year. Idaho Fish and Game biologists estimate there are currently about 750 wolves in the state, but after the breeding season this spring they expect more

than 1,000. The commissioners on the higher figures because they did not believe that hunting would bring the wolf population numbers down to the levels they wanted to see.

We therefore propose the following numbers of BP's statewide: 3 BP's to down list to Threatened, 6 BP's to down list to State Sensitive, and 8 BP's to change to a Big Game Animal. And we would eliminate the 3 year period since the state was not considered essential for recovery of wolves in the NRM (p.6119 Federal Register). This total number of 8 BP's or approximately 80 wolves would fit in the states economic analysis as outlined in Chapter XIV, "Economics" which states "Wolf numbers between 50 and 100 animals should pose little detriment to the states livestock industry as a whole…As wolf populations become larger and more widely distributed, financial impacts are likely to accrue to more producers" (p.126). "Populations of 50 to 100 wolves should not have negative effects on big game hunting in Washington" (p.139).

The advantages of going with a lower number of BP's are: the sooner wolves can be removed from endangered and threatened status, the more tools stockmen and rural residents will have at their disposal to deal with problem wolves.

The sooner we can get wolves de-listed, the sooner our Fish and Wildlife Department can begin to manage them, until then their hands are tied. The sooner we can get them listed as a Big Game Species, the sooner our Fish and Wildlife can turn them from a liability into an asset through the sale of raffle tags, permits, and Governors Tags.

We believe that these numbers are far too high and do not accurately represent the concerns that the livestock production community has with wolves. The livestock community has preferred zero wolves from the beginning however, due to ESA and WDFW requirements zero is not an option. We support the Minority Opinion Numbers of 3 breeding pairs to downlist to threatened, 6 breeding pairs to downlist to sensitive, and 8 breeding pairs to delist from sensitive and managed as a Big Game Species**.** The higher numbers that the WWG Draft Plan includes will result in far more individual wolves than Washington has habitat to support thus causing a severe negative impact on private landowners and livestock producers. Livestock producers must be able to protect their property regardless of the wolf's status. We are also concerned that the WDFW has not effectively demonstrated its ability to secure long-term funds that will be a requirement in Management and Compensation. Without funding there is **NO Support** of any plan!!

The remainder of the WWG plan is acceptable to the supporters of the minority position.

Jack Field
Duane Cocking
Ken Oliver
Daryl Asmussen
Jeff Dawson
Tommy Petrie

Response Guidelines

For

Reported Gray Wolf Activity

In Washington State

Coordinating Agencies:

U.S. Fish and Wildlife Service
Washington Department of Fish and Wildlife
USDA/APHIS – Wildlife Services

August 13, 2008

Table of Contents

PURPOSE

These response guidelines are a cooperative effort between the U. S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW) and U.S. Department of Agriculture Wildlife Services (WS). The purpose of the guidelines is to prepare for a coordinated and effective response to possible situations that may occur if wolf/human interactions take place in Washington State. **This is not a wolf management plan or recovery plan.** It does not contain any objectives for establishing wolves in Washington State. The guidelines adhere to Federal and, where appropriate, State law and policy and emphasize close interagency and inter-governmental coordination and a common understanding of specific roles and responsibilities between all involved agencies.

BACKGROUND

The following information provides some background on the legal status of wolves in Washington, management authorities, the history of wolves in Washington, and issues surrounding their migration into the State.

1. The gray wolf was long believed extirpated from Washington, meaning that the species, which is native to the state, was no longer thought to occur here. However, occasional unconfirmed sightings since the 1930s suggest that a few single dispersing wolves have continued to enter Washington from neighboring areas, although these animals were never successful in reestablishing a breeding population. The past few years have experienced an increase in wolf reports in northeastern, north-central, and southeastern Washington. Many of these are unconfirmed or represent sightings of wolf-dog hybrids. However, some are considered reliable and are single animals in most cases. In July 2008, a pack with pups was discovered in Okanogan County and is the first fully documented breeding by wolves in the state since the 1930s.

   Wolves are adept at dispersing into new areas and establishing new packs, given an adequate prey source and protection from human persecution. Average pack size ranges from 5 to 10 animals in Idaho, Montana, and Wyoming.

2. The gray wolf is listed as endangered in Washington under the Federal Endangered Species Act (ESA). As long as the gray wolf remains Federally listed under the ESA, the USFWS has overall lead responsibility for wild wolves in Washington. Wild wolves that enter the State are fully protected by the ESA, which is administered and enforced by the USFWS. Wolf hybrids have no Federal or State legal status.

   For species listed under the Federal ESA, activities that may result in "take" of endangered species are generally prohibited. The definition of take under the ESA includes to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.

3. The gray wolf is also listed as endangered by the State of Washington and receives protection under State law (WAC 232.12.014, RCW 77.15.120). The State may designate agents or enter into cooperative agreements with Federal agencies to enforce State law. The

Washington Fish and Wildlife Commission may also promulgate rules to authorize Federal and State agencies concerned with the management of fish and wildlife resources to lethally remove wolves under limited circumstances.

The WDFW currently has a cooperative agreement with the USFWS, under Section 6 of the Federal ESA, that provides WDFW authority to manage for the conservation of endangered or threatened species, including gray wolves, within the State, except for lethal take of those species.

4. The Federal gray wolf recovery program in the northwestern United States is focused on maintaining viable wolf populations in parts of Idaho, Montana, and Wyoming. There are no federally sponsored plans to promote wolf recovery in Washington. However, wolves may move into the State from the expanding central Idaho or northwestern Montana populations, or from Canada, and it is anticipated that more packs may become established in Washington in the future.

5. When the wolf is Federally delisted, management authority will revert to the State. In anticipation of this, the WDFW is initiating development of a state wolf conservation and management plan.

6. The WDFW strives to recover extirpated native species whenever possible. However, the agency has no plans to reintroduce wolves to Washington. As noted above, it is expected that wolves will disperse naturally into the State from surrounding populations.

   In recognition that wolves may become established in the State in the future, the USFWS, WDFW and WS must be prepared to respond to incidents involving wolves.

7. Tribal governments manage wildlife on their reserved lands and they maintain certain rights to wildlife resources on ceded lands in the State.

8. Wolves sometimes depredate on livestock and/or other domesticated animals and these depredations must be investigated and controlled. Thus, Wildlife Services (WS), the Federal agency with nationwide responsibilities for managing wildlife damage problems, is also a key partner in wolf management in the State.

OVERVIEW OF POTENTIAL SITUATIONS

Discussed below are five situations that might arise in Washington and an overview of the recommended response strategy for each situation. The five situations are:

1. **Unconfirmed report of wolf activity or sightings.**
2. **Verified wolf activity, without a problem incident.**
3. **Report of possible wolf-caused livestock depredation.**
4. **Report of a wolf capture.**
5. **Report of an injured or dead wolf.**

Specific incidents will have unique circumstances and responses are likely to vary from case to case to account for individual situations. The cooperating agencies will coordinate their responses to the various wolf management situations as they arise. If wolf activity is discovered within or adjacent to tribal lands, government-to-government discussions with the affected Tribe will be initiated.

1. Unconfirmed Reports of Wolf Activity (Tracks or Sightings)

USFWS, WDFW and other agencies occasionally receive reports from people who have observed either large tracks or large animals that they think may be wolves. The response procedure is to interview the caller and fill out the observation form that documents details on the observation and where it was located. This information will be stored for future reference.

2. Verified Wolf Activity (Not Involving a Depredation or Conflict)

- Wolf activity in Washington will be considered verified when a State, Federal or Tribal wildlife biologist has been able to see and, to the extent possible, conclusively identify a wild wolf in the field. If current, highly credible reports are received from another source, or if multiple credible reports are received from the same area, appropriate personnel may be sent out to the area to verify it. If there is uncertainty about the identification, wolf experts may be brought in to assist in the confirmation process.

- If wild wolves are confirmed to be present in Washington and the animal(s) has not been implicated in a livestock depredation or other problem incident, USFWS, WS and WDFW will collaborate to monitor the wolf activity to the best of their ability, given available resources. Tribal wildlife agencies may also participate in monitoring activities. In addition, a WDFW local enforcement officer will coordinate with livestock producers in the local area to provide relevant information and what steps they may legally take to prevent depredation.

- The preferred monitoring approach is to capture and radio-collar wolves to facilitate regular tracking of movements. However, this can be difficult to accomplish with a lone wolf that is roaming across wide areas. Available funding and personnel may limit the ability to pursue this approach. Coordinating agencies would likely wait until there are multiple observations of wolf activity in an area – indicating the presence of one or more resident animals – before considering a concerted effort to capture and collar a wolf. A potential alternative approach would be to do periodic surveillance from the ground and air to document tracks and any observed wolf activity.

- The purpose of monitoring wolf activity, once verified, is to determine what areas wolves are using. Also, by knowing where the wolves are located, the agencies may be able to anticipate problem situations and utilize non-lethal techniques to possibly prevent or reduce conflicts. If problem situations do occur, the presence of radio-collared animals will increase the efficiency of subsequent actions.

- Both confirmed and unconfirmed reports of wolf sightings should be mapped, and reports stored by the agency wolf point of contact in their respective offices.

3. Report of Possible Wolf-Caused Livestock Depredation or Other Domestic Animal Conflict

WS is the lead Federal agency for animal damage control and, when authorized by USFWS, will implement wolf control actions in Washington. When a report is received claiming that a wolf has attacked livestock (cattle, sheep, horses, mules, herding or guarding animals such as llamas, donkeys and livestock guarding and herding dogs) or other domestic animals, agency response will include the following elements:

- WS investigates. Keys to a successful response include:
    - WS personnel are rapidly notified and respond promptly and determine whether or not it is a wolf depredation.
    - There is prompt coordination with the affected livestock producer to secure the scene.
    - Key individuals in USFWS and WDFW are promptly notified, including USFWS Office of Law Enforcement and WDFW Enforcement.
    - There is coordination between USFWS, WDFW, WS, and landowner to plan possible follow-up actions.

- If the WS investigation determines that the depredation was wolf-caused, a response action will be initiated. Site-specific circumstances will dictate what type of response action will be used. Response actions will become more aggressive, if needed, until depredations cease.

4. Wolf Capture

Wolves may be caught in traps or snares set for other animals. If a captured wolf is healthy, the responding agency will consult with partner agencies prior to initiating an action. Site-specific circumstances will influence how such captures are handled; however, a rapid response and decision will be necessary to ensure the health and well being of the animal. USFWS Office of Law Enforcement should immediately be consulted in this situation (to make a legal determination about the capture, properly document the event, and initiate further action if necessary).

Factors that will be considered when responding to a wolf capture include the following:

- If there is no history of wolf problems in the area where the animal is captured, the preferred approach is on-site release. However, decisions regarding how to manage the issue will be made on a case-by-case basis. An evaluation will be made to determine if there have been any reported wolf problems in the area prior to making a release decision. Interagency coordination will be initiated to determine what should be done with the animal.

- If an on-site release is being considered, an evaluation of the animal's health will be conducted prior to release. If the wolf is injured, depending on the severity of the injury, a decision will be made on whether or not to release the animal. Female wolves with pups captured on public lands prior to October 1 should be released in the same area as capture unless there have been repeated depredations in the area.

- If the animal is collared and released, collaborating agencies will monitor its movements as regularly as possible.

- If a decision is made to hold the animal, arrangements will be made with an appropriate kennel facility and veterinary care will be arranged, if needed.

5. Report of a Dead or Injured Wolf

USFWS Office of Law Enforcement and WDFW enforcement personnel will immediately be called in to investigate all reports of dead or injured wolves and make a determination about the cause of death or injury, properly document the event, and initiate further action as necessary. The USFWS is responsible for investigating cases that involve unauthorized take of a Federally listed species. The WDFW is responsible for investigating violations of State wildlife laws.

When an injured or dead wolf is found, response will include the following elements:

- USFWS and WDFW Law Enforcement will be immediately notified and they will determine and control all subsequent aspects of the response.
- Keys to a successful response include:
  - Law Enforcement officers are rapidly notified and respond promptly.
  - Scene where the animal was found is left undisturbed and effectively secured.
  - Key individuals in various agencies are promptly notified.
- If an injured wolf is found, actions will be taken immediately to stabilize its condition. Interagency coordination will be initiated to determine what should be done with the animal. Depending on the severity of the injury, a decision will be made on whether or not to release the animal.

RESPONSE STRATEGY

Response checklists have been developed for each of these five potential wolf situations to facilitate a smooth and organized response:

1. **Unconfirmed report of wolf activity or sightings.**
2. **Verified wolf activity, without a problem incident.**
3. **Report of possible wolf-caused livestock depredation.**
4. **Report of a wolf capture.**
5. **Report of an injured or dead wolf.**

RESPONSE CHECKLISTS:

UNCONFIRMED REPORT OF WOLF ACTIVITY

Recipient of report:

Take caller's name and call back information.

Contact the appropriate USFWS or WDFW office.

The USFWS or WDFW will interview the person(s) reporting the sighting and record all relevant information regarding the sighting on the appropriate form and mark the location on a map.

When warranted and resources are available, the WDFW or its designated agents will conduct a follow-up field investigation to try to determine if wolves are in fact in the area, particularly when multiple credible reports come in from the same area.

VERIFIED WOLF ACTIVITY, WITHOUT A PROBLEM INCIDENT

If the presence of wild wolves is confirmed, and there has not been a livestock or domestic animal depredation or other problem incident, the first recipient of the information will respond as follows:

Recipient of report:

- Take caller's name and call back information.
- Document the specific location(s) where activity has been observed.
- Contact the appropriate USFWS or WDFW office.

Agency Roles and Responsibilities

WDFW will investigate verified wolf sightings and monitor wolf activity.

USFWS may assist WDFW with investigating verified wolf sightings and monitoring wolf activity.

Wildlife Services personnel may provide assistance in trapping efforts for radio-collaring wolves.

1. The agencies will coordinate and share this information with all other appropriate agencies, e.g. USFWS or WDFW, WS, US Forest Service, BLM, National Park Service (NPS), and Washington Department of Natural Resources (WDNR).
2. If wolf activity is within or adjacent to Tribal lands, the USFWS office involved will share this information with the affected tribe.
3. All media inquiries should be referred to USFWS External Affairs contacts Tom Buckley (Spokane, east of the Cascade mountains), or Doug Zimmer (Lacey, west of the Cascade

mountains), and WDFW Public Affairs contacts Madonna Luers (Spokane, east of the Cascade mountains), or Margaret Ainscough (Olympia, west of the Cascade Mountains).

4. WDFW local Enforcement Officers will provide information updates to livestock producers in the area and describe what they can legally do to discourage wolves from frequenting their property or grazing allotment.
5. Monitoring of wolf activity will be coordinated among USFWS, WDFW and WS, using one or more of the following three approaches:
   - Compile information and map locations of sightings of animals and tracks through interviews with persons(s) reporting activity.
   - Conduct periodic ground surveys (i.e., scat and track surveys, howling surveys) and/or flyovers to monitor wolf activity.
   - Use radio-telemetry to regularly track collared animal(s).

REPORT OF POSSIBLE WOLF-CAUSED DEPREDATION ON LIVESTOCK OR DOMESTIC ANIMALS

Recipient of report:

Take caller's name and call back information and advise the caller to protect the scene. Ask for specific directions on how to reach the scene (street names, landmarks, gates, etc).

Give the caller the following instructions to protect the scene:

- Avoid walking in and around the area;
- Keep dogs and other animals from the area to protect evidence;
- Place tarp over carcass;
- If possible, use cans or other objects to cover tracks and scats that can confirm the depredating species;
- Inform caller that a Wildlife Services investigator will be notified of the incident.

Immediately contact the appropriate USFWS or WDFW office.

Agency Roles and Responsibilities

Wildlife Services is the lead agency for investigating livestock depredations and making the determination on cause of death.

1. USFWS, WDFW, or WS will interview the person(s) reporting the incident and record all relevant information regarding the incident on the appropriate form and mark the location on a map.
2. The USFWS or WDFW will contact WS and relay the information provided by the caller and request that an investigator be dispatched to the scene.
3. The responding agency will continue coordination with WS, WDFW or USFWS, and the livestock owner, as needed, to ensure someone responds and that the owner is kept informed.

4. The agency will notify law enforcement, and all other appropriate agencies (e.g. US Forest Service, BLM, NPS, WA DNR).
5. If wolf activity is within or adjacent to Tribal lands, the USFWS office involved will work with the affected tribe.
6. All media inquiries should be referred to USFWS External Affairs contacts Tom Buckley (Spokane, east of the Cascade Mountains), or Doug Zimmer (Lacey, west of the Cascade Mountains), and WDFW Public Affairs contacts Madonna Luers (Spokane, east of the Cascade Mountains), or Margaret Ainscough (Olympia, west of the Cascade Mountains).

IF WILDLIFE SERVICES DETERMINES THAT THE DEPREDATION WAS WOLF-CAUSED:

1. USFWS, WDFW, and WS will coordinate and consult with designated agency managers to evaluate possible response actions, assess the efficacy of non-lethal measures and document that process, and determine the appropriate response measure.

2. USFWS, in coordination with WDFW and WS, will authorize a course of action, with notification to USFWS and WDFW Law Enforcement prior to action being taken.

3. WS will implement the response efforts.

4. WDFW local enforcement officers will provide information updates to livestock producers in the area and describe what they can legally do to discourage wolves from frequenting their property or grazing allotment.

REPORT OF A WOLF CAPTURE

Recipient of report:

Take caller's name and call back information and get detailed description of the incident location from the caller. Ask about specific directions on how to reach the scene (street names, landmarks, gates, etc), provide them with instructions on what to do until someone arrives, and inform them that USFWS or WDFW personnel will respond to the scene immediately.

Immediately contact the appropriate USFWS or WDFW office.

Agency Roles and Responsibilities

WDFW will respond to wolf captures.

USFWS may assist in responding to wolf captures and will coordinate with WDFW and WS to decide on what course of action to take.

Wildlife Services may assist if conditions warrant.

1. The responding agency will interview the person(s) reporting the incident and record all relevant information regarding the incident on the appropriate form and map the location.

2. An agent from WS, or a biologist from WDFW or USFWS will be dispatched to confirm that the captured animal is a wolf and to evaluate the animal's condition.

3. If it is confirmed that the animal is a wolf, contact USFWS Office of Law Enforcement and advise them of the circumstances as soon as possible.

4. Initiate interagency coordination to determine what should be done with the animal. Depending on the severity of any injury to the animal, a decision will be made on whether or not to release the animal.

5. Upon the USFWS Office of Law Enforcement's determination that information can be released (if a wolf), the responding agency will notify all other appropriate agencies (e.g. US Forest Service, BLM, NPS, and WA DNR).

6. If wolf activity is within or adjacent to Tribal lands, the USFWS office involved will work with the affected tribe.

7. If the decision is to release the animal on site, WDFW Enforcement officers will provide information updates to livestock producers in the area and describe what they can legally do to discourage wolves from frequenting their property or grazing allotment.

8. In USFWS Office of Law Enforcement matters, refer media inquiries to the Redmond Office of Law Enforcement. In non-law enforcement matters, refer all media inquiries to USFWS External Affairs contacts Tom Buckley (Spokane, east of the Cascade Mountains), or Doug Zimmer (Lacey, west of the Cascade Mountains), and WDFW Public Affairs contacts Madonna Luers (Spokane, east of the Cascade Mountains), or Margaret Ainscough (Olympia, west of the Cascade Mountains).

REPORT OF A DEAD OR INJURED WOLF

Recipient of report:

Take caller's name and call back information and advise the caller to secure the scene. Ask about specific directions on how to reach the scene (street names, landmarks, gates, etc).

Give the caller the following instructions to protect the scene:

- Treat area as a potential crime scene.
- Do not touch anything and keep all people and animals from the area.
- A tarp can be placed over the wolf carcass.
- Cans or other items can be placed over footprints and animal tracks.

Immediately contacts the appropriate USFWS or WDFW office.

Agency Roles and Responsibilities

WDFW will respond to reports of dead or injured wolves.

USFWS will make decisions on euthanasia of injured wolves.

WS may respond to reports of injured wolves.

1. The USFWS or WDFW contacts caller to get a detailed description of the incident location.

2. USFWS or WDFW notifies USFWS and WDFW Law Enforcement. Relay information provided by the caller and request that an officer be sent to the scene.

IF THE WOLF IS DEAD: USFWS Law Enforcement personnel will take over the investigation and determine all subsequent aspects of the response. If there is an ongoing law enforcement investigation, refer all media inquiries to USFWS Office of Law Enforcement, Redmond.

IF THE WOLF IS INJURED:

1. Dispatch a USFWS, WS or WDFW biologist to the scene to evaluate the seriousness of injuries and recommend further action and continue coordination with USFWS law enforcement agent and on-site person.

2. With USFWS Office of Law Enforcement concurrence, the USFWS and WDFW will notify all other appropriate agencies (WDFW, WS, US Forest Service, BLM, NPS, and WA DNR).

3. Interagency coordination will be initiated to determine what should be done with the animal. Depending on the severity of the injury, a decision will be made on whether or not to release the animal.

4. If wolf activity is within or adjacent to Tribal lands, the USFWS will work with the affected tribe.

5. If there is an ongoing law enforcement investigation, refer all media inquiries to USFWS Office of Law Enforcement, Redmond. Otherwise, refer all media inquiries to USFWS External Affairs contacts Tom Buckley (Spokane, east of the Cascade Mountains), or Doug Zimmer (Lacey, east of the Cascade Mountains), and WDFW Public Affairs contacts Madonna Luers (Spokane, east of the Cascade Mountains), or Margaret Ainscough (Olympia, east of the Cascade Mountains).

Attachment A: Phone Contacts to Report Wolf Observation, Injury, or Suspected Depredation

U.S. Fish and Wildlife Service, Monday through Friday, 8:00 – 4:30 (except federal holidays):

Eastern Washington:
Spokane……..…….. (509) 891-6839

Western Washington:
Lacey …… (360) 753-9440

USFWS Office of Law Enforcement to report dead or injured wolves:
Spokane …….. (509) 546-8300
Lacey …….. (360) 753-7764
Redmond …….. (425) 883-8122
Bellingham ……..… (360) 733-0963
Burbank (Tri-Cities)…… (509) 546-8344
Portland …… (503) 780-9771

USFWS Office of Law Enforcement after hours:
Call Washington State Patrol Office (425-649-4370). Tell dispatcher which county is involved and ask to be connected to a USFWS Special Agent.

Washington Department of Fish and Wildlife, Monday through Friday, 8:00 – 5:00:
Spokane …… (509) 892-1001
Ephrata …… (509) 754-4624
Yakima …… (509) 575-2740
Vancouver …… (360) 696-6211
Mill Creek …… (425) 775-1311
Montesano …… (360) 249-4628
Olympia …… (360) 902-2200

USDA Wildlife Services, Statewide, Monday through Friday, 7:30 – 4:00:
Olympia …… (360) 753-9884

For Emergency and after-hours:
Contact your local State Patrol Office and ask to be connected to a local WDFW wildlife officer.

Washington State 24 hr Wolf Reporting Hotline……..…… **888-584-9038**