

Washington Department of Fish and Wildlife

Game Management Plan

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Department of
**FISH and
WILDLIFE**

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	I
CHAPTER 1.....	2
<i>Introduction.....</i>	<i>2</i>
<i>Public Involvement.....</i>	<i>2</i>
<i>Commission and Department Authorities.....</i>	<i>4</i>
<i>Background and Setting.....</i>	<i>6</i>
CHAPTER 2.....	18
<i>General Game Management Issues.....</i>	<i>18</i>
<i>PRIVATE LANDS HUNTING ACCESS.....</i>	<i>33</i>
<i>WILDLIFE CONFLICT.....</i>	<i>39</i>
<i>ELK (Cervus elaphus nelsoni, C. e. roosevelti).....</i>	<i>47</i>
<i>DEER (Odocoileus virginianus, O. hemionus hemionus, O. h. columbianus).....</i>	<i>62</i>
<i>BIGHORN SHEEP (Ovis canadensis).....</i>	<i>72</i>
<i>MOUNTAIN GOAT (Oreamnos americanus).....</i>	<i>83</i>
<i>MOOSE (Alces alces).....</i>	<i>90</i>
<i>PRONGHORN ANTELOPE (Antilocapra americana).....</i>	<i>98</i>
<i>BLACK BEAR (Ursus americanus).....</i>	<i>101</i>
<i>COUGAR (Puma concolor).....</i>	<i>107</i>
<i>WATERFOWL (Family Anatidae).....</i>	<i>116</i>
<i>MOURNING DOVE, BAND-TAILED PIGEON, COOT, AND SNIFE (OTHER MIGRATORY GAME BIRDS).....</i>	<i>124</i>
<i>WILD TURKEY (Meleagris gallopavo).....</i>	<i>127</i>
<i>MOUNTAIN QUAIL (Oreortyx pictus).....</i>	<i>134</i>
<i>FOREST GROUSE: Dusky Blue Grouse (Dendragapus obscurus), Sooty Blue Grouse (Dengragapus fuliginosus), Ruffed Grouse (Bonsa umbellus), and Spruce Grouse (Falcipennis canadensis).....</i>	<i>137</i>
<i>UPLAND GAME BIRDS: Pheasant (Phasianus colchicus), California Quail (Callipepla californica), Chukar (Alectoris chukar) and Gray (Hungarian) Partridge (Perdix perdix).....</i>	<i>141</i>
<i>SMALL GAME, FURBEARERS, AND UNCLASSIFIED SPECIES.....</i>	<i>151</i>
<i>Appendix A - POLICY-5302 Feeding Wildlife During Winter.....</i>	<i>157</i>

EXECUTIVE SUMMARY

This Game Management Plan (GMP) will guide the Washington Department of Fish and Wildlife's management of hunted wildlife for the next six years. The focus is on the scientific management of game populations, harvest management, and other significant factors affecting game populations.

As mandated by the Washington State Legislature (RCW 77.04.012), "... the Department shall preserve, protect, perpetuate, and manage the wildlife..."; "the Department shall conserve the wildlife... in a manner that does not impair the resource..."; and "The commission shall attempt to maximize the public recreational... hunting opportunities of all citizens, including juvenile, disabled, and senior citizens." It is this mandate that sets the overall policy and direction for managing hunted wildlife. Hunters and hunting will continue to play a significant role in the conservation and management of Washington's wildlife.

An Environmental Impact Statement (EIS) was completed on November 27, 2002, after public review of draft and supplemental EIS documents. The Washington Fish and Wildlife Commission formally adopted the Game Management Plan on December 7, 2002. This comprehensive process facilitated public discussion and understanding, while cooperatively developing the priority strategies.

The purpose of this Supplemental EIS is to update the plan for 2015-21. The Environmental Impacts Chapter (Chapter 2) from the original EIS is not included in this document, as no changes were made to that section. Several of the original strategies and objectives have been accomplished, additional studies and research have been conducted, and some priorities have changed. Those are the changes that have been addressed in this SEIS. Public outreach earlier this year helped shape the priority issues, objectives, and strategies identified in the SEIS.

The overall goals are to protect, sustain, and manage hunted wildlife, provide stable, regulated recreational hunting opportunity to all citizens, protect and enhance wildlife habitat, and minimize adverse impacts to residents, other wildlife, and the environment.

With all of these issues, it is understood that the implementation of strategies are conditioned first on meeting game population objectives. Science is the core of wildlife management, supporting WDFW's legislative mandate to preserve, protect, and perpetuate wildlife populations while maximizing recreation.

Science and the professional judgment of biologists is the foundation for all objectives and strategies identified in this plan. At times, the science may not be as strong as managers would like. In those instances, management actions will be more conservative to minimize the potential for significant negative impacts to hunted wildlife species. Chapter 2 focuses on the science and management of hunted species and lays out how those populations will be monitored to ensure perpetuation of these species over the long term.

CHAPTER 1

Introduction

The mission of the Washington Department of Fish and Wildlife (WDFW) is “Sound Stewardship of Fish and Wildlife.” The Department serves Washington’s citizens by protecting, restoring, and enhancing fish and wildlife and their habitats, while providing sustainable fish and wildlife-related recreational and commercial opportunities. Planning helps the Department prioritize actions to ensure accomplishment of its mission and mandate.

The purpose of the Game Management Plan is to assess current issues for hunted wildlife and outline strategies to help WDFW prepare for the future. The emphasis in this plan is the scientific management of hunted species populations, harvest management (hunting), and other significant factors affecting game populations. The plan is dynamic, and it is designed to facilitate resolution of emergent issues and allow adjustment of priorities when issues are resolved. The issues and options in the plan are based on current management information. As new information becomes available, options may be modified or new ones developed.

The plan identifies priorities for hunted wildlife and keeps the Department focused, directed, and accountable. The plan will guide the development of the three-year hunting season packages for 2015-17 and 2018-20. In addition, the plan will direct the development of WDFW Game Division work plans and budget proposals. Implementation will begin July 2015 and continue through June 2021.

The overall goals of the plan are to protect, sustain, and manage hunted wildlife, provide stable, regulated recreational hunting opportunity to all citizens, to protect and enhance wildlife habitat, and to minimize adverse impacts to residents, other wildlife, and the environment.

Public Involvement

Active public involvement is important for successful planning. In May 2001, WDFW asked the public to identify the key game management issues that need to be addressed in the future. This was done using a series of questionnaires and by facilitating input via a webpage on the agency’s website. Over 2,500 responses were received. Based on the issues identified during this process, WDFW hired a consulting firm to conduct a telephone survey of both the hunting public and the general public. This was used to get a more scientific sampling of the public. Responsive Management conducted the surveys using randomly selected telephone numbers with a sample of over 800 citizens for the general public survey and over 700 hunters for the hunter survey. References to public opinion based on this survey are made throughout this plan. To further refine the priority issues, WDFW consulted with the Game Management Advisory Council, the Wildlife Diversity Advisory Council, and members of the Fish and Wildlife Commission. The advisory councils include a cross section of interested citizens who provide feedback and advice to WDFW on a variety of topics. The information from the surveys, polls, and consultations identified the issues addressed in this plan. Finally, WDFW followed the Environmental Impact Statement (EIS) process to facilitate public involvement in reviewing alternatives and setting priorities.

The main issues identified by the public were categorized into several key areas:

- Scientific/professional management of hunted wildlife
- Public support for hunting as a management tool
- Hunter ethics and fair chase
- Private lands programs and hunter access
- Tribal hunting
- Predator management
- Hunting season regulations
- Game damage and nuisance
- Species-specific management issues

The first public release of the Draft Environmental Impact Statement (DEIS) for the Game Management Plan (GMP) was on July 26, 2002. After an extension, the deadline for public comment was September 10, 2002. Comments were received from over 77 groups and individuals. Extensive public comments resulted in significant re-writing and re-formatting of the EIS and GMP. Key changes included the EIS formatting, modification of elk and cougar issues, refining objectives and strategies, and consideration of the impacts of hunting on non-target wildlife species.

A Supplemental EIS (SEIS) was released on October 18, 2002, with a public comment deadline of November 18, 2002. During this comment period, a scientific peer review of the cougar management section of the plan was also solicited by WDFW.

The process of developing a non-project EIS allowed WDFW to use an iterative process, with releases of a Draft and a Supplemental EIS to facilitate public comments and add, modify, or delete strategies. This iterative process was used instead of the more traditional use of preferred and alternative strategies. Essentially, the number of alternative strategies was not limited and the preferred strategies were developed in concert with the public through a long scoping and development process and multiple comment periods.

The current process (2014) of developing a Supplemental EIS included a public scoping period, discussions with the Game Management Advisory Council, the Wolf Advisory Group, the Master Hunter Advisory Group, the Waterfowl Advisory Group, an updated telephone survey of hunters and the general public, and the current comment period for the draft of this supplemental EIS. Thousands of comments have been received to help shape the amended issues, objectives, and strategies to be implemented in the 2015-2021 Game Management Plan.

A few new issues or emphasis areas have also surfaced including:

- Wildlife Conflict Management
- Recruitment & Retention of Hunters
- Disease Impacts
- Non-toxic Ammunition
- Re-introduction of pronghorn
- Wolf Management

Commission and Department Authorities

The establishment of hunting seasons and management of game species is consistent with the authorities granted the Fish and Wildlife Commission and Department of Fish and Wildlife by the Washington State Legislature through Title 77 of the Revised Code of Washington. The Fish and Wildlife Commission develops and adopts hunting regulations (i.e., rules in the Washington Administrative Code) per the authority granted under Title 77 authority. In addition, various Commission and Department policies and procedures, including this Game Management Plan (GMP) guide game management.

The Washington Fish and Wildlife Commission and Department of Fish and Wildlife are responsible for the management and protection of fish and wildlife resources in Washington State. The Legislative mandate (RCW 77.04.012) for the Commission and the Department includes the following directives for wildlife management:

- The Commission, director, and the Department shall preserve, protect, perpetuate, and manage the wildlife...
- The Department shall conserve the wildlife resources in a manner that does not impair the resource. The Commission may authorize the taking of wildlife only at times or places, or in manners or quantities, as in the judgment of the Commission does not impair the supply of these resources.
- The Commission shall attempt to maximize the public recreational hunting opportunities of all citizens, including juvenile, disabled, and senior citizens (see Title 77 Revised Code of Washington).

In addition, various policies and procedures guided the Commission and Department in developing this GMP. In particular, the Washington Department of Fish and Wildlife Hunting Season Guidelines (August 1999), and further amended by the Commission in 2014, provide further guidance for this GMP:

Hunting seasons and regulation recommendations should be based on good science. When biological information is lacking or insufficient, management decisions should be sufficiently conservative to ensure protection of wildlife resources. At no time should decisions favor income to the agency or recreational opportunity to the detriment of conservation of wildlife populations.

1. *In general, hunting seasons and boundaries of game management units should be easy to understand while maintaining hunting opportunity and management options.*
2. *Continuity in hunting seasons over time is highly valued by the public; therefore Department recommendations for significant changes to seasons should be adequately explained to the public and should address a resource management need.*
3. *Establishing hunting seasons shall be consistent with the Commission Policy C-3607 regarding cooperatively managing wildlife resources with the tribes.*
4. *In general, hunting seasons shall be consistent with species planning objectives and provide maximum recreation days while achieving population goals.*
5. *A three-year season setting process which provides consistent general seasons from year to year with annual changes in permit levels to address emergent resource issues; natural disasters; and to meet requirements of federal guideline changes; etc.*

6. *The public shall be offered substantial and timely opportunity to make comments on and recommendations for the three-year hunting rules decision-making process. These opportunities must comply with the state's Regulatory Reform Act.*
7. *Public involvement for annual permit season setting shall include at a minimum, a standard written comment period and one public meeting where comments will be considered.*
8. *Hunting rules shall provide separate deer and elk general season recreational opportunities for archers, muzzleloaders, and modern firearm hunters.*
9. *Special deer and elk permit hunt opportunities shall be allocated among three principal user groups (archery, muzzleloader, and modern firearm) using the approved formula of success/participation rate.*
10. *Weapon and hunting equipment restrictions should maintain public safety; protect the resource; allow wide latitude for individuals to make equipment choices; be easy to understand and allow effective enforcement.*
11. *Disabled hunter opportunities shall emphasize equal access consistent with the Americans with Disabilities Act.*
12. *For disabled hunters, graduates of Master Hunter programs, youth hunters, and hunters over 65, strategies for enhanced opportunity shall include special consideration during general seasons, opportunities for special access, and other incentives rather than special permit hunts. Master Hunter incentives should return to the program's original intent, which was to address wildlife problems, issues associated with hunter ethics, and the challenging hunting circumstances on private lands.*
13. *Private landowner hunting issues such as season length, damage control, and trespass should be given consideration when developing hunting season recommendations.*
14. *The rules shall standardize furbearer seasons to provide trapping opportunity and address damage control.*
15. *The migratory bird and small game regulations shall provide maximum hunting opportunity considering federal guidelines, flyway management plan elements, and Department management objectives.*
16. *The hunting season closures and firearm restrictions shall be sufficient to assure resource conservation and public safety.*
17. *The goat, sheep, and moose permit hunting rules shall maintain high quality opportunities consistent with resource availability.*
18. *The Department shall maintain programs that offer the public high quality hunter education and firearm safety training.*
19. *The Department shall promote high standards of hunter ethics and adoption of principles of fair chase.*

Implementing the legislative mandate and the Commission guidelines for game species requires knowledge of game population trends and impacts of hunting regulations, development and management of hunting seasons and actions that support and maximize public recreation, and conservation of wildlife resources. The Fish and Wildlife Commission adopts major hunting seasons every three years. Minor adjustments are made annually such as modifying permit levels or addressing crop damage or nuisance problems. Migratory waterfowl seasons are adjusted annually in coordination with the U.S. Fish and Wildlife Service and the Pacific Flyway Council. The process for developing hunting seasons typically includes the following steps:

1. Staff determine the status of game populations and impacts of previous harvest strategies;
2. Staff engage in preliminary discussion of ideas with the tribes, the public, state and federal agencies, and WDFW biologists and managers;
3. Staff develop a set of season and regulation alternatives;
4. Staff prepare formal submissions pursuant to the Administrative Procedures Act of the draft regulations and identify the period for public comment;
5. Staff receive, consider, and summarize public comments;
6. Staff develop final recommendations for hunting season rules;
7. The Fish and Wildlife Commission considers staff recommendations, public comments, and related information and adopts regulations governing hunting seasons.

The process of establishing hunting seasons, bag limits, and geographical areas where hunting is permitted is exempt from State Environmental Policy Act (SEPA) rules through WAC 197-11-840. In addition, feeding of game, issuing licenses, permits and tags, routine release of wildlife, or re-introductions of native wildlife are also listed as exemptions from SEPA rules. However, policy development, planning, and all other game management actions are not considered exempt from SEPA rules.

Background and Setting

Native Americans

Native Americans have inhabited the State of Washington for at least 9,000 years. The Cascade mountain range splits Washington State into two very distinct environments: the dry conditions of the east and the much wetter, rain forest areas of the west. Native Americans adapted to these different conditions and evolved into two distinct patterns. The Pacific Coast Indians inhabited a land of plenty with an abundance of fish, shellfish, roots, berries, and game. While Native Americans east of the Cascades also had access to salmon and steelhead returning up the Columbia River system, they depended more on game and other food sources (Pryor 1997).

In 1853, Isaac I. Stevens was named the first Territorial Governor of the Washington Territory. He was also appointed Commissioner of Indian Affairs and negotiated treaties between Pacific Northwest tribes and the United States of America to pave the way for settlement and assimilation of Native Americans into non-Indian society. The treaties established a number of reservations for the Indian people, and in exchange the tribes ceded much of their territory to the U.S. government. The treaties and associated tribes are shown in Table 1.

Table 1. Indian Treaties between the United States of America and Northwest Indian Tribes.

Treaty	Indian Tribes	Location and Date
Treaty with the Yakamas	Yakama confederated tribes and bands	Camp Stevens, Walla Walla Valley June 9, 1855
Treaty with the Walla Wallas	Walla Walla, Cayuse and Umatilla tribes and bands	Camp Stevens, Walla Walla Valley June 9, 1855
Treaty of Olympia	Quinault, Hoh, and Quileute	Qui-nai-elt River –Jan. 25, 1856
Treaty of Point No Point	Jamestown S’Klallam, Port Gamble S’Klallam, Lower Elwha, Skokomish	Point No Point, Suquamish Head Jan. 26, 1855

Table 1. Indian Treaties between the United States of America and Northwest Indian Tribes. (Continued)

Treaty	Indian Tribes	Location and Date
Treaty of Point Elliott	Lummi, Nooksack, Stillaguamish, Swinomish, Upper Skagit, Suquamish, Sauk Suiattle, Tulalip, and Muckleshoot	Point Elliott January 22, 1855
Treaty with the Nez Perces	Nez Perce	Camp Stevens, Walla Walla Valley June 11, 1855
Treaty of Neah Bay	Makah	Neah Bay January 31, 1855
Treaty of Medicine Creek	Nisqually, Puyallup, Squaxin Island, Muckleshoot	Medicine Creek December 26, 1854

The tribes that signed the treaties retained certain rights and privileges. For example, Article 3 from the Medicine Creek Treaty with the Nisqually, Puyallup, Squaxin Island, and Muckleshoot Tribes states:

The right of taking fish, at all usual and accustomed grounds and stations, is further secured to said Indians in common with all citizens of the Territory, and of erecting temporary houses for the purpose of curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses on open and unclaimed lands...

Washington State courts have interpreted this treaty language to mean that treaty tribes can hunt within the boundaries of the area ceded to the federal government by their treaty, or in areas traditionally “used for hunting and occupied over an extended period of time,” on open and unclaimed lands that have not been put to a use that is inconsistent with hunting. In conjunction with such hunting, tribes are responsible for the management of their own hunters and hunting activities.

Not all of the tribes signed treaties with the government. Several of these tribes have reservations designated by federal executive order. These include the tribes of the Colville, Spokane, and Kalispel reservations in eastern Washington and the Chehalis and Shoalwater reservations in western Washington. Tribal hunting rights for these tribes are typically limited to areas on the reservation, or in the case of the Colville Tribe to areas that were formerly part of the reservation. There are additional tribal groups that are recognized by the federal government, but have no specific reservation or tribal hunting rights. Since tribal and non-tribal hunters impact the wildlife resource over much of the state, it is important that WDFW and the tribes work cooperatively to develop management strategies that can meet the needs of both. This process is complicated by the fact that tribal subsistence and ceremonial hunting and state recreational hunting are two very different philosophies steeped in different traditions and cultural heritages (McCorquodale 1997). This means that both sides have to work very hard to understand and appreciate other views.

Tribal governments take an active role in the management of wildlife resources. They typically have a tribal hunting committee that meets to develop regulations and management strategies. Many tribes have hired biologists or have access to biological staff that can advise them on the development of management approaches. Tribes have taken the lead in several areas on research projects to gather the information that is needed to better manage wildlife resources. WDFW and various tribes are working together to develop herd plans for key wildlife populations. WDFW is also working cooperatively with tribes to rebuild or augment populations that are below desired levels.

European Settlement

During the early European settlement of North America, hunting was primarily a subsistence activity (Organ and Fritzell 2000). The same was true for the early immigrants to the Washington Territory. Hunting was also used to eliminate animals that posed a threat to humans or their livelihood. Hunting eventually became a profitable commercial venture promoted initially by the fur trade and later for food, clothing, and jewelry. Conflicts between market hunters and sport hunters began to occur by the mid-1800s and nationally some influential sportsmen's organizations were formed (Trefethen 1975). During the 19th century, hunting changed from mostly a subsistence activity to a commercial one, and then to the beginnings of a recreational activity. At the same time, wildlife habitats were being fenced, plowed, burned, developed into towns, and cut by roads and rails (Madson and Kozicky 1971).

By the late 1800s, there was a new movement of sportsmen and other conservation minded people. Theodore Roosevelt led a social movement that pressed for an end to commercial traffic in wildlife and for government oversight of wildlife conservation (Reiger 1975, Warren 1997). Roosevelt introduced a new thought, "conservation through wise use" (Madson and Kozicky 1971). It was also the foresight of President Roosevelt that was responsible for the establishment of the U.S. Forest Reserves (Service) and the creation the National Wildlife Refuges. His legacy of public lands is in place today, more important than ever before, as strongholds of fish and wildlife in Washington State and the Nation.

In 1928, the American Game Conference, chaired by Aldo Leopold, formed a committee on Game Policy. During this period, wildlife conservation programs focused on laws and enforcement, but a formal wildlife management profession did not exist. The report (Leopold 1930) described the problem of declining wildlife and recognized the need for scientific facts concerning game species management. The committee called for the reorganization of state game departments and outlined the steps needed to reverse the trend (Madson and Kozicky 1971, Organ and Fritzell 2000).

"The report strongly urged that conservation be taken out of politics, that fish and game funds be earmarked for fish and game programs, and that every effort be made to build competent, stable, adequately-financed conservation departments (Madson and Kozicky 1971)."

Funding for key elements of the (government) agencies was linked to earmarked fees paid by hunters. Most significant were the Migratory Bird Hunting Stamp Act (1934), which funded National Wildlife Refuges; and the Federal Aid in Wildlife Restoration Act (1937), which provided federal funding for state agencies.

As the population of Washington increased, laws were enacted to protect the wildlife resources. The Legislative Assembly of the Territory of Washington enacted the first laws concerning wild animals within the territory in 1863. The first game species law allowed the "county commissioners of each and every county authority, if they think proper, to offer a bounty for killing wild animals." Although a few early laws were passed to preserve and protect game, they were largely ineffective and not enforced. In 1890, the Governor was given authority by the Legislature to appoint game wardens in each county.

In 1901, the State Legislature passed the first hunting license requirement allowing counties to issues licenses with a fee of \$1.00 for residents and \$10.00 for non-residents. In addition, any

person killing a male elk was required to pay an additional sum of \$20. Thus, game management in Washington entered the twentieth century with the beginnings of a user-fee hunting program to be administered by the county.

The passage of the Pittman-Robertson Federal Aid in Wildlife Restoration Act specified that an eleven percent excise tax on sporting arms and ammunition must be maintained in a separate fund in the Treasury and allocated annually to the states. In order for the states to participate, each state was required to pass enabling legislation and adhere to the provisions of the Act. This required all hunting license fees be dedicated to use by the state game department. The enabling legislation was passed by Washington State Legislature and signed into law in 1939. This was the beginning of modern wildlife management.

The Natural Environment

Washington has a rich diversity of flora. Forests cover about half of the state's land area. The Olympic Peninsula supports a temperate rain forest consisting of spruce, cedar, and hemlock, with an understory of ferns and mosses. The areas surrounding the Puget Sound and the western slopes of the Cascade Range are forested, consisting mostly of cedar, hemlock, and douglas fir, with an understory of shrubs. On the eastern slopes of the Cascades and in the Blue Mountains of southeastern Washington ponderosa pine, douglas fir, grand fir, western hemlock, and sub alpine fir are the major conifer species. The forests in these areas are more open, with an understory of grasses and shrubs, especially at the lower elevations. Across the northeast region of the state, the forest is dominated by douglas fir, western red cedar, western hemlock, and sub-alpine fir. The forests of the state have been intensively logged and contain second and third growth forest plantations of mostly douglas fir (Access Washington 2002).

In the Columbia Basin, the native vegetation is drastically different from the forested lands of the state, due to the dryer and hotter climate of the region. The pristine vegetation consisted of shrubs and grass (shrub steppe). With the introduction of agriculture and livestock grazing in the mid-1800s the vegetative character of the land took on a new look. Overgrazing by sheep, cattle, and horses was evident by 1885. Lands were cleared for intensive farming, both dry land and irrigated. On the prairies of the Palouse, the conversion of all arable land was nearly complete by 1910. Other lands are continuing to be converted to the growing of agricultural crops or converted to urban uses (Access Washington 2002).

The introduction of non-native weed species by imported livestock, contaminated commercial seeds, and other sources have resulted in a dramatic change in the landscape and the productivity of the land for commercial use, as well as intrinsic values. In Washington, invading weeds have adversely impacted native wildlife habitat and domestic livestock rangelands (Access Washington 2002).

The Social Environment

The evolution of the human social environment and its impact on the natural environment has been dramatic from pre-settlement to the present. Some game species have benefited from this transition while others have not.

Between 1950 and 1960, 60% of Washington's human population resided in incorporated areas. In 1990, only 52% live in incorporated areas (Access Washington 2002). This movement of people into rural and formerly undeveloped lands had significant impacts on wildlife habitat and abundance.

Washington has the second largest human population of the western contiguous states, but is the smallest in size. In 2010, the population was estimated at 6,724,540 compared to 5,974,900 in 2001 making it the 13th most populous state in the union. The long-term outlook in human population for the state of Washington is continued growth reaching the 7 million mark in 2015, with ever increasing impacts to the natural resources of the state.

The ten largest cities are almost exclusively on the west side of the state, with Spokane and Yakima the two representatives from the east side. The US Interstate 5 Highway corridor is the area of highest human population and where the greatest changes to the natural environment have taken place. Seattle is the largest city in the state with over a half million people. The cities of Spokane, Tacoma, Vancouver, Bellevue, and Everett are all over 100,000 in population.

Industry

Before settlement, the Pacific Northwest region was important for its fur-trapping industry. With the completion of the Northern Pacific Railroad in 1886 and Great Northern Railroad in 1893, Washington's economy grew. Agriculture and the lumber industry developed in western Washington and eventually to the east. A transportation network was a key to the growth of the state's economy (Access Washington 2002).

During the twentieth century, the construction of dams on the Columbia and Snake rivers provided abundant, cheap electrical power, resulting in the rapid growth of manufacturing. Dams for agricultural irrigation also advanced farming in the dryer Columbia Basin. Farms in western Washington are small, and dairy products, poultry, and berries are the primary commodities produced. The eastern side of the Cascade Range has larger farms, and potatoes, fruit, vegetables, and small grains such as wheat and barley are the primary crops.

According to the Economic Research Service of the U.S. Department of Agriculture, the 2007 Census of Agriculture showed that Washington farmland acreage totaled 14.9 million or about 35% of the total land area. Farmlands are highly valued wildlife habitats for which the landowner is not often recognized. Game species such as pheasants, quail, deer, elk, and waterfowl are attracted to private lands for their abundance of food and water.

Recent changes in natural resource policies, implementation of new ecosystem management strategies, as well as changing silvicultural practices on private forest lands have affected the timber industry, the people of Washington, and the Northwest. The timber harvest changes in Washington between 1989 and 2012 have been substantial (Table 2), (DNR 2012). The changes in forestry practices are necessary for the survival of many species that require older, more ecologically complex forests. However, there may be serious impacts to the future amount and quality of deer and elk forage and population numbers due to the lack of robust early-successional habitats over the long term.

Table 2. Timber harvest changes in Washington between 1989 and 2012.

Ownership	1989 harvest ^a	2012 harvest ^a	Percent Decrease
Private	4,027,278	2,182,159	-45.8
Public	1,929,039	33,260	-98.3
Total	5,956,317	2,217,431	-62.8

^a in thousand board feet

Land Use and Ownership

The total land area of the state is 45.9 million acres. Out of this total, 2.6 million acres are aquatic lands and 43.3 million acres are uplands. The public land ownership and principal uses in the state are found in the publication Interagency Committee for Outdoor Recreation 2001.

Public lands make up about 52% of the state. The U.S. Forest Service, representing about 41% of public lands, manages the greatest amount of public land. The total of all federal ownership in Washington represents about 58% of public lands. State lands represent about 27% of public lands. The Department of Natural Resources is the largest manager of state lands. Local and tribal lands make up the rest.

Public lands are not evenly distributed across the state, because of the historical pattern of settlement and development. The largest concentrations of public lands are at the higher elevations, while the lowlands and lands associated with waterways are mostly private. The Columbia Basin in eastern Washington and the Puget Trough region on the west side are mostly in private ownership.

Washington Hunters

The number of licensed hunters in the state of Washington grew rapidly since the 1930's with the increase in leisure time and availability of game. Historical records of hunting license sales by the counties are not readily available from 1901 to 1933. From 1933 to 1953, hunting license sales increased, peaking in 1953 at approximately 445,000 state and county hunting and fishing combination licenses sold (Figure 1). The growth in hunting license sales was particularly steep following World War II.

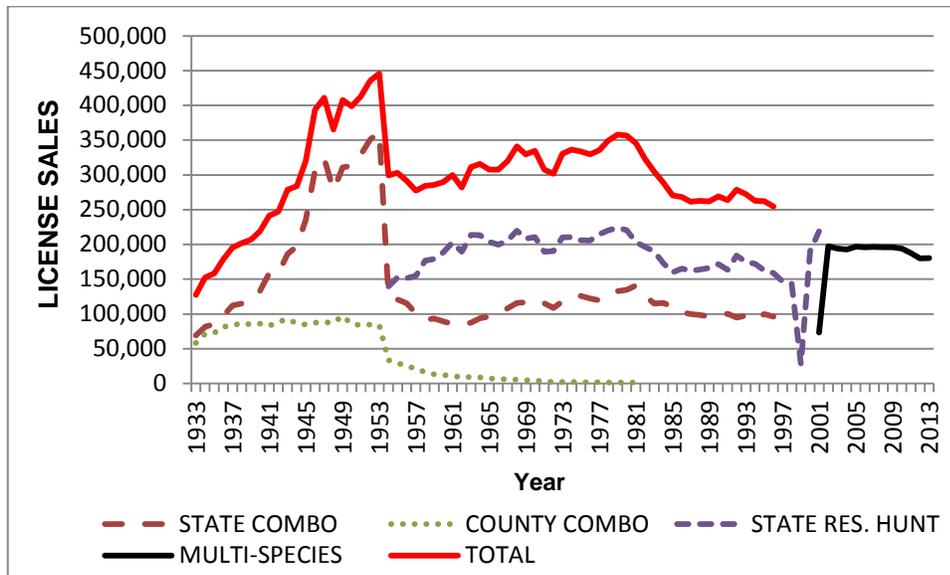


Figure 1. Washington hunting license sales and numbers, 1933-2012. In 1999, WDFW changed the type of license sold from a “state residential hunt” license to big game and small game licenses.

In 1954, a separate resident hunting license was introduced resulting in a substantial drop in total licenses sold. This drop most likely reflected the number of fishers who chose not to purchase a state hunting license rather than the hunting/fishing combination license because they had no intention of hunting. If this is true, then the increasing trend in hunters actually peaked quite a few years later in 1979 with about 358,000 hunting licenses sold. Thereafter, sales declined through 1989, when 261,907 licenses were sold. After 1989, hunter numbers slowly but consistently declined; at the same time the state’s human population increased substantially.

A discussion of trends in hunting participation by Brown et al. (2000) suggests that the trend of stable to decreasing numbers of hunters continues. They predict managing wildlife damage through hunting will be increasingly challenging because of declining recruitment of hunters and declining social support for hunting. In Washington, an analysis of general season deer hunter trends shows a slow decline. Since 1984, deer hunting participation rates have been highly variable from one year to the next but generally declining (Figure 2).

Washington hunter characteristics in 2011 were very different from a century ago. In 2012, Washington hunters were mostly well educated: Overall, 83% of Washington hunters had graduated from high school (or equivalent). In addition, many Washington hunters had obtained additional higher education, including some additional college or trade school training (39% of hunters), college degree (19%), and post-graduate or professional degrees (9%) (Responsive Management 2008). In 2008, Washington hunters were mostly 35 years old or older, with over half being 45 or older (Responsive Management 2008). In comparing an older demographic study of Washington hunters (Johnson 1973) to recent data (*National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*, U.S. Fish and Wildlife Service 2011), there has been little change in male dominance (94% males and 6% females) in the intervening 31 years. Age distributions of hunters in 1972 and 2008 are not directly comparable between the two studies. However, it is apparent that the majority of hunters in 1972 were less than 29 years of age compared to 2012 data where age of respondents were predominantly 35 years of age and older (70%) (Responsive Management 2008).

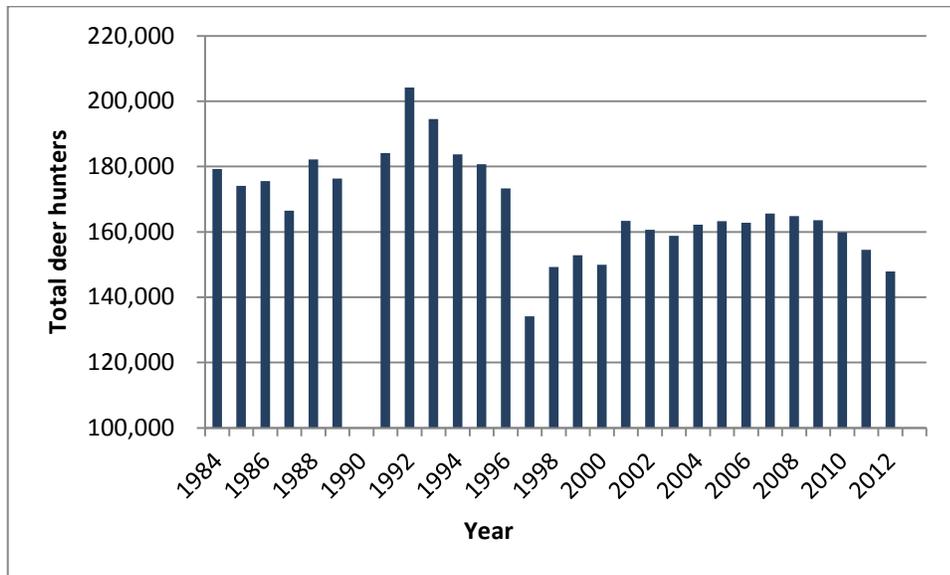


Figure 2. Washington deer hunting participation, 1984-2012.

Resource Allocation

During the 1970s, big game hunter numbers in Washington were at an all-time high. Hunter crowding, competition among hunters, and the declining quality of the hunting experience resulted in significant hunter dissatisfaction. As a result, many hunters changed from the use of modern firearms to primitive archery equipment and black powder muzzle loading rifles to take advantage of less-crowded hunting conditions. In 1982, the Department formed a Big Game Ad Hoc Committee to address the problems facing hunters in Washington and developed a plan of fair allocation of hunting opportunity. The committee identified three major goals as follows:

1. Reduce crowding in the more popular modern firearm hunting seasons.
2. Provide quality-hunting opportunity.
3. Provide early primitive weapon opportunity.

Following extensive debate and public involvement in 1984, the Fish and Wildlife Commission adopted a major change in deer and elk hunting. This new rule required all deer and elk hunters to select one type of gear for hunting (modern firearm, archery or muzzleloading rifle). In addition, all elk hunters continued to be restricted to an elk tag area.

Since 1984, modern firearm deer hunters have continued to represent the majority (over 70%) of active hunters. Archery deer hunter numbers increased to about 19% of deer hunters then stabilized. The number of muzzleloader deer hunters has shown a more protracted incline but appear to have stabilized, representing about 6% of the deer hunters.

On the other hand, elk hunter numbers have shown a more pronounced change in user group size. In 1984, modern firearm hunters represented 88% of all elk hunters, archery hunters 9.5%, and muzzleloader hunters 2.4%. In 1999, the modern firearm hunter represented just 68% of the total, archery hunter numbers doubled in percentage, and muzzleloader hunters increased six-fold (Johnson 1999). Since about 1994, the proportion of each user group (modern firearm, archery and muzzleloader elk hunter) has stabilized at about 69%, 17% and 14% respectively.

Separating hunters by hunting method has successfully distributed hunting pressure, relieved congestion, and increased primitive weapon opportunity. However, the quality of hunting opportunity has been more difficult to assess.

Resource allocation continues to be a contentious issue with hunters. A few of the more hotly contested issues include:

- Which group gets to hunt first?
- How should timing of various hunting seasons between user groups be fairly established?
- Should fairness be related to equal opportunity (days) or equal success?
- How primitive should “primitive weapon” hunting seasons remain?
- How should quality opportunity be addressed?

Hunter Education/Safety Training

Hunter education programs are in place in all 50 states, reaching about 650,000 hunters annually (Duda et al. 2010). In Washington, all individuals born after January 1, 1972, must show proof that they have completed a hunter education course before purchasing a hunting license.

The former Washington Department of Game first offered hunter education in 1955 on a voluntary basis. In 1957, it became mandatory for all juveniles less than 18 years of age. In 1995, all individuals born after January 1, 1972 were required to successfully complete a hunter education class. Washington currently certifies approximately 13,000 Hunter Education students each year.

Hunter Access

As early as 1875, the Legislative Assembly of the Territory of Washington passed a law that prohibited persons from entering upon private lands (enclosed premises) without permission from the landowner for the purpose of hunting grouse during the open season. This law demonstrates the early roots of conflict between hunters and landowners. Hunter access onto private lands and through private lands to public lands is a continuing issue.

WDFW has placed considerable emphasis over the years on obtaining access to lands for the enjoyment of hunting. Currently, there are several programs promoting hunter access. For decades the WDFW Private Lands Program has provided incentives to private landowners through technical assistance, implementation of habitat enhancement strategies, and hunter management assistance. Landowners agree to open their lands for recreational opportunity in exchange for materials and help planting and developing habitat. Over the past decade WDFW has also begun to offer cash incentives on either a per-acre or per-site basis in limited high priority focus areas where access has been difficult to secure. The Department provides free signs and assists the landowner in posting their lands as “feel free to hunt,” “register to hunt,” “hunt by written permission”, or “hunt by reservation only.” “Hunt by reservation” is the newest option and was first used in 2013 to provide quality hunting opportunities and give landowners another option to meet their needs. There are over 1 million acres and over 500 landowners in Washington under cooperative agreement.

The Private Lands Wildlife Management Area (PLWMA) program was developed and initiated on a trial basis in 1993. This program was designed to enhance wildlife habitat on private lands and encourage public access opportunities. Two PLWMAs were authorized in 1993, 201-Wilson

Creek and 401-Champion's Kapowsin Tree Farm. A third PLWMA 600-Pysht was added in 1997. A common criticism of this program from hunters was that public access was not adequately addressed and wildlife habitat enhancements may have been driven by incentives, rationale, or regulations outside of the PLWMA program. In 2006, the Fish and Wildlife Commission revised the state policy for the private lands program. As part of the revision, the PLWMA program was terminated and the Landowner Hunting Permit (LHP) program was developed. The major change included the provision of public hunting benefits. There are currently six cooperators in the LHP program, all located in eastern Washington.

There are many benefits for market-based (economically beneficial) programs on private lands for both the public and the private landowner. The major benefits are opening closed private lands to public access, protection and enhancement of wildlife habitat, and economic benefit to private landowner and local economies. On the other hand, major impediments include the concern for loss of control by state agencies, potential for over-harvest of the wildlife resource, and a potential for forced decline in hunter participation rates because of escalating costs (Duda et al. 2010).

A survey of Washington hunters was conducted (Duda 2002b) to determine opinions about private land access and other private land programs. A strong majority of hunters felt that private lands were very important to wildlife and for outdoor recreation. All hunter groups surveyed felt that private land programs should provide incentives to landowners for improved wildlife habitat and allowing access onto their lands. The majority of all hunters agreed that access to private lands for hunting is important even if an access fee is charged. A 2009 survey (Duda et. al) found that 58% of hunters felt that lack of access had affected their hunting activity over the previous five years.

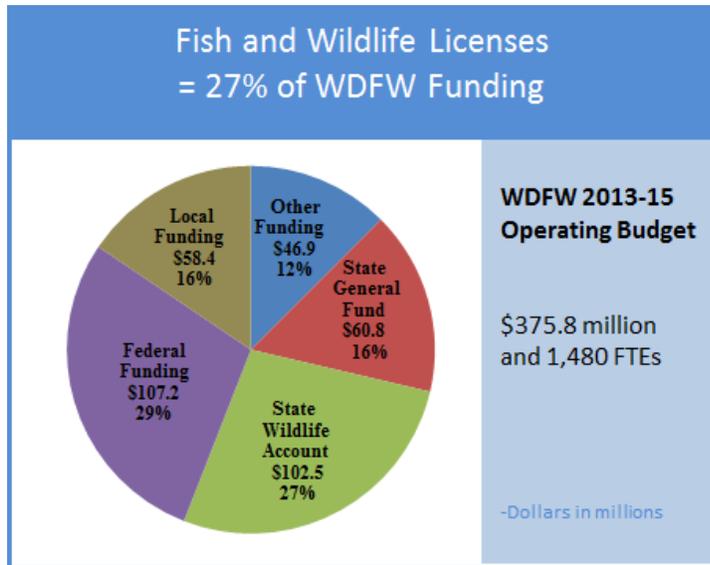
Hunters are feeling the "crunch" in available hunting areas. Private lands have always been recognized as important to the future of hunting, especially upland game bird and waterfowl hunting. More recently, access restrictions and landowners charging fees on large tracts of commercial timberlands has become a major concern. By the end of 2014, over a quarter of Washington's private industrial timberland may be in some form of a fee access system with some of those landowners limiting the number of hunters well below historical levels. Maintaining hunting opportunities on these lands is becoming increasingly difficult and may lead to further crowding on public lands. The hunter's willingness to pay landowners for hunting opportunity is a significant change from attitudes of the past.

Economics

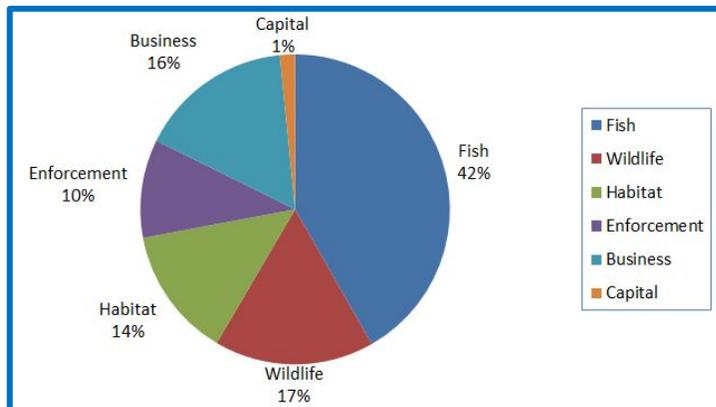
In 2011, Washington hunters spent \$356 million for trip related expenses, equipment, and other expenditures primarily for hunting (U.S. Dept. of Interior et al. 2011). About 46% of their expenditures were for food, lodging, and transportation; 44% for hunting equipment (guns, ammunition, camping); and 10% for the purchase of magazines, membership dues, land leasing, and licenses and permits.

The national survey reported that there were 219,000 resident and nonresident hunters 16 years of age or older who hunted in Washington. These hunters spent 2.5 million days hunting in the state. Expenditures per hunter were \$1,421 or \$64 per day per hunter.

Resources provided to the Department during the 2013-15 biennium were \$375.8 million. Funding came from a variety of state, federal, and private/local sources. The chart below shows relative proportions of those funds.



There are six programs within WDFW. Each program's proportion of the operating budget is shown in the chart below:



The Game Division is one of six divisions in the Wildlife Program. The 2013-15 biennial budget for the Game Division is about \$19 million. Of that total, over \$5.5 million is dedicated to specific activities. The dedicated fund sources are from auction and raffle sales (\$1.3 million), migratory bird permit sales (\$639,000), turkey tag sales (\$331,000), background license plate sales (\$572,000), the eastern Washington pheasant enhancement program (\$879,000), and wolf management (\$1.8 million). The remaining funds come from the general fund (\$60,000), revenue from license sales or the wildlife fund (\$5.1 million), and federal funds (\$8.7 million), which is mostly from the Pittman-Robertson Act (excise tax on sporting equipment and ammunition).

This \$19 million is the base funding for most of the activities identified in this plan except for research, hunter education, and law enforcement. These activities are funded from other divisions

or programs within WDFW. Implementation of new activities in this plan will be dependent on additional funding, grants, and partnerships.

LITERATURE CITED

Duda, M.D, M.F. Jones, A. Criscione. 2010. The Sportsman's Voice: hunting and fishing in america. Responsive Management, Harrisonburg, Virginia, USA.

Duda, M. D., S. J. Bissell, K. C. Young. 1998. Wildlife and the American mind. Public opinion on and attitudes toward fish and wildlife management. Responsive Management, Harrisonburg, Virginia, USA.

Duda, M. D., P. E. De Michele, M. Jones, S. J. Bissel, P. Wang, J. B. Herrick, W. Testerman, C. Zurawski, A. Lanier. 2002b. Washington hunters' opinions on and attitudes toward hunting and game species management. Responsive Management, Harrisonburg, Virginia, USA.

Duda, M. D., M. Jones, T. Beppler, S. J. Bissell, A. Criscione, J. B. Herrick, J. Nobile, A. Ritchie, C. L. Schilli, M. Wilkes, T. Winegord, A. Lanier. 2009. Issues related to hunting access in the United States; Washington state results. Responsive Management, Harrisonburg, Virginia, USA.

CHAPTER 2

General Game Management Issues

The process of developing a non-project EIS allowed WDFW to use an iterative process. Essentially the number of alternative strategies is not limited, and the strategies are developed in concert with the public through a scoping and development process and multiple comment periods. The original 2003-09 plan was updated for 2009-15, and is now being updated for 2015-2021.

During the original 2003-09 public involvement process, issues were identified in nine categories for WDFW to address in the plan. The major categories included: scientific/professional management, public support for hunting as a management tool, hunter ethics and fair chase, private lands programs and hunter access, tribal hunting, predator management, hunting season regulations, and game damage and nuisance. The final category, which centered around species-specific management issues is addressed in this document. The issues, objectives, and strategies contained within this plan are the preferred alternatives.

Scientific/Professional Management of Hunted Wildlife

The concept of scientific management is very important to the public. The use of scientific information and the judgment of professionals in management decisions were rated very high (>90%) by both the general public and hunters. Next came economic (>68%) and social concerns (>54%), followed by political concerns (<25%), which received low ratings.

Issue Statement

WDFW wildlife managers and biologists have developed goals, objectives, and strategies in this plan to ensure long-term sustainability of all wildlife. The best available science will be the basis for the maintenance of all endemic wildlife populations. Strategies for hunted wildlife will not have significant negative impacts on the sustainability of other wildlife or their habitats. None of the strategies, subsequent hunting season recommendations, or implementation of activities will deviate from these fundamental principles. Science is the core of wildlife management, the basis for achieving the agency's mandate, and the foundation of this plan.

Objective 1:

Game Division Section Managers, Regional Wildlife Program Managers, District Wildlife Biologists, and field biologists should each attend at least one professional seminar/workshop each year that is relevant to their job.

Strategies:

- a. Agency staff will maintain regular contact with peer scientists and wildlife managers by attending Wildlife Society, Western Association of Fish and Wildlife Agencies, and Technical Group meetings including the annual Game Division workshop or other professional workshops.
- b. Significant impacts and the scientific basis for recommended actions will be "peer reviewed" by scientists outside WDFW when determined necessary by WDFW biologists and managers.

Issue Statement

While science and professional opinion form the foundation of wildlife management, social and economic issues often strongly affect public opinion, and influence management strategies and regulations. An easily accessible public involvement process is necessary to facilitate broad public involvement in developing and implementing management alternatives. The key is to develop programs that both achieve key biological objectives and are supported by the public.

Objective 2:

Provide multiple opportunities for stakeholders and the interested public to participate in development of three-year regulation packages, collection of biological information, and in planning efforts for game species.

Strategies:

- a. Maintain citizen advisory councils and seek their input at least twice during the process of developing plans and regulation packages, and post the dates of those meetings on the WDFW web page.
- b. Use the WDFW Web page to encourage public comment and ideas for regulations and priorities.
- c. Conduct a minimum of one public meeting in each WDFW region for statewide issues, two per WDFW region for more local issues, and provide other routine opportunities for the public to interact with WDFW staff regarding plans and three-year regulation packages.
- d. Conduct a public opinion survey at least once every six years to monitor support for agency programs, planned activities, and regulations.
- e. Publicize and maintain an email list of citizens interested in receiving copies of plans and regulations and notify those on the list as plans and season recommendations are developed.
- f. Encourage public participation and comment during the Fish and Wildlife Commission meeting process.
- g. Use webinars or other interactive forums to workshop with stakeholders, interested public, and organizations.

Predator/Prey Interactions

This section does not include gray wolf management; they are addressed in the Wolf Conservation and Management Plan. Predator populations (especially black bears and cougars) have increased to long-term sustainable levels in Washington over the past 30 to 40 years. While the public generally views their increase positively from an ecological perspective, managing carnivores in the smallest state in the west with the second highest human population presents many challenges. One of those challenges is addressing potential predator effects on prey species.

WDFW must effectively manage wildlife to meet population objectives in balance with citizen tolerance and support. The management goals for black bear, cougar, bobcat, and coyote will ensure managing statewide predator populations for healthy, long-term viable population levels and be consistent with achieving ungulate population objectives.

Issue Statement

The Department has developed management guidelines for when black bear, cougar, bobcat, or coyote management actions would be recommended as a means to achieve ungulate population objectives using the best appropriate science. WDFW recognizes that predator management can be a viable population management tool to achieve prey population objectives (hereafter referred to as predator-prey management). The Department also recognizes that societal values are often polarized regarding predator management.

Objective 3:

Implement the following guidelines for predator-prey management.

GUIDING PRINCIPLES

WDFW will consider predator-prey management actions using the following guiding principles:

- 1) Predator and prey populations are managed to ensure the long-term perpetuation of each species while attaining individual species population objectives.
- 2) Management of predators to benefit prey populations will be considered when there is evidence that predation is a significant factor inhibiting the ability of a prey population to attain population management objectives. For example, when a prey population is below population objective and other actions to increase prey numbers such as hunting reductions or other actions to achieve ungulate population objectives have already been implemented, and predation continues to be a limiting factor. In these cases, predator management actions would be directed at individuals or populations depending on scientific evidence and would include assessments of population levels, habitat factors, disease, etc.
- 3) Affected co-managers and stakeholders should be consulted prior to taking significant actions.
- 4) Conservation, ecological, economic, recreational, and societal values will be considered.
- 5) Any proposed management action must be consistent with federal and state law.
- 6) Decisions will be based on scientific principles and evaluated by WDFW and when determined necessary by the Department, an external scientific review panel of experts in predator-prey ecology will review the relative risk to all affected wildlife species and habitats.
- 7) Public education will be incorporated with any predator-prey management actions.

ACTION CONSIDERATION

When the Department decides to take an action, management will be directed at either individual predators or populations and would be primarily managed through:

- a. Recreational hunting seasons,
- b. Predator removal via:
 1. Specific actions to remove individuals or reduce populations of predators, using licensed hunters/trappers,
 2. Professional contractors such as USDA Wildlife Services (monitored and supervised by WDFW),
 3. Department staff.

ASSUMPTIONS

Certain assumptions apply when considering predator-prey management:

- a. The scientific information points to predators having an effect on prey population levels that ultimately impacts attainment of a population management objective.
- b. The term “management objective” means a population or management objective identified in a planning document or commonly accepted and used by WDFW for management of that species. The basis for population objectives (outside of a listing status) are assumed to include viable and productive population levels and are often developed in consideration of: current population estimates; harvest history; current harvest levels; currently occupied summer and winter ranges; condition of available forage and other habitat; land use practices; volume and distribution of property damage complaints; landowner tolerance; and public satisfaction.
- c. Implementation can apply across a continuum of predator management strategies, ranging from removal of individual or small numbers of animals to population level management across a broad spectrum of geographic scales (from site management to a larger landscape or region). Individual and local population management actions will be addressed as a priority, with ‘population level’ actions considered only when wide scale actions are deemed necessary to attain prey population objectives.
- d. Implementation has a reasonable likelihood of attaining the intended management outcome.

Strategies:

Implementation of Predator Management Actions

When WDFW considers predator management actions, the following information would be documented:

- a) Define the problem and rationale for a proposed action.
 1. Articulate the biological status (e.g., productivity, survival, population trend) of the predator and prey populations.
 2. Assess the evidence that prey population objectives are not being met due to predation.
 3. Assess the ecological factors other than predation (e.g., winter severity, habitat, disease, etc.) that affect prey populations.
 4. Determine whether population or individual level management actions are appropriate to achieve the intended outcome.
- b) Risk assessment – Assess the effect of proposed management actions on:
 1. Predator populations
 2. Prey populations
 - i. Level of acceptable predation.
 3. Other species (e.g., trophic cascades)
 4. Habitat
 5. Recreational opportunity
 6. Landowners
 7. Stakeholders who might be for or against actions.
- c) Proposed Action:
 1. Define geographical boundaries.
 2. Identify which predator species are affected.
 3. Identify prey or other species that may be affected by the proposed action.

4. Describe the predator removal methods to be used.
 5. Project the expected outcome/objective.
 - i. Include scientific information that addresses the expected effectiveness/success of predator control actions.
 - ii. Likelihood of successfully achieving objectives and how success is measured.
 6. Develop a monitoring plan to evaluate effectiveness prior to and following the control actions.
 7. Define a timeline for evaluating action.
- d) Public Review:
1. Stakeholder discussions as appropriate
 2. SEPA/NEPA review when appropriate
 3. Commission action when appropriate

Wolf Recovery

Wolf recovery will continue to be managed under the Washington's Wolf Conservation and Management Plan (Wolf Plan) that was adopted by the Fish and Wildlife Commission in December of 2011. The Wolf Plan lays out the recovery objectives of at least fifteen successful breeding pairs of wolves for three years distributed across the state in three recovery zones, or eighteen successful breeding pairs distributed across the state in three recovery zones in one year.

Key issues such as wolf-livestock conflict and wolf impacts on ungulate populations are addressed in the Wolf Plan and will continue to be implemented consistent with that plan. The 2009-15 Game Management Plan identified wolf recovery as an important issue for management of game species with strategies associated with completion and implementation of the Wolf Plan and monitoring impacts to ungulate species. The wolf population in Washington has grown since the first pack was documented in 2008. The number of packs, successful breeding pairs, and the minimum number counted each year has increased substantially between 2008 and 2013. Currently, there are thirteen documented packs and five breeding pairs which are established in two of the three recovery regions identified in the Wolf Plan. With the rate of wolf re-colonization observed to date in Washington, the Department is anticipating that recovery objectives may be reached during the term of this plan.

Issue Statement

Once wolf delisting objectives have been achieved, wolves can be considered for down listing or delisting. A population model developed by Maletzke et al. in (in press) has been tracking well with Washington's wolf population growth and predicts that recovery objectives will be reached by 2021. The Department is currently accepting information for a pending status review for wolves and, subsequent to that review, will continue to conduct reviews of wolf status at least every five years. These reviews 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. All status reviews will be consistent with WAC 232-12-297 and the State Environmental Policy Act (SEPA).

Once wolves have achieved the recovery objectives in the Wolf Plan, a status review (as noted on page 68 of the Wolf Plan) will be prepared for the Fish and Wildlife Commission and it will

possibly include a recommendation for a change in status. If the recommendation was to de-list, then the Commission will be asked to consider classification of wolves as either:

1. *Protected*: Meaning they would not be hunted, but could be killed if causing property damage issues.
2. *Game animal*: Meaning they can only be hunted under rules created by the Commission, and they could also be killed if causing property damage.
3. *Un-classified*: They could leave wolves un-classified which would mean they are not protected.

The inclusion of wolf management strategies in this Game Management Plan does not pre-suppose classification status of wolves after they are delisted. Although the Wolf Conservation and Management Plan states (page 70) that "...it is anticipated that the WDFW would recommend listing as a game species". It is also stated that "Proposals to hunt wolves following delisting would go through a public process with the Fish and Wildlife Commission. This process would address the diverse public values regarding the hunting of wolves."

This series of decisions by the Commission will likely be very contentious. Even with a majority of Washington citizens expressing support of hunting of wolves to maintain population objectives, reduce depredation of livestock, and address ungulate declines, there is substantial opposition to hunting of wolves (Duda, 2014).

The only objective for wolf management identified in this Game Management Plan is to implement the Wolf Conservation and Management Plan. Several key strategies are listed including initiation of a post-delisting management plan for wolves. With the continued controversy anticipated with wolf management after they have reached the recovery objectives identified in the Wolf Plan and the fact that the Wolf Conservation and Management Plan took five years to complete (2007 to 2011), it is apparent that planning efforts for when wolves have met delisting objectives need to be initiated. The Fish and Wildlife Commission stated the need for a post-delisting plan to begin immediately in their wolf management policy statement issued in 2012. Again, this does not pre-suppose the outcome, only identifies the planning process that would be implemented.

Objective 4:

Implement Washington's Wolf Conservation and Management Plan.

Strategies:

- a. Monitor wolf population status and trend annually and provide a status report each March.
- b. Manage wolf-livestock conflicts to minimize impacts to producers and wolf recovery.
- c. Manage ungulate populations to maintain prey populations and harvest opportunities.
- d. Develop and implement a comprehensive outreach program.
- e. Draft an independent plan by 2018 for how wolves will be managed after recovery objectives have been achieved.
 1. Utilize the Wolf Advisory Group to guide the Department's development of a post delisting management plan. At a minimum the post delisting management plan will include:
 - i. Management Goals and Objectives
 - ii. A description of how wolves will be monitored
 - iii. Wolf-livestock conflict management

- iv. Wolf-ungulate population management
2. The post delisting management plan development will go through the State Environmental Policy Act (SEPA) process and will encourage public involvement including:
 - i. A public scoping survey
 - ii. Conducting a random public opinion survey
 - iii. Public meetings
 - iv. Public review and comment of the draft plan
3. The Fish and Wildlife Commission will be asked to consider adoption of a post delisting wolf management plan through a public hearing process.

Recruitment and Retention of Hunters

This issue is becoming one of the most important issues for Fish and Wildlife Management Agencies across the country. In the past couple of years, there has been a slight resurgence in the number of hunters participating in hunting nationwide. In Washington, the number of deer hunters was maintained for a period; however declines have occurred during the past few years. Elk license sales have been at an all-time high over the past ten years, while those who actually participate have remained stable. The greatest declines in hunter numbers have been among small game hunters. In particular, the numbers of waterfowl, forest grouse, and pheasant hunters have dramatically declined over the past thirty years.

Issue Statement

In recent times, adjustments to license types and fees as well as increases in funds from the federal excise taxes on sporting arms and equipment have generated significant revenue for the Department's conservation and management actions. This has occurred even though the number of individuals purchasing hunting licenses each year has been decreasing. This revenue stream has allowed the expansion of access and wildlife conflict programs in recent years as well as significant improvements in research, annual surveys, and monitoring of game species, which in turn, increases opportunity for hunters. However, fee increases may also result in declines in hunter numbers. To maintain hunter numbers and revenue for the conservation of wildlife, current hunters must be encouraged to participate more frequently and hunters who have quit hunting must be encouraged to return, and efforts to recruit new hunters must be expanded.

Objective 5:

Increase the number of hunters who hunt each year rather than every couple of years, and create incentives for those who have stopped hunting to participate once again. Increase the number of hunters participating for the first time in Washington.

Strategies:

- a. Develop a stakeholder group to advise the Department on ways to recruit, retain, and re-activate hunters.
- b. Develop a plan that (at a minimum) includes:
 1. A summary of research into the reasons hunters quit and why hunting is less popular than in past years.

2. Survey intermittent hunters to understand why they only hunt every few years; hunters who stopped hunting within the past few years; and hunter education class graduates to see why they do not decide to hunt.
 3. Techniques employed by other states to recruit and retain hunters. Survey of general residents and/or other outdoor recreationists to identify demographic groups that are willing to participate in hunting but have never purchased a license.
 - i. Identify barriers to hunting participation by potential participants.
 4. Incentives to encourage participation from:
 - i. Seniors
 - ii. Hunters with disabilities
 - iii. First time hunters
 - iv. Female hunters
 5. Key actions or strategies that Washington should implement to be effective in recruiting and retaining hunters.
- c. Implement the actions and strategies in the plan.
 - d. Monitor the effectiveness of the actions.

Hunter Ethics and Fair Chase

This issue is related to improving the public perception of hunters and support for hunting as a wildlife management tool. This is a very significant issue to hunters, as identified during the 2002 public involvement process. Different people define fair chase in different ways.

Issue Statement

Many hunters think that the latitude to determine what constitutes fair chase belongs to the individual. They feel that others should not determine what fair chase is for someone else. Other hunters are concerned that the image and standard of ethics for hunting may be compromised, particularly with the expanding use of technology for hunting. This is especially evident with equipment technology.

Objective 6:

During each three-year hunting package, facilitate public debate of regulations for use of electronic equipment and baiting of wildlife for purposes of hunting.

Strategies:

- a. Conduct public outreach and consider restricting new electronic devices or baiting of wildlife.
- b. Develop effective regulations regarding fair chase that are understandable and enforceable.
- c. Consider exceptions to new equipment regulations to accommodate the needs of hunters with disabilities.

Hunter Behavior/Ethics

Another significant issue for hunters identified during the public involvement process is illegal activity and a desire for greater enforcement presence in the field.

Issue Statement

A majority of the general public believes that many hunters violate hunting laws (Duda 2002a). They feel that hunting without a license and poaching are the major violations, and shooting game

out of season and hunting over the bag limit are also common violations. Hunters cite these same concerns with the addition of shooting from a vehicle. The public also indicated, they developed their opinions from direct observation, physical evidence, and from talking with others. In addition, they support hunter refresher courses and feel that an additional training requirement will improve their opinion of hunters.

Objective 7:

Improve compliance rates for common violations.

Strategies:

- a. Emphasize the importance of hunter compliance with regulations and public opinion of hunters in hunter education classes, hunting pamphlets, and other information provided to hunters.
- b. Concentrate enforcement efforts on improving compliance for the most common violations.
- c. Review and simplify, clarify, or eliminate regulations that are dubious, ambiguous, or confusing.
- d. Reduce the number of violations for the top violations over the term of this plan.

Non-toxic Ammunition

Concerns continue to be expressed regarding the use of lead ammunition since it is known to be a toxic substance, and there is documented ingestion of spent ammunition and ammunition fragments by many wild birds and mammals. Impacts to wild birds from lead poisoning tend to be much more severe than mammals; however, population level impacts to wildlife other than California Condors have not been well documented. There have also been concerns expressed about potential impacts to hunters and their families from eating game harvested by lead ammunition. Most recently, the state of California passed a law that will phase out the use of lead ammunition for hunting by 2017.

The Washington Department of Fish and Wildlife Commission has a history of addressing concerns with the use of toxic shot when population level impacts can be documented and in areas where deposition or use of lead is likely to be problematic. Lead shot use and possession has been prohibited for all waterfowl hunting in Washington since a nationwide phase-in of nontoxic shot was implemented in 1986-1991. Beginning in 2000 and phased in through 2009, the Commission expanded nontoxic shot requirements for hunting all upland birds, doves, and band-tailed pigeons on all pheasant release sites. The Commission has also regulated the use of lead sinkers for fishing in lakes used by loons. A continuing problem in Washington is the poisoning of swans that consume lead shot deposited before it was banned for waterfowl hunting.

While alternatives have been developed for many of the popular types of shot and bullets, there have been concerns expressed about the limited quantities available; concerns that ammunition for some of the smaller calibers have not been extensively produced yet and that the availability of small shot sizes is limited; concerns that the non-lead alternatives are more expensive than some of the more common ammunition used for hunting and shooting; and there continue to be concerns expressed about damage to older types of firearms.

Issue Statement

A wide variety of birds may consume spent lead shot, resulting in increased mortalities and sublethal effects. Birds of prey may ingest lead as they scavenge animals (e.g., deer) taken during hunting seasons. In Washington, there is increasing evidence of lead consumption by golden eagles, a species of concern with low population levels (see http://wdfw.wa.gov/conservation/research/projects/raptor/golden_eagle_ecology/). However, some sportsmen are concerned that the added expense of purchasing non-toxic ammunition is not justified with population-level impacts and may further reduce hunter recruitment and retention.

Objective 8:

Reduce the availability and use of lead ammunition where lead poisoning of wild birds is problematic.

Strategies:

- a. Survey Washington hunters regarding their ammunition preferences; concerns for both lead and non-toxic ammunition; relative knowledge of the issues; and their levels of support for the development of mechanisms to reduce the use of lead ammunition.
- b. Survey Washington's general public to better understand their relative knowledge of the issues; their levels of support for the continued use of lead ammunition; and the development of voluntary programs and/or regulatory mechanisms to eliminate use of lead ammunition.
- c. Develop voluntary programs to encourage hunters to utilize lead alternatives.
- d. Develop an outreach plan that helps hunters understand the lead ammunition issues and gain support for reducing the use of lead for hunting.
- e. Work with hunters to develop restrictions that are supported and effective at reducing lead poisoning of wildlife.
- f. Promote use of non-toxic ammunition for department activities, where applicable.

Tribal Hunting

Native people have their own unique tradition, culture, and values related to hunting game and gathering traditional foods and medicines. Many tribes also have reserved rights to hunting and gathering in the language of the treaties signed with the United States. These rights allow tribes to manage their hunters, often with different seasons and rules than non-tribal hunters. This has led to frustration, anger, and misunderstanding on the parts of both tribal and non-tribal citizens. At the same time, limited state-tribal coordination has made it difficult for tribal and non-tribal wildlife managers to do their jobs of managing harvest and protecting game populations.

Issue Statement

Non-Indian hunters often do not understand the treaty hunting rights issues, leading to anger and frustration.

Objective 9:

Increase public understanding and acceptance of treaty hunting rights.

Strategies:

- a. Develop an outreach package that can be sent to citizens concerned about tribal hunting.

- b. Develop cooperative management programs that demonstrate state and tribal management programs.
- c. Link the WDFW website to tribal websites with information on tribal harvest statistics.
- d. Continue to include a segment on tribal hunting rights and tribal management activities as part of the Hunter Education Program.

Issue Statement:

Improve coordination of treaty and non-treaty hunting and wildlife management.

Objective 10:

Complete additional coordinated tribal/state harvest management plans for species such as deer, elk, mountain goat, bighorn, and/or cougar populations subject to both tribal and non-tribal hunting.

Strategies:

- a. Use existing herd plans to develop coordinated harvest management plans or MOUs for elk herds or other game species. The MOUs should include harvest objectives that are sustainable and meet the needs of both state and tribal hunters; result in sharing of harvest information and hunting regulations; encourage cooperative research and population monitoring; and supports both party's interests in gaining access to lands for hunting.
- b. Based on tribal interest and availability, pick key populations in each treaty ceded area as a starting place to build working arrangements and processes for developing coordinated harvest management plans.

Hunting Season Regulations

The Washington State Legislature provides the directive: *“The commission shall attempt to maximize the public recreational game fishing and hunting opportunities of all citizens, including juvenile, disabled, and senior citizens.”* (RCW 77.04.012).

In hunter opinion surveys, most hunters expressed general satisfaction with their hunting experience. Harvesting an animal (hunter success) and seeing plenty of game were the main factors driving hunter satisfaction. It is fairly clear that harvest success plays a significant role in hunter satisfaction.

Issue Statement

Hunters feel that seasons are still too crowded and regulations too confining. In addition, they say that seasons are too short for their group or too long for others, success rates are too low, antler restrictions on deer and elk are too onerous, and overall, there is not enough game.

Objective 11:

Maintain hunter satisfaction and participation at or above 2014 levels for the life of this plan.

Strategies:

- a. Consistent with population goals and objectives, conservation principles, and social constraints, develop and maintain a variety of deer and elk hunting season opportunities within each administrative district of WDFW:

1. Provide sufficient hunting opportunities for archers, muzzleloaders, and modern firearm hunters to approach average statewide participation rates and seek to generally equalize success rates where possible. Address additional “fairness” issues between users through the Allocation Committee of the Game Management Advisory Council and recommend changes supported by the Council. Provide general season antlerless harvest opportunities approximately equal to recruitment in Population Management Units (PMUs) (these are combinations of GMUs) meeting population objectives. Provide harvest opportunities that exceed recruitment in populations that are above objectives.
 - i. Provide general antlerless opportunity to users in the following order of priority:
 - Youth hunters
 - Hunter’s with disabilities
 - Senior hunters
 2. Provide antlerless opportunity to archery or muzzleloader hunters if needed to equalize success rates with modern firearm hunters, or equally between weapon types if success rates are nearly equal.
 3. Support the Master Hunter program by providing members primary consideration in hunting efforts designed to resolve private land and sensitive damage issues.
- b. Districts should retain general season opportunity whenever possible. Use other techniques to manage harvest rates within a population management unit before considering permit only restrictions.
 - c. While striving to achieve population goals, maintain season length as a second priority to maintaining general seasons. Use other techniques to manage harvest rates, such as timing, antler points, etc.

Urban Hunting Issues

Since early in the history of Washington, wildlife management has focused on hunting as the primary means of managing wildlife population levels and for funding wildlife conservation. As the human population grows and expands or dominates the landscape, this traditional wildlife management technique is being challenged. Increasingly, the demand for resolution of wildlife population problems also includes the constraint that hunting is a less acceptable method of alleviating conflicts. Unfortunately, the concept of general public responsibility for wildlife problem resolution has not risen to a level of political support that results in adequate funding from general taxpayers.

Issue Statement

As the number of people in the state increase, citizen demands for resolution of conflicts with wildlife are expanding. At the same time, constraints to address perceived safety issues, noise levels, and the nuisance associated with hunter management results in significant challenges.

Objective 12:

Develop at least five local level plans or significant actions designed to resolve wildlife/human problems.

Strategies:

- a. Assist local governments in identifying current and potential issues for wildlife/human conflicts.
- b. Support conflict resolution that includes hunting as a principal means of state funded resolution.
- c. Recommend alternative conflict resolution techniques for local government consideration and funding.
- d. Develop model ordinance language for local governments that supports hunting as the primary wildlife population management resolution provided by the state.

Communication Issues

Communication between the Department and the public was a very consistent and important issue to the public that was identified in the 2008 opinion survey.

Objective 13:

Improve the Department's rating on game management communication by 2021.

Strategies:

- a. Expand the use of email to communicate with those directly affected by game management decisions.
- b. Expand the use of the Department's website to explain game management policy and direction and the rationale behind decisions related to game management.
- c. Continue the use of news releases (magazines and newspaper) to facilitate media coverage of important game issues.
- d. Expand the use of the hunting regulation pamphlets to provide information regarding game management.
- e. Hire a consultant to conduct a comprehensive review of game management communications to improve effectiveness, credibility, and public support by 2016, including emerging technologies and social media.
- f. Conduct a public opinion survey in 2020 to determine how the Department rates on game management communication.

Plan Monitoring

In order to clearly identify accomplishment of the objectives identified throughout this plan, a "report card" will be prepared by the Game Division. This list of accomplishments will clearly demonstrate public accountability associated with implementation of the Game Management Plan.

LITERATURE CITED

Access Washington Web Site. 2002. www.access.wa.gov/government/awgeneral.asp.

Brown, T.L., D. J. Decker, W. F. Siemer and J. W. Enck. 2000. Trends in hunting participation and implications for management of game species. Pages 145-154 in Gardtner, W.C. and D.W. Lime, editors. Trends in outdoor recreation, leisure and tourism editors. CAB International Publishing, USA.

- Cole, E. K., M. D. Pope, R. G. Anthony. 1997. Effects of road management on movement and survival of Roosevelt elk. *Journal of Wildlife Management* 61:1115-1126.
- Dodge, S. R. 2001. Mapping people and communities. U.S. Forest Service. Science – findings. Pacific Northwest Research Station, Issue 37.
- Duda, M. D., S. J. Bissell, K. C. Young. 1998. Wildlife and the American mind. Public opinion on and attitudes toward fish and wildlife management. Responsive Management, Harrisonburg, Virginia, USA.
- _____. 2002a. Washington residents’ opinions on and attitudes toward hunting and game species management. Responsive Management, Harrisonburg, Virginia, USA.
- _____. 2002b. Washington hunters’ opinions on and attitudes toward hunting and game species management. Responsive Management, Harrisonburg, Virginia, USA.
- _____. 2008. Public opinion on hunting and wildlife management in Washington. Responsive Management, Harrisonburg, Virginia, USA.
- _____. 2008. Hunters’ opinions on wildlife management and other hunting issues in Washington. Responsive Management, Harrisonburg, Virginia, USA.
- Duda, M. D., M. Jones, T. Beppler, S. Butzen, S. J. Bissell, Ph.D., A. Criscione, P. Doherty, G. L. Hughes, P.E., E. Meadows, A. Lanier. 2014. Washington Residents’ Opinions on Bear and Wolf Management and Their Experiences With Wildlife That Cause Problems, conducted for the Washington Department of Fish and Wildlife by Responsive Management.
- Interagency Committee for Outdoor Recreation. 2001. The 1999 Public and Tribal Lands Inventory. Final Report. Olympia, Washington, USA.
- _____. 2002. An Assessment of Outdoor Recreation in Washington State. A state comprehensive outdoor recreation planning document 2002-2005. Public Review Draft. Olympia, Washington, USA.
- Johnson, R. L. 1973. 1972 Demography of Washington hunters. Washington Game Department. Olympia, Washington, USA.
- _____. 1999. Staff Report: Update on resource allocation. Washington Department of Fish and Wildlife. Olympia, Washington, USA.
- Leopold, A. 1930. Report to the American game conference on an American game policy. *Transactions of the American Game Conference* 17:281-283.
- Madson, J. and E. Kozicky. 1971. Game, gunners, and biology: the scientific approach to wildlife management. Conservation Department – Winchester – Western Division, Olin East Alton. Illinois, USA.
- Maletzke, B. T., Wielgus R. B. 2011. Wolf Conservation and Management Plan. Washington Department of Fish and Wildlife. Olympia, Washington, USA.
- McCorquodale, S.M. 1997. Cultural contexts of recreational hunting and native subsistence and ceremonial hunting: their significance for wildlife management. *Wildlife Society Bulletin* 25:568-573.

- Organ, J. F. and E. K. Fritzell. 2000. Trends in consumptive recreation and the wildlife profession. *Wildlife Society Bulletin* 28:780-787.
- Phillips, G. E. and A. W. Alldredge. 2000. Reproductive success of elk following disturbance by humans during calving season. *Journal of Wildlife Management* 64:521-530.
- Pryor, N. 1997. History of Washington. 1997 Washington State Yearbook, Richard and Charity Yates editors. Olympia, Washington, USA.
- Reiger, J. E. 1975. American sportsmen and the origins of conservation. Winchester, New York, New York, USA.
- Smith, J. L., W. A. Michaelis, K. Sloan, J. Musser, and D. J. Pierce. 1994. An analysis of elk poaching losses, and other mortality sources in Washington using biotelemetry. Washington Department of Fish and Wildlife Publication, Olympia, Washington, USA.
- Strickland M.D., H.J. Harju, R. McCaffery, H.W. Miller, L.M. Smith, and R.J. Stoll. 1994. Harvest management, pages 445-473 in T.A. Bookhout, editor. *Research and Management Techniques for Wildlife and Habitats*. Fifth ed. The Wildlife Society, Bethesda, Maryland, USA.
- Trefethen, J. B. 1975. An American crusade for wildlife. Winchester, New York, New York, USA.
- U.S. Department of Interior and Department of Commerce. 1998. 1996 National Survey of fishing, Hunting, and Wildlife-Associated Recreation-Washington. Washington D.C., USA.
- Warren, L. E. 1997. The hunter's game: Poachers and conservationists in twentieth century America. Yale University, New Haven, Connecticut, USA.

PRIVATE LANDS HUNTING ACCESS

I. HUNTING ACCESS STATUS AND TREND

The state of Washington has had agreements or contracts with private landowners to improve habitat or provide hunting access almost since the initial formation of the Department of Game in the early 1900s. Since approximately half of the state is in private ownership, private lands represent a vital component of habitat for wildlife species and outdoor recreation. Historically, hunter access programs in Washington have resulted in response to landowners charging fees for hunting or otherwise limiting or closing access.

In 2012, WDFW had agreements with 513 landowners which provided hunting access to over 1,000,000 acres. Most of this contracted acreage is in eastern Washington and associated with agricultural lands. A smaller number of formal agreements also exist in western Washington, especially for waterfowl hunting. Less formal relationships fostering hunting access have occurred throughout the state, but have been especially important on industrial timberland in western Washington.

Recent trends in the amount of private land available for public hunting have become a cause of concern among hunters and the Department. There has been an overall decline in contracted acreage as well as a proliferation of fee access programs by major landowners that limit hunter numbers. Historically, common landowner concerns have included liability, property damage, and safety. While “hunt clubs” have been on the agricultural landscape for years, deriving income from recreation has become a more recent landowner objective with large corporate landowners. WDFW has responded by offering landowners cash incentives in localized high priority areas, but addressing large acreages in this manner on a statewide basis is beyond what existing budget resources can support.

II. RECREATIONAL OPPORTUNITY

A 2009 survey of hunters (Duda et al., 2009) regarding access indicated that over half of the hunters surveyed either strongly (41%) or moderately (17%) agreed that lack of access had affected their hunting. Approximately 47% of hunters in the same survey indicated that they spend about half or more of their time hunting on private lands. The importance of access to hunters is obvious and the declining trend is a cause for concern.

WDFW has five program types for landowners who participate in agreements to provide hunting access as follows:

- **Feel Free to Hunt** – Is the least restrictive for hunters who can simply go to a site and hunt without registering or needing to make any kind of advance arrangement.
- **Register to Hunt** – Is similar, but requires that hunters complete an onsite registration form before hunting and sometimes submit a daily report of harvest before leaving the site. The number of hunters allowed at any one time is sometimes limited by designating a limited number of parking spaces which when full; indicates that no more hunters are allowed.

- **Hunt by Written Permission** – Requires hunters to obtain a written permission form from the landowner before hunting. The landowner’s contact information is included on signs posted around the property.
- **Hunt by Reservation System** – First used in 2013, is the newest option and has been well received by landowners and many hunters. This option requires that hunters make an advance reservation through a self-service online system before arriving at the site to hunt. Landowners have an online portal that they can use to view the reservations made and the names of hunters who will be on their property. The reservation system gives both WDFW and landowners a high degree of control in tailoring how hunts are managed on each site by allowing for rest periods and limited group sizes.
- **Landowner Hunting Permit** – This program is used where WDFW has negotiated access to unique or high quality hunting opportunities. It also provides for the flexibility of customized seasons managed with special permits.

III. DATA COLLECTION

On an annual basis, WDFW compiles and summarizes basic information related to landowner contracts. Acreages are totaled by county for the various types of access programs and included in the annual Game Status and Trend Report. Many other landowners certainly allow access outside of WDFW programs, but these opportunities are not closely monitored. WDFW has also conducted surveys of landowners and hunters to help identify concerns and set priorities for the program. In 2013, program staff began an inventory of private industrial timberland that was in fee access programs in western Washington. Based on this inventory, WDFW anticipates that at least a quarter of the state’s private industrial timberland could be in some type of landowner fee permit system by the 2014 hunting season.

IV. MANAGEMENT GOALS

The statewide goals for private lands are:

1. Engage landowners, provide technical advice, and encourage them to maintain and enhance habitats to sustain healthy and productive wildlife populations.
2. Engage landowners and provide them support and resources to increase the availability of private lands to the public for recreation to include: Hunting, fishing, and wildlife viewing.
3. Address costs associated with providing recreation and the economic needs of landowners, while striving to minimize direct costs to recreational users.

V. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Habitat Management

Issue Statement

WDFW has a long history of working with landowners to improve a wide range of wildlife habitats. One of the keys to landowner participation in WDFW’s access programs is the technical support provided by field staff to assist landowners with meeting the requirements of the federal farm bill conservation programs. Cuts to these federal programs have affected landowner participation, but newer programs have offered new opportunities through grants to states.

Objective 14:

Maintain a strong team of thirteen private lands biologists statewide to assist landowners with habitat enhancements and provide recreational access. Utilize Farm Bill and state fund sources to enhance habitat under a minimum of 400 landowner agreements by 2021. Submit at least one proposal for permanent additional funding for habitat and access incentives.

Strategies:

- a. Provide information to elected officials outlining the public benefits of existing programs and support any new federal legislation that would fund habitat or access incentives.
- b. Continue to utilize state migratory bird stamp, eastern Washington pheasant enhancement, and turkey tag revenue to offer landowner incentives for enhancing habitat and public access.
- c. Develop at least one state legislative proposal to increase funding for landowner incentives.
- d. Where landowners have elected to charge fees to hunters, encourage use of the permit income for habitat enhancement.

Population Management

Issue Statement

Hunting can be an important mechanism to alleviate damage caused by wildlife on private lands. Landowners who incur damage caused by game animals must allow public hunting access in some form to be eligible for some types of assistance from WDFW. A variety of options exist depending on the specific situation and location. Refer to the Wildlife Conflict Chapter for more information on conflict management.

Objective 15:

Evaluate the suite of hunting options to address wildlife conflict situations and adapt as needed to best meet landowner needs and maximize opportunities for hunters. Require a close working relationship within the Wildlife Program at all levels (between private lands, wildlife conflict, and district wildlife biologists). By 2017, improve information available to hunters to help them locate areas where damage by game animals is occurring.

Strategies:

- a. Identify areas with chronic wildlife conflict issues.
- b. Improve coordination between district biologists, private lands biologists and conflict staff, to enhance landowner relationships and provide public access in chronic conflict areas.
- c. Develop a method for hunters to locate damage areas where landowners may need hunters to address damage caused by game on their property.

Recreation Management

Issue Statement

The availability of private lands for hunting has become more limited or restrictive in recent years and is affecting overall recreational opportunity. Historically, WDFW and hunters have competed with organized hunt clubs or other types of exclusive leases for hunting access on agricultural lands or smaller ownerships. Until very recently, general limitations on hunter numbers or fees by corporations on vast ownerships, was not common. As of 2014, WDFW staff compiled a list of

over 1.3 million acres of private industrial timberlands in western Washington that had implemented fee access permit or lease programs that also capped hunter numbers. This represents over one quarter of the state's private industrial timberland. Washington law (RCW 4.24.210) has limited the liability of landowners who allow recreational access without charging a fee. Landowners who charge fees must purchase insurance to protect themselves from lawsuits by their permittees. A change to this law is currently under consideration, which would allow landowners to charge limited fees as long as they do not limit the number of users allowed. This proposal recognizes that landowners often incur costs associated with allowing recreation on their land and would allow them to recoup those costs.

In some cases, access to public lands has been affected by private land closures or limitations. Access for the public on some public lands is not secured and recreation is in effect controlled by private landowners where public right of way is not established.

WDFW increased field staffing levels in all regions to work with private landowners to expand public access. Generally, the strategies used have centered on reducing landowner costs associated with allowing access. These kinds of measures have included providing signage, monitoring public use, enforcement, and other incentives. In recent years, WDFW has begun to use cash incentives to increase landowner interest in localized priority areas, but funding limits currently preclude using this approach on a larger scale.

Objective 16:

Continue to utilize available resources and foster the development of new incentives to increase landowner participation in WDFW access programs and increase acreage enrolled to 1.3 million acres.

Strategies:

- a. Continue to work closely with landowners to mitigate their costs, and provide traditional incentives to facilitate recreational access on private lands.
- b. Seek and review other plans and efforts to improve outdoor recreational access and take advantage of opportunities to combine resources to maximize potential benefits.
- c. Develop new materials that inform landowners about the programs and services offered and make available on the Department's website and other formats.
- d. Where possible, encourage landowners who feel they must charge fees to keep costs low and not limit the number of individuals who may obtain a permit.
- e. Within available budgets, continue to utilize monetary incentives in high priority areas where this approach is already in use.
- f. Develop criteria to evaluate and prioritize where cash incentives to facilitate access are most needed and would have the greatest benefit.
- g. Seek or leverage funding from other sources to increase the capacity to offer incentives to landowners. Submit proposals that may increase permanent funding.
- h. Request or support legislation that encourages landowners to allow free access or low-cost permit programs that do not limit participation.
- i. Develop other methods beyond enrolled acreage to measure success of the private lands program such as hunter days provided and hunter harvest.
- j. Encourage landowners to make accommodations for disabled hunters, and provide hunters with information about where these opportunities exist.

- k. Continue to review requirements for public hunting access in situations where WDFW provides assistance with wildlife damage, and look for ways to leverage or require general season hunting access as a condition of that assistance.

Objective 17:

Complete an inventory of public lands by 2016. Evaluate situations where access is closed, impaired, or at-risk of closure by private landowners not allowing access, and develop a strategy to address these issues.

Strategies:

- a. Develop a system to inventory where private ownership is restricting access to public lands in Washington. Classify land blocks as secure, closed, impaired, or at-risk of a reduction in public access.
- b. Prioritize areas and work with landowners and other agencies to secure or improve access through private land to public land.
- c. Seek funding in cooperation with other public landowners to secure easements or fund agreements that provide public access to public land.
- d. Monitor exchanges or sales of public lands to identify situations where transactions could limit or otherwise affect recreational access.
- e. Develop informational materials that convey the status of public land access and the need to address access to landlocked parcels.

Issue Statement

WDFW launched a new access program in 2013 that allows hunters to make advance reservations to hunt on selected properties enrolled in hunting access agreements. The current Hunt by Reservation System is considered an interim solution and does not include all of the desired features. The system appears to be popular with the hunters who use it and the landowners in the program, but surveys to measure satisfaction and opinions have not been conducted since the program began. The current reservation system operates strictly on a first-come, first-served basis with all reservations becoming available with the same lead time. While this has been acceptable for some properties, it has been a point of dissatisfaction among some users.

Objective 18:

By 2016, make improvements to the current reservation system that allow drawings for some reservations and adds flexibility as to when reservations first become available to the public. Add other features to meet the needs of hunters and landowners, and make the program more efficient to administer.

Strategies:

- a. Conduct surveys of system users to measure satisfaction with the program and seek suggestions for improvements.
- b. Add the ability to conduct drawings to the current system.
- c. Improve the system to help better inform users of program rules, such as listing all hunting partners on the permit.
- d. Explore options to develop a fully automated system that meets all of the desired system improvements; is funded by users; and linked to the WDFW license system.
- e. Include an automated approval and update process for sites in the program to make the information available to users more quickly.

Issue Statement

Improving the availability of information about the location and features of lands providing public hunting access is frequently cited as a desire of hunters. Information on private lands in agreements with WDFW was improved during the development of the interim reservation system, but not all sites currently have this improved information available.

Objective 19:

By the beginning of 2015, assure that all landowner access agreements are included in the private lands database, and add the ability for hunters to locate properties meeting their needs on the WDFW website by adding a search tool. Improve and update information about access opportunities included in written materials and hunting pamphlets.

Strategies:

- a. Enter site data and information for all landowner agreements and update annually as appropriate.
- b. Improve the ability of users to search for sites offering opportunities by species, ADA accessibility, and other features.
- c. Link hunting access information to pages with information on the various game species and seasonal hunting prospects.
- d. Consider development of a phone application that would assist hunters with identifying access opportunities while in the field.
- e. Continue to use signage around sites as a primary method of identifying lands that are available for recreation. Assure that signs are posted prominently and at frequent intervals. Improve information regarding the Private Lands Access Program in hunting pamphlets, and develop other written materials for hunters and landowners. Include educational materials that encourage hunters to respect the landowner and their property.
- f. Make contact information for private lands staff available on the agency website as a resource for hunters looking for access opportunities.

VI. LITERATURE CITED

Duda, M. D., M. Jones, T. Beppler, S. J. Bissell, A. Criscione, J. B. Herrick, J. Nobile, A. Ritchie, C. L. Schilli, M. Wilkes, T. Winegard, A. Lanier. 2009. Issues related to hunting access in the United States; Washington state results. Responsive Management, Harrisonburg, Virginia, USA.

WILDLIFE CONFLICT

I. CONFLICT STATUS AND TREND

Human-wildlife interactions will likely continue to increase over time as Washington's human population expands. In addition, there is increasing public demand for recreational use of Washington's wildlands, which brings more people into contact with wildlife. Maintaining healthy wildlife populations while minimizing negative human-wildlife interactions will increasingly rely on informing and assisting the public to employ proactive measures and providing quick effective response once conflicts and property damage occur (Conover 2001).

A 2014 opinion survey indicates that more than a quarter of the Washington public (29%) has experienced negative situations or problems associated with wildlife (Duda et al. 2014). Deer and raccoons were the most commonly named species that had caused problems (35% of those who said they had problems cited deer, 25% cited raccoons), followed by bear (14%), geese (13%), and coyotes (10%) (Duda et al. 2014).

Conflict issues with small game, furbearers, and unclassified species (raccoons, beavers, coyotes) are typically handled using one of three methods:

1. Self-assistance; using "Living with Wildlife" information on WDFW web site <http://www.wdfw.wa.gov/living/>.
2. Wildlife Control Operator (WCO); landowner can select and hire a WCO from a list of certified individuals.
3. USDA Wildlife Services; landowner can contract USDA to resolve the human-wildlife conflict situation.

Conflict issues involving public safety with bear, cougar, moose, and wolves are generally resolved by WDFW Law Enforcement. Unfortunately, many of these situations require the use of lethal control measures to remove the offending animal through agency kill authority. In 2013, many wildlife conflict responsibilities were transferred from WDFW Law Enforcement to WDFW Wildlife Program. Presently, non-public safety related conflict issues with deer, elk, turkey, bear (timber damage), and wolf are resolved through the Wildlife Program while Enforcement continues to resolve dangerous wildlife conflicts.

A primary objective of WDFW is to minimize conflict and assist landowners with prevention, mitigation, and when necessary compensation for property damage or loss (as provided by law). An effective strategy for managing negative human-wildlife interaction is to allow staff a degree of flexibility to test and implement new techniques while perfecting existing mitigation tools. WDFW staff will assess each scenario on a case-specific basis and use their professional judgment to determine the best course of action for conflict resolution.

II. RECREATIONAL OPPORTUNITY

In Washington, human-wildlife conflict resolution is a management necessity that at times cannot be resolved using traditional recreational harvest strategies. WDFW has utilized hunters to assist with deer and elk conflict issues and houndsmen and hunters to assist with bear and cougar

depredation events. In each case, there are criteria that must be met and restrictions in some cases that prohibit the hunter or houndsmen from keeping the animal harvested. Licensed hunters may be issued a damage prevention permit through a Wildlife Conflict Specialist and purchase a Damage Tag to participate in a deer or elk damage resolution hunt and retain the deer or elk. Additionally, Washington allows trappers to become certified as Wildlife Control Operators who then may operate a business to remove nuisance wildlife and be compensated by individual landowners for their efforts.

III. DATA COLLECTION

The WDFW Law Enforcement Program documents human-wildlife conflict complaints that result in an officer responding to an incident. Historically, most complaints called into Law Enforcement involve conflict with cougar, bear, deer, and elk. In 2013, WDFW transferred most wildlife conflict activities from Law Enforcement to the Wildlife Program. The Wildlife Program now handles deer and elk damage permits and damage claims and Law Enforcement continues to log reports of dangerous wildlife situations, per RCW 77.12.885.

IV. WILDLIFE CONFLICT MANAGEMENT GOALS

The statewide management goals for wildlife conflict management are:

1. Improve our understanding and ability to predict human-wildlife conflict issues.
2. Enhance proactive measures to prevent conflict and improve Department response to wildlife conflict events.
3. Minimize, mitigate, and manage wildlife conflict events to maintain human tolerance and perpetuate healthy and productive wildlife populations.

V. ISSUE STATEMENTS, OBJECTIVES AND STRATEGIES

Deer and Elk Damage to Commercial Agriculture

Issue Statement

Farming is a vital part of the Washington's economy. The lands that support this industry also provide wildlife habitat and forage opportunities for deer and elk, which may result in crop damage. Landowner tolerance for deer and elk damage depends on how quickly and effectively the Department responds to mitigate damage (Washington Department of Fish and Wildlife 2008). The Department is committed to providing technical assistance for minimizing and mitigating damage. Damage resolution may be achieved through use of non-lethal or lethal measures. Whereas the Department generally promotes the use of non-lethal measures prior to lethal action, there are occasions where lethal removal may be necessary. Washington residents historically have supported the use of hunting as a tool for damage prevention and mitigation (Duda et al. 2008a, Washington Department of Fish and Wildlife 2008, Dietsch et al. 2011, Duda et al. 2014). Majorities of Washington residents support hunting for the following reasons: To address nuisance animals (73% of Washington residents strongly or moderately support hunting for this reason), to address human-wildlife conflicts (67%), and to control wildlife damage to private property (62%) (Duda et al. 2014).

Objective 20:

Respond to wildlife damage complaints to private agricultural crop lands within 72 hours, and increase the number of WDFW agreements used to mitigate deer and elk damage issues by 10% during the period 2015-2021.

Strategies:

1. Provide agriculture producers with information materials to proactively address deer and elk damage issues and to improve the Department's ability to respond to agriculture crop damage from deer and elk.
2. Promote the use of WDFW agreements to commercial landowners and lessees, and encourage non-commercial agriculture landowners to use non-lethal conflict prevention measures identified on a prevention measures checklist.
3. Promote participation in conflict prevention/resolution by Treaty Tribes.
4. Use hazing and other non-lethal measures to resolve damage; with emphasis placed in areas where the feasibility of lethal action is limited or ungulate populations are below management goals.
5. Encourage recreational harvest in areas with chronic crop damage.
6. Implement actions to encourage private land owners to consider, purchase, and use deer/elk fencing as part of their new and long-term business practices.
7. Expand the use of cooperative fencing projects in chronic damage areas with emphasis on high-value crops.
8. Facilitate the deer/elk depredation program (including agreements, permits, and claims process) to improve WDFW's response to landowners experiencing agriculture damage.
9. Assess the feasibility of using partnerships and cooperators to assist with crop damage issues.
10. Increase the number and accessibility of crop assessors on contract statewide.
11. Utilize agency kill authority and depredation permits for problem crop damage areas.

Carnivore (bear, cougar, wolf) Depredation on Livestock

Issue Statement

Livestock production, similar to farming, is an essential component of Washington's economy. In addition to minimizing loss and injury of livestock and maintaining landowner tolerance of carnivore species there is increased concern for public safety. Protecting people from dangerous wildlife while maintaining sustainable wildlife populations, is a primary objective of the Department. The Department utilizes both non-lethal and lethal techniques to provide landowners with assistance for minimizing livestock loss or injury caused by carnivores. Washington residents historically have supported the use of hunting to address human safety and prevent loss of livestock (Washington Department of Fish and Wildlife 2008, Dietsch et al. 2011 and Duda et al. 2014).

Objective 21:

Maintain or decrease livestock depredation levels over the period 2015-2021.

Strategies:

- a. Provide livestock producers and owners with printed information materials to minimize conflict with carnivores.

- b. Promote the use of WDFW agreements for livestock to commercial livestock producers, and encourage the use of a non-lethal prevention measures checklist.
- c. Promote the use of non-lethal conflict prevention measures and a prevention measures checklist to non-commercial producers.
- d. Develop response protocols for carnivore depredation on livestock.
- e. Use hazing and other non-lethal prevention measures to minimize potential loss or injury.
- f. Encourage recreational harvest (black bear and cougar), where feasible, in areas with chronic depredation events.
- g. Review and improve the techniques used for lethal removal of offending animal(s).
- h. Utilize agency kill authority and depredation permits, when feasible, for carnivore depredations on livestock, consistent with state and federal law.

Urban Wildlife Conflict

Issue Statement

Urban wildlife is a valuable natural resource; providing the public with opportunities to observe and experience wildlife. However, sometimes wildlife can damage property or threaten human safety. Rather than immediately resorting to removal of a species, deploying proactive prevention methods can deter human-wildlife conflict issues within urban areas. Public tolerance and appreciation of wildlife species is an important component of human-wildlife conflict management (Conover 2001). While it is impossible to eliminate human-wildlife conflict, many human-wildlife conflict situations in urban areas can be avoided through the use of exclusion techniques, removal of unnatural food resources, and education about of wild animals and their living requirements.

Objective 22:

Decrease or minimize the number of urban human-wildlife conflict calls requiring WDFW response so that the number of calls is constant or declining over the period 2015-2021.

Strategies:

- a. Develop a program to track the number of calls requiring WDFW response.
- b. Distribute informational materials to increase public awareness about ways citizens can better coexist, through use of preemptive actions, and respond to wildlife in urban areas.
- c. Develop and promote activities and programs (e.g., volunteer hazing to scare animals away) that reduce the likelihood of human-wildlife conflict in urban areas.
- d. Promote the development of local ordinances, rules, and regulations (e.g., fines, prohibiting feeding, etc.) which local governments can utilize to minimize human-wildlife conflict.
- e. Promote collaboration with local governments to co-manage conflict issues with select species in urban areas.
- f. Identify priority areas where changes to wildlife conflict management response may be necessary.

Black Bear Tree Depredation on Commercial Timberlands

Issue Statement

During the spring, when black bears are emerging from dens, high nutritional value food resources are limited. Bears will often seek sapwood as a preferred food resource because of its high sugar content. Trees with high growth rates, typically found on commercial timberlands, contain the

highest sugar content and therefore are the most vulnerable to depredation. Damage to commercial timberlands can, at times, exceed one-third of the trees in a given stand; resulting in economic losses for landowners (Washington Department of Fish and Wildlife 2008).

Objective 23:

Improve and expand WDFW's black bear tree damage program, by incorporating alternate strategies beyond existing techniques, which will result in an overall 10% reduction in the number of permits requested to lethally remove black bears for timber damage while maintaining or decreasing the amount of bear caused timber damage over the period 2015-2021.

Strategies:

- a. Conduct a review of existing data and current processes to understand the current level of complaints and response; and identify and prioritize areas that may need management improvements.
- b. Develop a black bear timber depredation program that includes proactive non-lethal prevention measures, methods to validate damage, options for lethal removal prevention (during and post damage seasons), collaboration with other entities for testing and evaluating damage and prevention techniques, and methods to evaluate the efficacy of the program.
- c. Provide information to landowners on damage prevention tools and promote the use of non-lethal measures; where feasible.
- d. Develop protocols to assist landowners in assessing bear damage over time.
- e. Improve opportunities for recreational bear harvest to minimize potential timber damage.
- f. Facilitate the black bear timber depredation program (including applications, permits, and actions) to improve WDFW's response to landowners experiencing timber damage.
- g. Evaluate the potential to use a variety of methods for lethally removing black bears to address timber damage.
- h. Provide Department-coordinated lethal removal to mitigate timber damage by bears.

Communication and Outreach

Issue Statement

Communication between the Department and constituents on human-wildlife conflict prevention and resolution is paramount to increasing the public's ability to resolve problems with wildlife and to maintain support for wildlife in Washington.

Objective 24:

Reproduce and/or update existing conflict prevention outreach materials and create two (2) new conflict prevention publications by 2021.

Strategies:

- a. Use the top five consumer rated media (e.g., direct mail, internet, newspaper, television, and email) to disseminate information.
- b. Develop printed conflict resolution information for distribution to landowners.
- c. Improve the WDFW web page to include a "communication matrix" that directs the public to the appropriate point of contact (i.e., WDFW staff, Wildlife Control Operator, other resources) to resolve the wildlife conflict problem.
- d. Develop fact pages to clarify rules and regulations related to human-wildlife conflict resolution.

- e. Provide continual updates to the WDFW web page regarding rules, regulations, and procedures.
- f. Develop educational partnerships for informing the public on how to minimize human-wildlife conflict issues.

Data Collection

Issue Statement

Lethal removal, through hunting and trapping, of game species (deer, elk, bear, and cougar) and furbearer species is an effective tool for mitigating human-wildlife conflict. It is important to account for removals due to conflict issues when assessing population-level impact and viability of game and furbearer species.

Objective 25:

Develop a standardized data collection system for recording complaints and lethal removal of game and furbearer species; searchable by species, location, and resolution.

Strategies:

- a. Identify areas where changes to conflict management approaches may be needed, e.g., increase recreational harvest.

Issue Statement

Measuring the effectiveness of programs and actions taken by WDFW to minimize human-wildlife conflict is essential to providing appropriate response to landowners and maintaining support for wildlife populations statewide.

Objective 26:

Conduct a survey of complainants who filed deer, elk, bear, cougar, and wolf complaints to determine the level of satisfaction with WDFW actions for resolving their wildlife conflict complaint during the period 2015-2021.

Strategies:

- a. Capture complainant contact information when responding to conflict calls.
- b. Identify and work with a data collection team to conduct a survey.
- c. Evaluate results to develop strategies for addressing human-wildlife conflicts.
- d. Implement the strategies identified and use stakeholder groups where necessary.

Techniques and Tools

Issue Statement

Human-wildlife conflict will likely continue to increase as human populations increase. Although it is unrealistic to expect elimination of conflict issues, there are numerous ways to minimize human-wildlife conflict. Tools and techniques to resolve human-wildlife conflict continue to improve, and new innovative ideas are frequently introduced. To properly manage wildlife conflict issues, the Department must utilize a full spectrum of techniques. Both lethal and non-lethal measures are necessary to provide adequate response to problems and maintain public

tolerance of wildlife. Because wildlife conflict resolution is dynamic and evolving it is imperative that WDFW remain flexible, adaptive, and up-to-date on resolution techniques.

Objective 27:

Develop a minimum of two projects to expand, improve, or develop the use of non-lethal harassment, deterrent, or long-term mitigation measures to minimize negative human-wildlife interactions; particularly in: 1) urban areas, 2) areas where species populations are below management objectives, or 3) areas where species are under federal protection during the period 2015-2021.

Strategies:

- a. Identify, explore, and test the use of new non-lethal deterrent measures for wildlife conflict issues, e.g., using dogs to move turkeys from an urban area.
- b. Provide opportunities for volunteers to assist in wildlife conflict resolution activities.
- c. Provide opportunities for testing new techniques through pilot studies and collaborative research projects.
- d. Encourage WDFW staff to engage in activities and programs that may reduce the likelihood of human-wildlife conflict.
- e. Support collaborative research opportunities that test, assess, and evaluate existing and new conflict prevention and mitigation techniques.
- f. Use contracts and agreements with landowners to try new techniques, engage in proactive prevention tools, and mitigate potential for compensation associated with human-wildlife conflict.
- g. Develop new options for providing compensation to landowners outside of annual cash payments.

Issue Statement

Wildlife Control Operators (WCO) have an essential role in responding to nuisance wildlife complaints. They assist landowners by providing quick action to resolve conflict issues with small game, furbearers, and unclassified wildlife. Because wildlife conflict issues will continue to rise as human populations increase, WDFW can utilize the WCO in an adaptive management approach to address a variety of human-wildlife conflict issues.

Objective 28:

Expand and improve the existing wildlife control operator program to ensure statewide coverage in each county and include comprehensive training and accountability.

Strategies:

- a. Revise the existing wildlife control operator program to include a training program for certification and recertification requirements; including fees.
- b. Improve the certification process to include more opportunities for certification and a more comprehensive and interactive training program.
- c. Develop a plan to broaden the type and extent of work in which wildlife control operators can participate to allow more flexibility of their use by WDFW for conflict resolution under WDFW guidance.
- d. Develop web based or electronic based reporting system for special trapping permits and wildlife control operators to improve customer service and conflict tracking.
- e. Provide a mechanism for collecting data on non-target species.

Issue Statement

Compensation for property loss and damage can be an effective tool for mitigating human-wildlife conflict events. When proactive measures fail, compensation programs help maintain public support and landowner tolerance for wildlife. These programs must be designed to provide the landowner with a relatively simple process and reasonable reimbursement for their loss.

Objective 29:

Revise statewide standardized compensation programs for crop and livestock loss.

Strategies:

- a. Clarify criteria for each claims process.
- b. Evaluate and refine existing compensation programs to facilitate a streamlined claims process.
- c. Review and consider other methods to provide compensation or resolution for crop or livestock loss as a result of human-wildlife conflict.

VI. LITERATURE CITED

- Conover, M. R. 2001. Resolving human-wildlife conflicts: the science of wildlife damage management. Lewis publishers. Boca Raton, Florida, USA.
- Dietsch, A. M., Teel, T. L., Manfredo, M. J., Jonker, S. A., & Pozzanghera, S. 2011. State report for Washington from the research project entitled: understanding people in places. Project Report for the Washington Department of Fish and Wildlife. Fort Collins, CO: Colorado State University, Department of Human Dimensions of Natural Resources.
- Duda, M. D., P. E. De Michele, M. Jones, W. Testerman, C. Zurawski, J. Dehoff, A. Lanier, S. J. Bissell, P. Wang, and J. B. Herrick. 2002. Washington residents' opinions on and attitudes toward hunting and game species management. Harrisonburg, Virginia, USA.
- _____. 2008a. Public opinion on hunting and wildlife management in Washington. Responsive Management, Harrisonburg, Virginia, USA.
- Duda, M. D., M. Jones, T. Beppler, S. Butzen, S. J. Bissell, Ph.D., A. Criscione, P. Doherty, G. L. Hughes, P.E., E. Meadows, A. Lanier. 2014. Washington Residents' Opinions on Bear and Wolf Management and Their Experiences With Wildlife That Cause Problems, conducted for the Washington Department of Fish and Wildlife by Responsive Management.
- Washington Department of Fish and Wildlife. 2008. Final supplemental environmental impact statement for the 2009-2015 Game Management Plan. Washington Department of Fish and Wildlife, Olympia, Washington. USA.

ELK (*Cervus elaphus nelsoni*, *C. e. roosevelti*)

I. POPULATION STATUS AND TREND

Elk (*Cervus elaphus*) have been present in Washington for 10,000 years (McCorquodale 1985, Dixon and Lyman 1996, Harpole and Lyman 1999). Although complete prehistoric distribution and densities are not yet fully understood, it is known that some form of elk was present in western Washington, on the Olympic Peninsula, on both sides of the Cascade Crest, in northeast and southeast Washington as well as the relatively arid Columbia Basin (McCorquodale 1985, Dixon and Lyman 1996, Harpole and Lyman 1999).

Both Roosevelt elk (*C. e. roosevelti*) and Rocky Mountain elk (*C. e. nelsoni*) are native to Washington (Murie 1951, Bryant and Maser 1982, Spalding 1992). Roosevelt elk are found on the Olympic Peninsula and in portions of southwestern Washington. Based on preliminary genetic work conducted by WDFW, Roosevelt elk on the west slope of the Cascade Crest have interbred with Rocky Mountain elk. Elk occurring in central and eastern Washington are Rocky Mountain elk that either avoided extirpation or were reestablished by reintroductions of elk originating from Montana and Wyoming (Washington Dept. of Game 1939, Washington Dept. of Fish and Wildlife 2001, 2002a, 2002b, 2002c, 2002d, 2005, 2006a, 2006b).

Elk were hunted regularly but not always extensively, by tribes in both eastern and western Washington (McCabe 1981). As European settlement expanded into this region, elk harvest increased dramatically. By the beginning of the 1900s, most if not all of the elk in eastern Washington had been eliminated. Small populations of Roosevelt elk persisted in southwestern Washington and on the Olympic Peninsula (Washington Dept. of Fish and Wildlife 2005).

By the beginning of the last century, Roosevelt elk were greatly reduced in numbers as well, but due to denser forests with more escape cover, small groups of Roosevelt elk were able to persist. Efforts to re-introduce Rocky Mountain elk were conducted from as early as 1912 through the 1930s (Washington Dept. of Game 1939). Elk populations peaked in Washington in the late 1960s and early 1970s mostly due to habitat conditions and forest management practices. A recent marked reduction in timber harvest, especially west of the Cascade Crest, and an increase in the human population in Washington have reduced the overall carrying capacity for elk in Washington compared to decades past. WDFW currently recognizes 10 major elk herds totaling approximately 56,000 to 60,000 animals.

II. RECREATIONAL OPPORTUNITY

In Washington, elk are hunted from August through December with some special permit hunts to address agricultural damage taking place as late as March. Non-recreational lethal removals to mitigate wildlife conflict can happen year-round. Hunting seasons for archery, muzzleloader, and modern firearms are currently available to both resident and non-resident hunters. There are currently no quotas on the number of general elk season licenses sold. Hunters are required to choose one weapon type and declare whether they will hunt east side or west side elk. For most of eastern Washington, general hunting seasons allow spike-only bull harvest and special permit opportunities allow the harvest of branch-antlered bulls. Currently, “any bull” harvest is allowed

for general season in northeastern Washington. West side elk hunting regulations usually include 3-point minimum antler restrictions. Some western Washington GMUs can only be hunted under limited-entry, special permits. Some “any elk” hunting opportunities exist in parts of south-central and southwest Washington where expansion of elk populations is discouraged. In a recent public opinion survey of hunters in Washington, elk hunters indicated that they prefer less restrictive hunting seasons with more opportunities to harvest a legal animal and with more days available to hunt elk than are currently available (Duda et al. 2002a., 2002b.).

III. DATA COLLECTION

Elk populations are assessed for a variety of characteristics, often including herd composition and population size (Lancia et al. 1996, 2000). Herd composition is an estimate of the proportions of various age and sex classes occurring in the population such as the number of calves per 100 cows, the number of bulls per 100 cows, or the number of spike bulls per total bulls. Age and sex class data alone are not adequate for population management (Caughley 1974, 1977). Data are collected using a variety of techniques, depending on information needs and local conditions. Common tools used to assess elk populations include:

- Surveys conducted by personnel on the ground.
- Aerial surveys with and without visibility (sightability) corrections (Samuel et al. 1987).
- Mark-resight population estimates from air or ground surveys where a known number of animals are marked and then subsequent surveys are conducted and the number of marked and unmarked animals observed. Those data are then used in statistical models to estimate the population as well as a measure of the precision.

IV. ASSESSMENT OF CURRENT MANAGEMENT OF ELK

Background

The Department has developed or is updating management plans for each of the ten elk herds in the state. Herd plans specifically address the unique conservation challenges that face each herd. Elk herd plans, which come under the overall management guidance of this Game Management Plan (GMP), also facilitate cooperative management with tribes. The existing herd plans are an important resource used in implementation of this GMP, and are intended to be updated as needed.

The elk herd management plans include:

- Blue Mountains
- South Rainier
- North Rainier
- North Cascade (Nooksack)
- Yakima
- Olympic
- Colockum
- Mount St. Helens
- Selkirk
- Willapa Hills

Objective 30:

Update the elk herd management plans as needed.

Strategies:

Nearly all of the state's elk herds are being impacted by development and other habitat modification as a result of human population increases.

There are additional factors controlling elk population levels. For some elk herds, the limiting factors that prevent the achievement of population objectives may be known. For others, limiting factors may be more difficult to isolate or the concept of limiting factors may not apply in the strictest sense. The focus of the plans is to identify and correct limiting factors and achieve the population objectives.

- The Blue Mountains elk herd's limiting factors are likely historic antlerless harvest levels on the Oregon side of the Wenaha, and more importantly, the current lack of regular fire regime in the Wenaha unit. All other units are currently at population objective. Without the benefits of fire in the Wenaha-Tucannon Wilderness, the habitat will not support the desired number of elk and the population objective will need to be reduced.
 - The top spending priorities for this herd are habitat improvement and preservation, wildlife conflict resolution, and annual surveys.
- The South Rainier elk herd is probably limited by direct mortality caused by legal and illegal hunting or undocumented harvest, and secondarily by limited habitat.
 - Securing winter habitat, annual surveys, and an increased enforcement presence are the priorities for this herd.
- The North Rainier elk herd is probably limited by direct mortality caused by legal and illegal hunting, and secondarily by loss of habitat.
 - The priorities for the North Rainier herd are habitat enhancement and annual surveys to document harvest impacts.
- The North Cascade (Nooksack) elk herd is continuing to grow and is not currently limited by the carrying capacity of the elk habitat. If the Nooksack herd is limited, it is probably as a result of agricultural lands adjacent to core elk habitat and the Department's legal requirements to address wildlife damage.
 - The top priorities are to protect winter range on private land, promote elk habitat quality separate from agricultural lands on the valley floors, and minimize elk damage to agricultural lands.
- The Yakima elk herd is at population objective. Limiting factors affecting this herd will be better isolated when research pertaining to this herd is finalized in a WDFW report.
 - The spending priorities for this herd include habitat conservation, resolving wildlife damage conflicts, and winter-feeding.
- The Olympic elk herd is probably limited by loss of elk habitat to human encroachment and available elk habitat, which is a function of timber management on private industrial timber lands and to a lesser extent, limited timber management on U.S. Forest Service lands.
 - The top priorities identified for this herd are the green forage program, encouraging land managers to consider elk when manipulating habitat, reduction of open roads, and annual surveys.
- The Colockum elk herd is limited by available habitat, hunting, and lethal removals related to resolving agricultural damage.
 - The priorities for the Colockum herd are habitat conservation, habitat enhancement, resolving wildlife damage conflicts, and bull escapement. Additional priorities

include completing analysis of research data collected during 2008-2012; completing the new elk bull movement study; and improving monitoring surveys.

- The Mount St. Helens elk herd is near objective at this writing. The limiting factor for this herd is likely adequate forage. Hoof disease is a major concern for the herd as is understanding the causes, developing the management options, and understanding the implications to overall herd health and population dynamics.
 - The spending priorities for managing this herd are enhancing habitat and continuing comprehensive annual surveys to determine the impacts of harvest strategies. Hoof disease monitoring and management is a high priority for this herd.
- The Selkirk elk herd is likely increasing in numbers and distribution based on harvest data and observations made by WDFW staff. The limiting factor for this herd is probably the amount of habitat created by active timber management and wildlife damage issues occurring on agricultural lands adjacent to elk habitat.
 - The priorities include habitat enhancement, annual surveys, and resolving damage issues.
- Very little is known about the Willapa Hills elk herd. The limiting factors are probably loss of habitat, reduced forage quality, direct mortality resulting from legal and illegal hunting, and potentially from disease concerns.
 - The priority for the Willapa Hills population is to improve survey protocols. Hoof disease monitoring and management is also a high priority for this herd.

V. ELK MANAGEMENT GOALS

The statewide management goals for elk are:

1. Preserve, protect, perpetuate, and manage elk and their habitat to ensure sustainable populations.
2. Manage elk for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, subsistence, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography.
3. Manage elk populations for a sustainable annual harvest.

VI. BACKGROUND, OBJECTIVES, AND STRATEGIES

Population Management

The primary goal is to manage for viable and productive elk populations with desirable population characteristics using the best available science. The Department measures elk populations using a variety of techniques. Techniques that work well in the more open habitats of eastern Washington may be of little value in areas that are densely forested. Population objectives defined in this plan are consistent with objectives defined in the respective elk herd plans. A realistic approach to the management of wild animal populations does not assume that the true number of animals in the population is known. Therefore, the preferred target for each elk herd is defined as the population objective plus or minus a range of 10% (Table 1).

Population objectives are determined by agency staff using a combination of factors that include:

- current population estimates
- harvest history
- current harvest levels
- currently occupied summer and winter range
- current condition of available forage
- nutritional status of elk, if known
- current land use practices
- number and location of elk damage complaints
- landowner tolerance
- hunter satisfaction
- disease considerations

Consistent with the primary goal, the secondary goal is to provide recreational opportunity and sustainable annual harvests that fluctuate somewhat due to weather conditions, hunter participation, the number and density of available legal animals, the number of special permits issued for a particular GMU, etc. Hunting seasons are designed to limit extreme fluctuations in sustainable harvests from year to year, although some aspects are out of the control of the Department.

The Washington Fish and Wildlife Commission shall attempt to maximize the public recreational game fishing and hunting opportunities of all citizens, including juvenile, disabled, and senior citizens (RCW 77.04.012).

The secondary goal can be met as long as it does not impinge on the population objectives for total population numbers and population composition and a viable, productive elk population defined as the primary goal. Population composition is typically measured as a ratio of bulls per 100 cows and calves per 100 cows. In some elk populations, these surveys are conducted before the hunt and then post-hunt ratios are projected using harvest information. In some populations, both pre-hunt and post-hunt information is gathered. In a limited number of GMUs, a large enough number of elk are radio-marked to allow biologists to estimate annual mortality rates for different age classes and sex classes (Table 2). There are no elk herds in Washington where all of the parameters listed in Table 2 are collected. Different information is collected for different elk herds that live in different habitats and under differing circumstances. Two or more of the parameters in Table 2 are collected for most elk sub-populations that are monitored. Antler points are used as an index of age-class (e.g., yearling, sub-adult, adult) because it is a characteristic that is readily visible when conducting aerial surveys.

The parameters collected in Table 2 function as guidelines biologists use to make management decisions. The challenge presented to managers is to interpret parameter values that are not in complete agreement across guidelines. Pre-hunt bull:cow ratios may be high for a particular population but post-hunt bull:cow ratios could be very low. Post-hunt bull:cow ratios may be acceptable, whereas bull mortality rates may be higher than desired. These parameters are typically averaged over a 3-year period before changes are implemented, except for extreme cases when immediate action is required. These guidelines are not rigid prescriptions. Often, extenuating circumstances will dictate whether management changes will be made and what

direction those changes might take. Un-hunted elk populations have shown bull-to-cow ratios ranging from 30 to 45+ bulls per 100 cows (Biederbeck et al. 2001, Houston 1982, Flook 1970).

Background

An effective strategic plan for managing wild animals allows a certain degree of flexibility for field staff to determine if changes are warranted. Biologists must consider all of the parameters available for a particular elk population and use their professional judgment when making management decisions.

Due to priorities, funding, and weather, comprehensive aerial surveys are not conducted for every elk herd each year. The four herds that are routinely surveyed in a comprehensive fashion are the North Cascades, Yakima, Colockum, and Blue Mountains.

New protocols were developed for the Mount St. Helens herd and WDFW is now able to annually survey 5 core GMUs for the population as long as funding remains available. Using similar techniques, WDFW has started surveying 2 to 3 priority GMUs for the Willapa Hills herd annually. This approach will result in each priority GMU being surveyed every third year.

Herd-wide estimates or indices for the North Rainier, South Rainier, and Olympic herds have not been practical for a number of years. Portions of the Olympic herd are monitored closely through collaborative efforts between Olympic National Park, tribal wildlife programs and WDFW. A comprehensive survey of elk on the entire Olympic Peninsula is not practical at this time.

Table 1. Population estimates and population objectives with (+/- 10 %) acceptable range for 10 elk herds in Washington.

ELK HERD	MOST RECENT POPULATION ESTIMATE	POPULATION RANGE OBJECTIVE
Yakima	11,308	8,550-10,450
Olympic	Not Available	10,215-12,485
Colockum	6,018	4,050-4,950
North Rainier	Not Available	2,520-3,080
South Rainier	Not Available	2,700-3,300
North Cascades	~1,200	1,755-2,145
Selkirk	Not Available	2,160-2,640
Willapa Hills	2 to 3 core GMUs surveyed annually	7,200-8,800
Mount St. Helens	5 core GMUs surveyed annually	9,000-11,000
Blue Mountains	5,200	4,824-5,896

Table 2. Parameter guidelines that affect decisions pertaining to hunting season structure and which class of animals would be impacted by a change in season structure.

Criteria	Class of Elk Targeted by Season Change	Consider Liberalizing Season	Acceptable Range	Consider Restricting Season
Pre-hunt Bull:Cow Ratio	Antlered & Antlerless	Greater than 35 bulls:100 cows	15 to 35 bulls:100 cows	Less than 15 bulls:100 cows
Post-hunt Bull:Cow Ratio	Antlered & Antlerless	Greater than 20 bulls:100 cows	12 to 20 bulls:100 cows	Less than 12 bulls:100 cows
Estimated Bull Mortality	Antlered	Less than 40 %	Less than or equal to 50 %	Greater than 50 %
Percent 6-Point or Better Branch-Antlered Bulls In the Post-hunt Bull Sub-Population	Antlered	Greater than 10 %	2 to 10 %	Less than 2 %
Population Objective	Antlerless	Above Objective	At Objective	Below Objective

Objective 31:

Continue to monitor elk populations annually to determine whether they are consistent with Tables 1 and 2. Exceptions will sometimes be made when WDFW is dealing with chronic wildlife conflict issues involving elk.

Strategies:

- a. Conduct aerial surveys to estimate populations, estimate indices, or to estimate composition ratios of bulls, cows, and calves when funding is available.
- b. Manage for cow elk sub-populations that are consistent with the increase or decrease that will allow the population objective to be met for that elk herd (Table 2).
- c. Manage for a post-hunt bull:cow ratio range of 12 to 20 bulls:100 cows (Peek et al. 2002, Biederbeck et al. 2001, Noyes et al. 1996, Squibb et al.1991, Squibb et al. 1986, Squibb 1985, Houston 1982, Prothero et al. 1979, Flook 1970). The Blue Mountains elk herd is managed for a post hunting season bull:cow ratio of 25 bulls:100 cows with a range of 22 to 28 bulls:100 cows and 10% of the bull sub-population made up of older age class bulls.
- d. When pre-hunt surveys are conducted, manage for a pre-hunt bull cow ratio range of 15 to 35 bulls: 100 cows (Peek et al. 2002, Biederbeck et al. 2001, Noyes et al. 1996, Squibb et al. 1991, Squibb 1985, Houston 1982, Prothero et al. 1979, Flook 1970).
- e. When bull mortality is measured for a population, assess whether estimated bull mortality rate is less than or equal to 50% averaged over three years.
- f. Manage for a post-hunt 6-point bull or better percentage of 2% to 10% of the bull sub-population (Table 2).

Recreation Management

Background

In 2012, over 94,000 Washington elk licenses were sold and over 60,000 elk hunters took to the field. Hunters in Washington harvested an average of 7,800 (range 6,826 to 9,162 for 2001-2013)

elk annually from an estimated population of approximately 60,000 (Figs. 1 and 2). Washington has more elk hunters per elk than any other western state and has no limit on the number of elk licenses sold. Any qualified hunter can purchase a license and hunt elk in a general season, and as a result success rates for general season hunters are low. Without carefully managed season timing, antler point restrictions, and relatively short seasons, the male sub-population would be over-harvested. Opportunities to hunt and spend time afield must be balanced against achieving or maintaining elk population objectives. As herd population levels increase, harvest levels will increase as well.

Objective 32:

Maintain a sustainable annual elk harvest (range 7,500 to 9,000) that is consistent with the population objectives in Tables 1 and 2.

Strategies:

- a. Maximize season length where possible while maintaining or approaching elk population objectives.
- b. In those eastern Washington GMUs that currently have spike-only hunting seasons, retain spike-only seasons and adjust branch antlered bull permit levels to achieve bull:cow ratio objectives. Retain “any bull” seasons in northeastern Washington as long as population objectives are being met or have a reasonable likelihood of being met.
- c. Retain 3-point restrictions in western Washington as long as population objectives are being met or have a reasonable likelihood of being met over time.
- d. Design and implement harvest strategies based on the best available information collected for specific elk populations and sub-populations.
- e. Unless extreme circumstances warrant, allow at least three years to determine effectiveness of regulation changes designed to achieve management objectives.

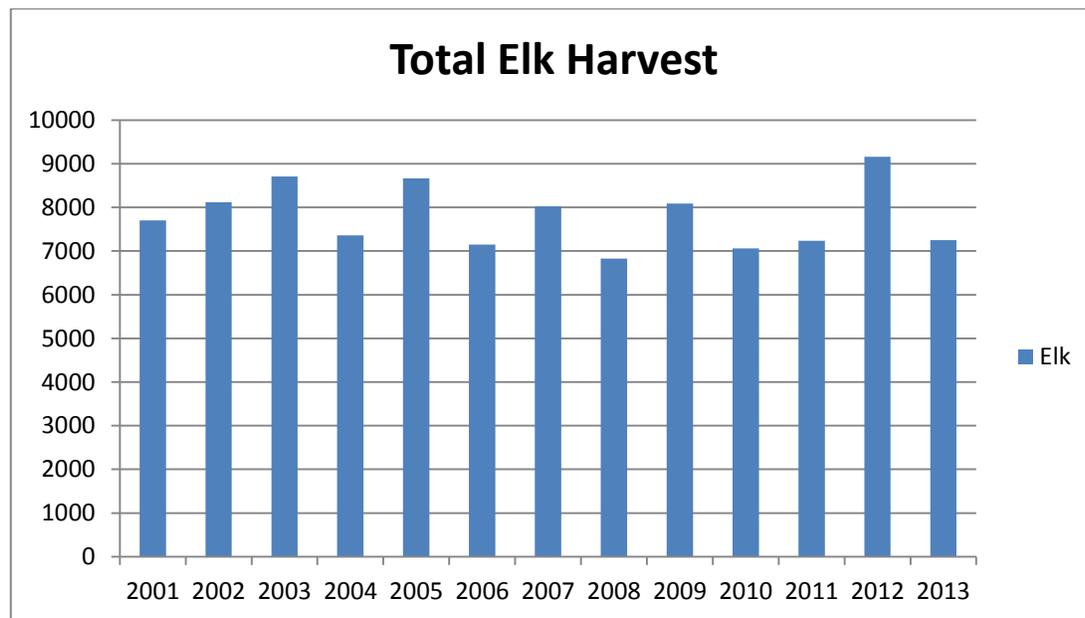


Figure 1. Total elk harvest for Washington, 2001 to 2013.

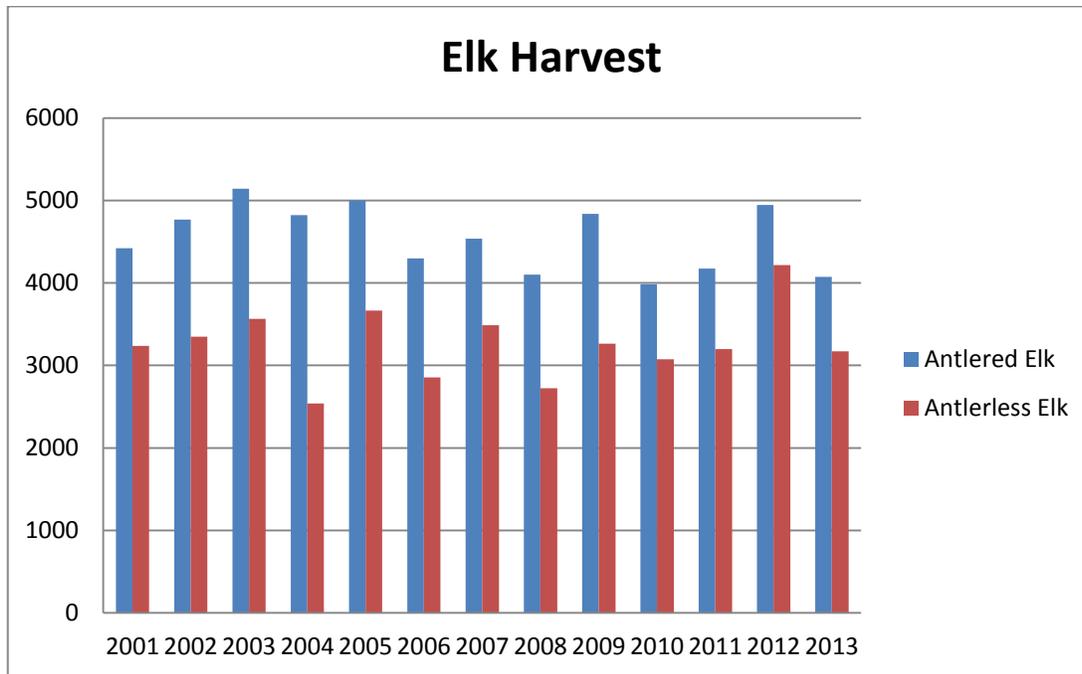


Figure 2. Total antlered and antlerless elk harvest for Washington, 2001 to 2013.

Background

Annual harvest data generally reflect elk abundance and are useful for monitoring impacts of changing hunting season regulations.

Objective 33:

Continually improve elk harvest data collection.

Strategies:

- a. Continue to implement and improve the mandatory harvest reporting system.

Habitat Management

Background

Elk habitat in Washington State is declining due to human population expansion, changes in timber management practices on public land, successional age of habitat, and competition with domestic livestock. The biggest threat to the sustainability of elk populations is loss of quality habitat. To effectively manage elk in Washington, certain priority lands must be conserved with the maintenance or improvement of elk habitat identified as the primary goal on those lands.

Objective 34:

Maintain and enhance 2,000 acres and acquire 2,000 acres of habitat for Rocky Mountain and/or Roosevelt elk during the life of this plan.

Strategies:

- a. Identify and prioritize important elk habitat that is at risk of being lost to other land use practices. Identify highest priority elk ranges to target for acquisition or conservation easements.

- b. Where habitat condition or quantity limits herd productivity, identify and implement large-scale habitat conservation and enhancement projects.
- c. Improve habitat condition where possible, by implementing habitat enhancements and coordinating with land management agencies and private landowners to improve elk habitat quality where those opportunities exist.
- d. Purchase, lease, acquire easements, and use other incentives to protect and enhance other key areas identified in elk herd plans.

Winter Feeding

Background

It is the intent of the Washington Department of Fish and Wildlife that wildlife should exist under natural conditions supported by suitable habitat. Although artificial feeding may assist in wildlife winter survival, it should not generally be considered a substitute for lost habitat and feeding shall be done only in limited situations as prescribed by Department Policy 5302 (Appendix A).

Despite this intent, the Department maintains some historic supplemental feeding operations for wildlife. Supplemental Feeding is defined by the Department as regular winter feeding operations to provide feed to wildlife where adequate winter habitat is not available and feeding is necessary to support the population level as identified in a management plan, or for specific control of deer or elk damage. The best example is the Yakima elk herd where winter habitat has been eliminated. Some historic winter habitat is currently growing high value agricultural crops. These crops are at risk of damage by elk unless supplemental feeding is provided each winter. A large percentage of what is considered historic elk winter range before European settlement has been lost or altered due to agriculture and housing development. To prevent elk in the Yakima herd from causing agricultural damage, elk fencing was constructed and a winter feeding program was established decades ago. Elk winter-feeding programs can be problematic. They are expensive and cause elk to congregate at high densities, where they have a higher potential for spreading diseases and/or parasites. Elk that are fed in the winter can also have extreme impacts on shrubs, trees, and riparian zones near feeding sites.

The Department also recognizes that extreme winter conditions sometimes necessitate implementation of emergency feeding operations (Appendix A). Both supplemental feeding and emergency feeding of wildlife introduces an artificial food source and concentrates animals, which can make them more susceptible to predation, poaching, and disease.

Winter-feeding will not occur in areas where species can be hunted for recreation while feeding activities are underway. The Department will periodically evaluate the need to continue winter feeding operations.

Objective 35:

Conduct an evaluation of the current elk-feeding program. Reduce the dependency on supplemental feeding if possible.

Strategies:

- a. Using the data generated from the Yakima elk herd study and other data, determine if the Yakima elk herd population objective needs to be adjusted.

- b. When needed implement winter feeding programs consistent with Department Policy 5302 (see Appendix A).

Disease

Background

Wild elk suffer from a wide variety of diseases. Some diseases are commonplace and have very little impact at the population level. Other diseases can be far more serious, have major impacts at the population level, and have severe economic consequences.

Objective 36:

Opportunistically monitor the health of wild elk in Washington when they are captured for other reasons and samples can be readily obtained. Take blood and tissue samples when elk are captured and/or from harvested elk and test for diseases common to elk. When necessary capture or collect elk to address specific disease issues.

Strategies:

- a. Continue to monitor for pathogenic conditions in elk and try to determine their causes.
- b. Continue to monitor elk hoof disease and determine its cause.
- c. Continue to gather on-line reports from the public regarding hoof disease distribution.
- d. Develop a protocol using the citizen science program to assess prevalence of hoof disease.
- e. Develop a multi-point outreach program to better inform the public about hoof disease and the actions WDFW and cooperators are taking with regard to hoof disease.
- f. Follow U. S. Department of Agriculture and Washington Department of Agriculture guidelines for reporting diseases that are detected and implement the disease-specific actions consistent with those guidelines.

Predation

Background

Black bears, cougars, coyotes, and wolves all prey on elk calves and/or adult elk. Predator management by WDFW will be consistent with the predator/prey guidelines explained previously in the section pertaining to Objective 3.

If the WDFW determines that wolf predation is a primary limiting factor for an “at-risk” ungulate population, and the wolf population in that wolf recovery region has at least 4 successful breeding pairs, the WDFW can consider reducing wolf abundance in localized areas occupied by the ungulate population before state delisting of wolves occurs.

At-risk ungulate populations are any that are federal or state listed as threatened or endangered (e.g., Selkirk Mountain woodland caribou, Columbian white-tailed deer). An at-risk population would also include any ungulate population which falls 25% below its population objective for two consecutive years or if the harvest decreases by 25% below the 10-year average harvest for two consecutive years.

Objective 37:

Identify herds or local populations that are below population objectives where predation effects might be a limiting factor by 2015.

Strategies:

- a. Develop a prioritized list of herds where predators might be limiting factors.
- b. Identify the biological parameters that implicate predators as the factor.
- c. Harvest history, etc.
- d. Invoke the predator-prey guidelines.

For ungulate populations lacking numeric estimates and/or without management objectives, the WDFW will rely on other information to assess a decline, such as harvest trends, hunter effort trends, sex and age ratios of the population, and others (WDFW 2011).

Research

Background

The Yakima elk herd is one of the largest in the state, and herd characteristics have responded well to management strategies designed to increase bull:cow ratios and the survival of adult bulls. Much of the historical winter range for ungulates is now under agricultural and rural development. Much of the potential winter range is used for high-value agriculture. Fences and artificial feeding are used to control elk distribution and movements on the very limited winter range. The U.S. Forest Service (USFS) has questioned whether the size of the current elk population can be maintained without damage to sensitive habitats, such as wet and dry meadows, on spring-summer-fall range. Better information is needed on the relationship between the size of the Yakima elk herd and the habitat supporting that herd.

Objective 38:

Complete the research project pertaining to the Yakima elk herd taking into account the number of environmental, social, recreational, and economic values assigned to this herd by various user-groups.

Strategies:

- a. Complete the data analysis and report writing needed to accomplish this objective.

Background

The Colockum elk herd has long been characterized by low bull:cow ratio estimates. In 1994, spike-only hunting was adopted for general license holders. This regulatory change had been implemented throughout much of eastern Washington and was designed to increase bull survival, increase the ratios of adult bulls to cows, and to promote early, synchronized breeding. In the Blue Mountains and Yakima elk herds the effects on bull:cow ratios were rapid and dramatic. These responses were not similarly observed in the Colockum herd, and bull survival is unknown. Bull:cow ratio estimates have generally remained below objective. Branch-antlered bull hunting has, therefore, been strongly limited. An alternative explanation to chronically low estimates of bull:cow ratios deriving mostly from low bull survival is that the distribution of wintering bulls renders them poorly detectable under the traditional winter survey design for population monitoring employed for the Colockum herd. In the fall of 2013, a study was implemented to

document seasonal movements/distribution of bull elk in this herd and also to estimate annual survival rates.

Objective 39:

Complete the bull elk movement/survival study in the Colockum elk herd.

Strategies:

- a. Estimate adult bull elk survival and document seasonal movements and distribution for the Colockum elk herd.
- b. Make appropriate changes to bull elk management and annual survey design supported by the study findings.

Background

Since 2008, a substantial increase in prevalence and distribution of hoof disease has occurred in southwest Washington. It is unclear at this time how hoof disease is affecting population dynamics of the Mount St. Helens and the Willapa Hills elk herds.

Objective 40:

Gain a better understanding of the population demography effects of hoof disease on elk.

Strategies:

- a. Develop a study proposal that explores the population dynamics of elk afflicted with hoof disease.
- b. Radio-mark elk in populations afflicted with hoof disease.
- c. Conduct survival and recruitment analysis on elk afflicted with hoof disease.

VII. LITERATURE CITED

- Biederbeck, H. H., M. C. Boulay, and D. H. Jackson. 2001. Effects of hunting regulations on bull elk survival and age structure. *Wildl. Soc. Bull.* 29:1271-1277.
- Bryant, L. D. and C. Maser. 1982. Classification and distribution. Pages 1-60 *in* J. W. Thomas and D. E. Toweill eds., *Elk of North America: ecology and management*. Stackpole Books, Harrisburg, PA.
- Caughley, G. 1974. Interpretation of age ratios. *J. Wildl. Manage.* 38:557-562.
- Caughley, G. 1977. *Analysis of vertebrate populations*. John Wiley and Sons, London. 234 pp.
- Dixon, S. L. and R. L. Lyman. 1996. On the Holocene history of elk (*Cervus elaphus*) in eastern Washington. *Northwest Science* 70:262-272.
- Duda, M. D., P. E. DeMichele, M. Jones, S. J. Bissell, P. Wang, J. B. Herrick, W. Testerman, C. Zurwarski, and A. Lanier. 2002a. Washington hunters' opinions on and attitudes toward game species management. *Responsive Management*, Harrisonburg, VA. 380 pp.

- Duda, M. D., P. E. DeMichele, M. Jones, W. Testerman, C. Zurawski, J. DeHoff, A. Lanier, S. J. Bissell, P. Wang, J. B. Herrick. 2002b. Washington residents' opinions on and attitudes toward hunting and game species management. Responsive Management, Harrisonburg, VA. 168 pp.
- Flook, D. R. 1970. Causes and implications of an observed sex differential in the survival of wapiti. Canadian Wildl. Serv. Rep. Series, No. 11. 71 pp.
- Harpole, J. L. and R. L. Lyman. 1999. The Holocene biogeographic history of elk (*Cervus elaphus*) in western Washington. Northwest Science 73:106-113.
- Houston, D. B. 1982. The northern Yellowstone elk: ecology and management. Macmillan Publ. Co., Inc., New York, NY. 474 pp.
- Lancia, R. A., J. D. Nichols, and K. H. Pollock. 1996. Estimating the number of animals in wildlife populations. Pages 215-253 in T. A. Bookhout, ed. Research and management techniques for wildlife and habitats. Fifth ed., rev. The Wildlife Society, Bethesda, Md.
- Lancia, R. A., C. S. Rosenberry, and M. C. Conner. 2000. Population parameters and their estimation. Pages 64-83 in S. Demarais and P. R. Krausman, eds. Ecology and management of large mammals in North America. Prentice-Hall, Inc., Upper Saddle River, NJ.
- McCabe, R. E. 1981. Elk and Indians: historical values and perspectives. Pages 61-123 in J. W. Thomas and D. E. Toweill eds., Elk of North America: ecology and management. Stackpole Books, Harrisburg, PA.
- McCorquodale, S. M. 1985. Archaeological evidence of elk in the Columbia Basin. Northwest Science 59:192-197.
- Murie, O. J. 1951. The elk of North America. Stackpole Co., Harrisburg, PA and Wildl. Manage. Institute, Washington, D.C.
- Noyes, J. H. B. K. Johnson, L. D. Bryant, S. L. Findholt, and J. W. Thomas. 1996. Effects of bull age on conception dates and pregnancy rates of cow elk. J. Wildl. Manage. 60:508-517.
- Peek, J. M., M. S. Boyce, E. O. Garton, J. J. Hard, and L. S. Mills. 2002. An Assessment of risks involved in current management of elk in Washington. Wash. Dept. of Fish and Wildl., Olympia. 99 pp.
- Prothero, W. L., J. J. Spillett, and D. F. Balph. 1979. Rutting behavior of yearling and mature bull elk: some implications for open bull hunting. Pages 160-165 in M.S. Boyce and L. D. Hayden-Wing, eds. North American elk: ecology, behavior and management. Univ. of Wyoming Press, Laramie.
- Samuel, M. D., E. O. Garton, M. W. Schlegel, and R. G. Carson. 1987. Visibility bias during aerial surveys of elk in north-central Idaho. J. Wildl. Manage. 51:622-630.
- Spalding, D. J. 1992. The history of elk (*Cervus elaphus*) in British Columbia. Contributions to Natural Science, Royal British Columbia Museum, Victoria, B.C., Canada. 27 pp.
- Squibb, R. C. 1985. Mating success of yearling and older bull elk. J. Wildl. Manage. 49:744-750.
- Squibb, R. C., R. E. Danvir, J. F. Kimball Jr., S. T. Davis, and T. D. Bunch. 1991. Ecology of conception in a northern Utah elk herd. Pages 110-118 in A. G. Christensen, L. J. Lyon, and T. N. Lonner eds. Proc. of the elk vulnerability symposium. Montana State Univ., Bozeman. 330 pp.

- Squibb, R. C., J. F. Kimball, Jr., and D. R. Anderson. 1986. Bimodal distribution of estimated conception dates in Rocky Mountain elk. *J. Wildl. Manage.* 50:118-122.
- Washington Department of Fish and Wildlife. 2001. Blue Mountains elk herd plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia. 47 pp.
- Washington Department of Fish and Wildlife. 2002a. North Cascade (Nooksack) elk herd plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia. 54 pp.
- Washington Department of Fish and Wildlife. 2002b. North Rainier elk herd plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia. 63 pp.
- Washington Department of Fish and Wildlife. 2002c. South Rainier elk herd plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia. 32 pp.
- Washington Department of Fish and Wildlife. 2002d. Yakima elk herd plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia. 69 pp.
- Washington Department of Fish and Wildlife. 2005. Olympic elk herd plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia. 52 pp.
- Washington Department of Fish and Wildlife. 2006a. Mount St. Helens elk herd plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia. 52 pp.
- Washington Department of Fish and Wildlife. 2006b. Colockum elk herd plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia. 48 pp.
- Washington Department of Game. 1939. Washington elk report. Washington Department of Game, Seattle. 23 pp.

DEER (*Odocoileus virginianus*, *O. hemionus hemionus*, *O. h. columbianus*)

I. POPULATION STATUS AND TREND

Black-tailed deer (*Odocoileus hemionus columbianus*), mule deer (*O. h. hemionus*), and white-tailed deer (*O. virginianus*) are all native to the state of Washington. The total deer population in the state numbers approximately 300,000 to 320,000. White-tailed deer populations at this writing appear to be stable or increasing after reductions in the northeast from back-to-back severe winters combined with liberal antlerless hunting opportunity. Mule deer populations in north-central and eastern Washington are stable to increasing at the time of this writing, with the exception of the south-central where mule deer numbers are slowly starting to increase after having declined, likely as a result of hair loss caused by exotic lice. Black-tailed deer populations seem to be stable across their range with localized population fluctuations. Where black-tailed deer populations are struggling, hair loss disease is likely one of the contributing factors. The goal set by the Washington Department of Fish and Wildlife (WDFW) for the management of black-tailed deer, mule deer, and white-tailed deer populations in Washington is to maintain numbers within habitat limitations. Landowner tolerance, a sustainable harvest, and non-consumptive deer opportunities are considered within the land base framework.

II. RECREATIONAL OPPORTUNITY

Deer are hunted in Washington from September through December with special permit opportunities extending into March. State regulations provide for archery, muzzleloader, and modern rifle seasons. In recent years Washington's deer harvest has been evenly distributed with black-tailed deer, mule deer, and white-tailed deer each making up one third of the harvest (Figures 1 and 2).

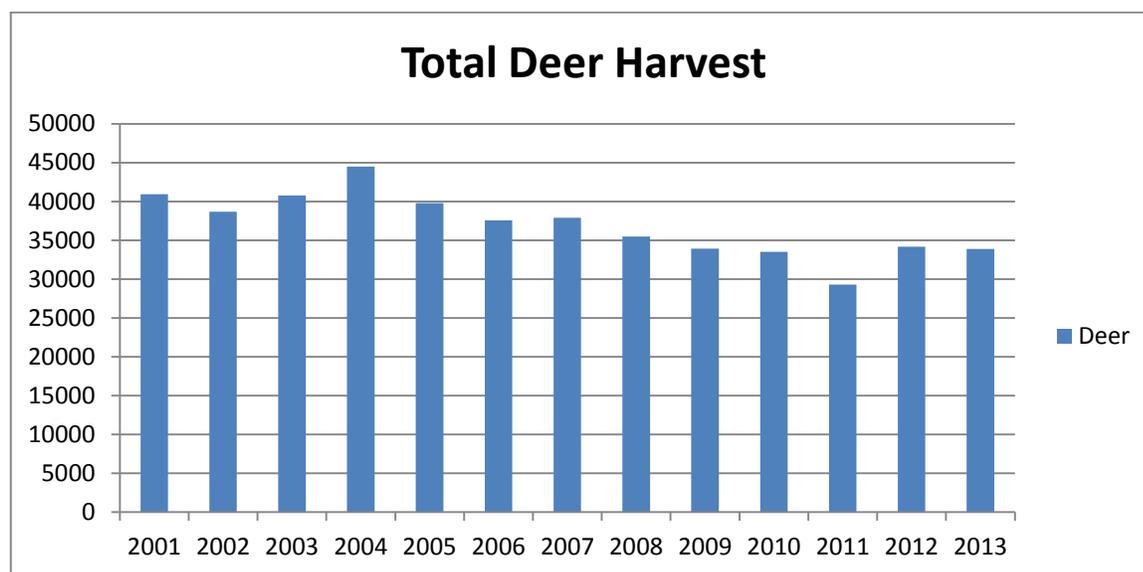


Figure 1. Estimated Washington deer harvest for 2001-2013.

White-tailed deer populations in northeastern Washington were affected by back-to-back severe winters of 2007-08 and 2008-09. In addition, the production of alfalfa and small cereal grains (oats, wheat, barley) declined from the middle 1980s to the mid-2000s by about 45%. From 1997 through 2009, youth, senior, and disabled hunters were allowed to take antlerless white-tailed deer during general buck seasons in northeast Washington. Starting in 2010, the need for more restrictive seasons was recognized. More restrictive actions included shortening season length for general season antlerless opportunity and eliminating most antlerless special permit opportunities. The Fish and Wildlife Commission also imposed a four-point antler restriction in GMUs 117 and 121. Early indications in harvest data suggest the white-tailed deer populations may be increasing slightly in northeast Washington.

Eastern Washington mule deer seasons have been much more restrictive since 1997. Some of the restrictive measures include a three-point minimum restriction for all mule deer in eastern Washington and a shortened deer hunting season for most hunters. As a result of the more restrictive general season opportunities for mule deer, a very successful late season special permit opportunity is now being offered in most areas where mule deer are a priority big game species. Antlerless mule deer hunting opportunities are offered mostly by special permit only.

Throughout western Washington, total black-tailed deer harvest has remained relatively stable in recent years in terms of total numbers harvested. Black-tailed deer provided 32.3% of the total 2013 deer harvest. Changes in land use practices have had a major influence on black-tailed deer populations (Nelson et al. 2008).

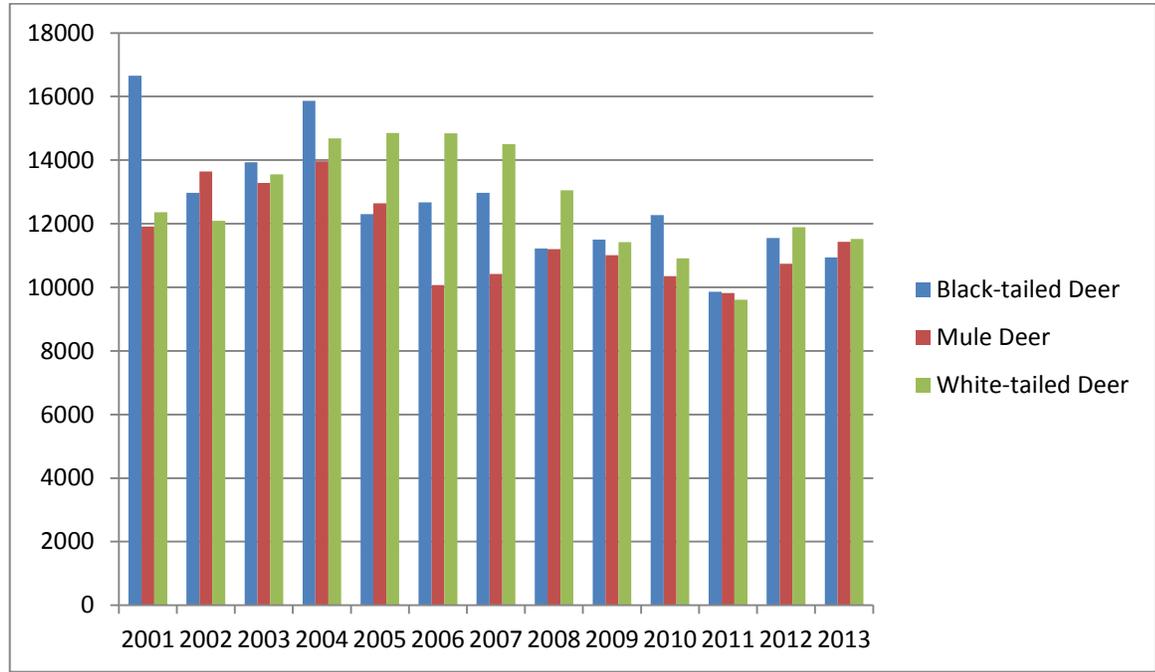


Figure 2. Estimated Washington deer harvest by deer type for 2001 through 2013.

III. DATA COLLECTION

WDFW conducts composition surveys from the air and on the ground to index buck, doe, and fawn ratios. Depending on the species/subspecies, location and terrain involved, deer composition surveys are conducted in the spring, summer, early fall (pre-hunt), and early winter (post-hunt) before deer shed their antlers. Population estimates are also derived for some mule deer subpopulations using a visibility bias model developed in Idaho for elk (Samuel et al. 1987, Ackerman 1988). Variants of the model have been developed for a variety of other species including mule deer (Ackerman 1988). All survey work is constrained by budget, staffing, and weather.

Pre-hunt and post-hunt surveys are generally conducted in eastern Washington for both white-tailed deer and mule deer. Deer populations in selected areas are frequently surveyed again in March and April to assess winter survival and recruitment.

White-tailed deer are surveyed in summer to determine pre-hunting season fawn and buck ratios and infrequently again in spring to determine recruitment – those fawns that have survived their first 10 or 11 months and will likely reach their first birthday alive. Hunter check stations are used to sample hunter success, deer condition, and age distribution of whitetail bucks in the harvest.

IV. DEER MANAGEMENT GOALS

The statewide management goals for deer are:

1. Preserve, protect, perpetuate, and manage deer and their habitat to ensure sustainable populations.
2. Manage deer for a variety of recreational, educational, and aesthetic purposes including hunting, scientific study, cultural, subsistence, and ceremonial uses by Native Americans, wildlife viewing, and photography.
3. Manage statewide deer populations for a sustainable annual harvest.

V. BACKGROUND, OBJECTIVES, AND STRATEGIES

Population Management

The goal of deer population management is to maintain relatively stable populations within the limitations of available habitat, landowner tolerance, accounting for extreme weather events (i.e., summer and fall drought, catastrophic fire, protracted winters with deep snow). Recreation management for deer is directly tied to population management. The recreation goal for deer is to maintain or increase hunting opportunity. An additional goal is to be responsive to landowner conflicts which sometimes involves recreational hunting seasons but other times requires separate mitigation tools as spelled out in the wildlife conflict section.

Aside from raw counts, some of the most straightforward metrics used to characterize deer herds are by composition ratios, such as buck:doe ratios. Post-hunt buck:doe ratios generally reflect how heavily the antlered class of the population is being hunted. The Department has designated three levels of hunting pressure and assigned a range of post-hunt buck ratio targets for each (Table 2). Recruitment rates and mortality rates vary substantially depending upon species/subspecies, weather, and location.

Table 2. Hunting intensity and related buck:doe ratios.

Level of Hunting Pressure	Post-hunt Buck Ratios
Liberal	15 to 19 bucks:100 does
Moderate	20 to 24 bucks:100 does
Conservative	25+ bucks:100 does

BLACK-TAILED DEER

Background

Of the three types of deer hunted in Washington, black-tailed deer have historically provided the highest number of deer harvested. In recent years, black-tailed deer harvest has been closer to both white-tailed deer and mule deer harvest estimates. Black-tailed deer are difficult to survey due to the habitat they occupy, making it difficult to quantify population trends. Age ratios or sex ratios by themselves are inadequate for detecting population growth or decline (Caughley 1977, 1974). Nonetheless, it is helpful to the process of setting deer harvest objectives, hunting intensity, and regulations to have some estimate or index of the abundance of animals in the population available for harvest (Table 3). Black-tailed deer habitat has been reduced in western Washington due to human encroachment, a reduction in timber harvest, and the natural progression of aging timber stands (succession). Annual harvest estimates indicate that black-tailed deer numbers are fairly static; however, the number of days per harvested animal would suggest that black-tailed deer might have declined somewhat over the past two decades. The suggested decline in black-tailed deer, particularly in coastal regions of the Olympic Peninsula, has been related to low winter survival of fawns afflicted with hair loss disease (McCoy, et al. 2014). Range-wide there are probably additional factors, as listed above, affecting localized population declines or increases. To complicate matters further, hunting regulations have varied substantially over the years making it difficult to compare harvest estimates across years. Because of their habitat and the difficulties involved with surveying them, there are still many unknowns about black-tailed deer population dynamics.

Objective 41:

Determine how well existing survey protocols for black-tailed deer are working by 2021.

Objective 42:

Establish and implement consistent survey protocols for black-tailed deer by 2021.

Strategies for Objectives 41 & 42:

- a. Conduct a literature search and peer review for existing population estimate and population index techniques that would be appropriate for black-tailed deer.
- b. Document, develop, and standardize survey protocols or population models for black-tailed deer.
- c. Incorporate the Department's black-tailed deer research results in the process of revising and expanding black-tailed deer population assessments.
- d. Summarize results from black-tailed deer habitat use research and use this knowledge to recommend deer habitat enhancements to land managers.

Table 3. Hunting intensity for black-tailed deer implemented within Regions.

Region	Liberal	Moderate	Conservative
Region 4	X	X	
Region 5	X		
Region 6	X		

MULE DEER

Background

Mule deer population levels are closely tied to severe winter events and severe drought, and they are susceptible to over-harvest. The variety of hunting seasons offered for mule deer attempts to address this susceptibility while still offering general season hunting opportunity (Table 4). Mule deer populations are more amenable to population surveys than black-tailed deer or white-tailed deer in Washington. Currently, not all mule deer populations in all parts of the state are being surveyed (Mayer et al. 2002). Depending on the district, mule deer may be surveyed after the hunting season, before the hunting season, or during the spring green-up. Some mule deer populations may be surveyed more than one time during the year.

Table 4. Hunting intensity for mule deer implemented within Regions.

Region	Liberal	Moderate	Conservative
Region 1	X	X	
Region 2	X		X
Region 3	X	X	
Region 5	X		

Objective 43:

Continue to implement, refine, and expand survey protocols for mule deer.

Strategies:

- a. Conduct post-hunt population surveys to estimate population size, or a population index, and a buck survival index.
- b. Conduct population surveys each year for major herds and expand the areas surveyed as resources are available.
- c. When appropriate, put survey areas on a two or three year cycle to provide adequate coverage and maintain cost-effectiveness.
- d. Conduct spring “green-up” surveys to quantify winter survival of adults and juveniles, and use this information to set special permit quotas and antlerless seasons for the next calendar year’s hunting season.
- e. Conduct pre-hunt surveys in summer and early fall to estimate productivity and to index the ratio of bucks per does and the ratio of legal bucks per does.

Background

Mule deer populations are influenced by site specific habitat quality, habitat quantity, land-use practices, severe winter events, drought, and predation. Recent mule deer research conducted by WDFW and cooperators has provided new information regarding how mule deer populations function in relation to their habitat.

Objective 44:

Use the information provided by the Cooperative Mule Deer Research study to inform mule deer management at an ecoregional scale.

Strategies

- a. Complete the Mule Deer Management Plan.
- b. Delineate ecoregional zones where mule deer habitat is similar.
- c. Explore the efficacy of designing surveys that discern population trends at the ecoregional scale.

WHITE-TAILED DEER

Background

White-tailed deer population levels are closely tied to severe winter events and land-use practices. White-tailed deer have the highest potential maximum rate of increase of all North American ungulates due to the type of habitat they occupy, their age at first reproduction when on a high nutritional plane, and their ability to successfully recruit twins into the population (McCullough 1987); however, in some of the western states where hard mast is not a component of forage, that full potential may not be realized. Age ratios or sex ratios by themselves are inadequate to detect population growth or decline (Caughley 1977). The majority of white-tailed deer populations in Washington are harvested under a fairly liberal hunting season structure despite some recent restrictions implemented since 2010 (Table 5).

Table 5. Hunting intensity for white-tailed deer implemented within Regions.

Region	Liberal	Moderate	Conservative
Region 1	X	X	
Region 2	X		
Region 3	X		

Objective 45:

Document buck-doe ratios for a sample subset of GMUs where at least 50 bucks are harvested each year.

Strategies:

- a. Conduct post-hunt population surveys to index population size.
- b. Conduct post-hunt population surveys to index buck survival.
- c. Conduct spring “green-up” surveys to quantify winter survival of adults and juveniles, and use this information to set special permit quotas and antlerless seasons for the next calendar year’s hunting season.
- d. Conduct pre-hunt surveys in summer and early fall to estimate productivity and to index the ratio of bucks per 100 does and the ratio of legal bucks per 100 does.

Background

Like black-tailed deer, white-tailed deer populations are difficult to estimate in many areas of Washington (Roseberry and Woolf 1991, Lancia et al. 1996, Lancia et al. 2000, Mayer et al. 2002).

Age ratios or sex ratios by themselves are inadequate for detecting population growth or decline (Caughley 1977, 1974).

Objective 46:

Improve and expand the existing survey protocols for white-tailed deer.

Strategies:

- a. Conduct literature review and consult with biometricians to evaluate the latest developments in population estimation.
- b. Develop and standardize best-case survey protocols for white-tailed deer throughout the state.

Predation

Background

Black bears, cougars, coyotes, bobcats, and wolves all prey on deer fawns and/or adult deer. Predator management by WDFW will be consistent with the predator/prey guidelines explained previously in the section pertaining to Objective 3.

If the WDFW determines that wolf predation is a primary limiting factor for an “at-risk” ungulate population, and the wolf population in that wolf recovery region has at least 4 successful breeding pairs, the WDFW can consider reducing wolf abundance in localized areas occupied by the ungulate population before state delisting of wolves occurs.

At-risk ungulate populations are any that are federal or state listed as threatened or endangered (e.g., Selkirk Mountain woodland caribou, Columbian white-tailed deer). An at-risk population would also include any ungulate population which falls 25% below its population objective for two consecutive years or if the harvest decreases by 25% below the 10-year average harvest for two consecutive years.

For ungulate populations lacking numeric estimates and/or without management objectives, the WDFW will rely on other information to assess a decline, such as harvest trends, hunter effort trends, sex and age ratios of the population, and others (WDFW 2011).

Objective 47:

Identify herds or local populations that are below population objectives where predation effects might be a limiting factor by 2015.

Strategies:

- a. Develop a prioritized list of herds where predators might be limiting factors.
- b. Identify the biological parameters that implicate predators as the factor.
- c. Harvest history, etc.
- d. Invoke the predator-prey guidelines.

Research

MULE DEER

Background

Mule deer populations have cycled in abundance during the last century across much of their North American range. In the 1990s, mule deer declined across most of the western United States. The public, the press, and wildlife scientists have postulated a variety of theories to explain this decline. Major contributors to the decline in mule deer numbers in Washington were deterioration of mule deer habitat due to successional progression of habitat from early to late successional stages, changes in land use, as well as high winter mortality due to the severe winters of 1992-1993 and 1996-1997. Because of this decline, the Department invested in a multi-cooperator, long-term mule deer research project.

Objective 48:

Use the information from the completed Mule Deer Cooperative Study, such as the relationship between habitat, predation, body condition, and other factors as they relate to Washington mule deer survival and recruitment to inform mule deer management.

Strategies:

- a. Provide information summaries and technical reports to the public.
- b. Implement recommendations as appropriate.

BLACK-TAILED DEER

Background

The mortality rates for black-tailed deer in hunted populations have been studied. The Department initiated studies on buck mortality in both Region 4 and Region 6 from 1999 through 2001. Annual survival for males was approximately 0.5 for both study sites despite differing hunting season structures (Bender et al. 2004).

Further work on population dynamics, habitat needs, the relationship between habitat and deer survival and productivity, and better techniques to estimate or index populations will help the Department better manage black-tailed deer.

Objective 49:

Continue and complete the current black-tailed deer research to develop a better understanding of population dynamics, survival, habitat needs, and population estimation techniques for black-tailed deer.

Strategies:

- a. Support the current black-tailed deer research project for which field work is scheduled to be completed by 2017 and data analysis and report writing is scheduled to be completed by 2018.
- b. When completed in 2017, disseminate the final report, dissertation, and any peer reviewed publications that result from the Washington State University tame deer nutritional study.
- c. Incorporate the results of the black-tailed deer research project in future management activities.

WHITE-TAILED DEER

Background

Little is known about survival, population dynamics, and movements of white-tailed deer in Washington State.

Objective 50:

Continue and expand the current white-tailed deer research.

Strategies:

- a. Conduct basic survival and movement research on white-tailed deer in eastern Washington.
- b. Collaborate with university researchers to develop resource selection functions for white-tailed deer.

Disease

ALL DEER

Background

Wild deer suffer from a number of diseases. Some can have severe but localized impacts on a sub-population.

Objective 51:

Monitor deer for disease each year and implement means to reduce the risk of disease when possible.

Strategies:

- a. Monitor for chronic wasting disease (CWD) using targeted surveillance.
- b. Enforce the current regulations that prevent the captive farming of native deer and elk in Washington.
- c. Continue to monitor for epizootic hemorrhagic disease (EHD), adenovirus hemorrhagic disease (AHD), hair loss syndrome, and tuberculosis (TB).
- d. Monitor for other diseases and maintain coordination with other state's wildlife veterinarians as necessary.

VI. LITERATURE CITED

- Ackerman, B. B. 1988. Visibility bias of mule deer aerial survey procedures in southeast Idaho. Dissertation, University of Idaho, Moscow, ID, USA. 106 pp.
- Bender, L. C., G. A. Schirato, R. D. Spencer, K. R. McAllister, B. L. Murphie. 2004. Survival, cause-specific mortality, and harvesting of male black-tailed deer in Washington. *J. Wildl. Manage.* 68:870-878.
- Caughley, G. 1974. Interpretation of age ratios. *J. Wildl. Manage.* 38:557-562.
- Caughley, G. 1977. Analysis of vertebrate populations. John Wiley and Sons, London. 234 pp.

- Lancia, R. A., J. D. Nichols, and K. H. Pollock. 1996. Estimating the number of animals in wildlife populations. Pages 215-253 in T. A. Bookhout, ed. Research and management techniques for wildlife and habitats. Fifth ed., rev. The Wildlife Society, Bethesda, MD.
- Lancia, R. A., C. S. Rosenberry, and M. C. Conner. 2000. Population parameters and their estimation. Pages 64-83 in S. Demarais and P. R. Krausman, eds. Ecology and management of large mammals in North America. Prentice-Hall, Inc., Upper Saddle River, NJ.
- Mayer, M. S., T. K. Fuller, R. D. Deblinger, and J. E. McDonald Jr. 2002. Can low-precision population and survival estimates of deer be accurate? *Wildl. Soc. Bull.* 30:440-448.
- McCoy, R.H., S. L. Murphie, M. S. Gunther, B. L. Murphie. 2014. Influence of hair loss syndrome on black-tailed deer fawn survival. *J. of Wildl. Manage.* 78:1177-1189.
- McCullough, D. R. 1987. The theory and management of *Odocoileus* populations. Pages 535-549 in C. M. Wemmer, ed. Biology and management of the Cervidae. Smithsonian Institution, Front Royal, VA.
- Nelson, J., D. Cottam, E. W. Holman, D. J. Lancaster, S. McCorquodale, D. K. Person. 2008. Habitat guidelines for black-tailed deer: coastal rainforest ecoregion. Mule Deer Working Group, Western Association of Fish and Wildlife Agencies.
- Roseberry, J. L., and A. Woolf. 1991. A comparative evaluation of techniques for analyzing white-tailed deer harvest data. *Wildl. Monogr.* 59 pp.
- Samuel, M. D., E. O. Garton, M. W. Schlegel, and R. G. Carson. 1987. Visibility bias during aerial surveys of elk in north-central Idaho. *J. Wildl. Manage.* 51:622-630.

BIGHORN SHEEP (*Ovis canadensis*)

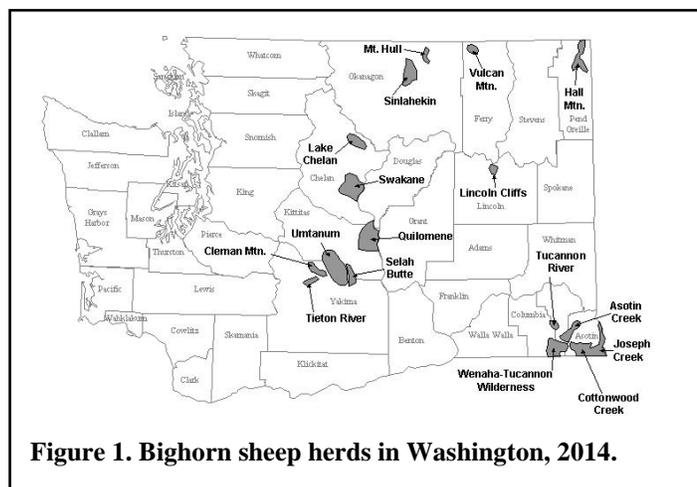
I. POPULATION STATUS AND TREND

Washington State has approximately 1,380 bighorn sheep distributed in 17 identified herds, exclusive of those managed by tribal governments. Of these, we categorize sheep in 11 herds as ‘California bighorns’ and 6 as ‘Rocky Mountain bighorns’, although the biological importance of these designations are subject to dispute (Wehausen and Ramey 2000). As of early 2014, herds vary from as few as 35 to as many as 250 sheep. Populations are considered to be approximately stable in 9 herds, increasing in 4 herds and declining in 4 herds. Although predators may be locally important limiting factors during some years and for some herds, the overwhelming management concern for bighorns in Washington during 2015-2021 will continue to be mortality and poor lamb recruitment caused by pneumonia.

The 5 herds considered to be part of the Hells Canyon meta-population (including herds in Oregon and Idaho) have all declined since the 1990s due to pneumonia and continue to suffer poor lamb recruitment. In 2009, the Umtanum/Selah Butte herd between Ellensburg and Yakima suffered a pneumonia outbreak. Although the herd subsequently rebounded, it is still considered infected and susceptible to future declines and poor recruitment. In 2013, a severe outbreak caused considerable mortality in the Tieton herd, near Naches. Concern about the potential spread of disease to the adjacent Cleman Mountain herd prompted WDFW to remove this herd entirely. Declines that do not appear to be related directly to pneumonia (but may also be related to other diseases) have recently been documented in the Sinlahekin and Vulcan Mountain herds. Herds unaffected by diseases and that have sufficient habitat, have thrived, and provided both consumptive and non-consumptive recreational opportunity. Unlike in the Rocky Mountain states, most bighorn herds in Washington live at relatively low elevations, often near public highways (e.g., Cleman Mountain, Swakane, Umtanum/Selah), and thus provide excellent opportunities for the general public to view these animals in their natural habitat.

II. RECREATIONAL OPPORTUNITY

Populations of ‘Rocky Mountain’ bighorns in south-eastern Washington are still affected by pneumonia, and thus are much smaller than their habitat could support. Most populations of ‘California’ bighorns, typically along the eastern foothills of the Cascades, are limited by available public lands. In Washington, most hunting is of mature rams. Therefore, harvest thresholds are based on total population size, sex structure, and the number of mature rams in a herd. Hunting opportunity for rams is allocated by permit drawing and is a once-in-a-lifetime opportunity (except for raffle and auction permit holders, and ewe hunts). The



number of permit hunt applications received annually varies, depending on the popularity of the hunt and number of permits available. Statewide, permit levels have varied from as few as 9 to as many as 37 hunts in recent years, depending on herd status. Hunter success is high (97%).

III. DATA COLLECTION

The Department has generally surveyed each herd annually, using either aerial or ground surveys. Surveys typically are conducted during winter when animals are concentrated, and data are used to estimate population size, lamb recruitment, sex ratio, and percentage of mature rams in the population. In addition to surveys, individuals from selected herds are screened for disease and parasites during winter captures or feeding operations.

IV. BIGHORN SHEEP MANAGEMENT GOALS

The statewide goals for bighorn sheep are:

1. Preserve, protect, perpetuate, and manage bighorn sheep and their habitats to ensure healthy, productive populations.
2. Manage bighorn sheep for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography.
3. Manage statewide bighorn sheep populations for a sustained yield.

V. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Habitat Management

Habitat quality influences bighorn sheep reproduction, survival, and abundance. Unfortunately, habitat conditions are deteriorating in some bighorn herds, primarily due to the spread of noxious weeds, human development, and fire exclusion. Improving habitat quality for bighorn sheep where possible is likely to improve reproduction and growth, particularly among young animals. Many bighorn sheep populations in Washington include or are adjacent to private lands. Although bighorns can be compatible with some commercial activities (e.g., timber harvesting, cattle grazing), they are susceptible to habitat loss or disease from others (e.g., housing development, domestic sheep or goat grazing).

Objective 52:

Identify locations within existing bighorn sheep ranges where prescribed burns or noxious weed eradication can be accomplished in a cost-efficient manner.

Strategies:

- a. Coordinate with WDFW Wildlife Area Managers where bighorn herds currently exist, in cooperation with district biologists to identify priority projects and budget needs by 2015.
- b. Accomplish at least one prescribed burn in a priority area by 2016.
- c. Work with federal (e.g., USFS, BLM) and other state land management agencies (e.g., DNR) to elevate the importance in their planning of fire management policies beneficial to bighorn sheep.

Objective 53:

Identify locations within and adjacent to existing bighorn sheep ranges where habitat acquisition of private land (either through fee title or conservation easement) is a high priority.

Strategies:

- a. Pursue conservation easements or fee title purchases for properties identified as high priorities when opportunity arises.

Population Management

Issue Statement

Bighorn sheep in Washington naturally occurred in patchy populations that, on a long-term scale, were susceptible to occasional extirpation and re-colonization. In the 21st century, these naturally occurring dynamics are no longer possible because most land use separating existing bighorn populations is incompatible with bighorn management. Thus, relocation has been used as a tool to establish new populations, augment existing populations, and artificially establish genetic connectivity. This, in turn, increases the long-term viability of bighorn sheep by increasing total population size, increasing the number of populations, and providing linkages between populations for the exchange of individuals and genetic material (Bailey 1992). Reductions, and in extreme cases, complete losses of bighorn populations due to disease outbreaks have both increased the need for reintroduction and augmentation, as well as the risk inherent in allowing bighorns to move out of existing ranges in natural exploratory movements.

Objective 54:

Re-establish a bighorn herd in the existing Tieton herd habitat patch by 2016, and monitor for reproduction and population trends by 2018.

Strategies:

- a. Identify risks to Tieton bighorns posed by presence of domestic sheep and/or goats.
- b. Minimize risks through combination of education, fencing, disease treatment, herd buy-outs, and other actions identified through ongoing analyses.
- c. Identify potential source animals through disease testing.
- d. Secure additional funds from private groups to assist in reintroduction expenses.
- e. Move bighorns into existing Tieton range during 2016 and 2017.
- f. Monitor movements, survival, and reproduction using GPS collars through 2020.

Objective 55:

Complete analysis of the feasibility of introducing bighorns into the Pasayten Wilderness by 2019.

Strategies:

- a. Produce maps of the biological potential for new bighorn ranges in the Pasayten Wilderness areas using existing summer and winter GIS habitat data by 2018.
- b. If above analyses suggest that areas are biologically suitable, investigate USFS interest and capability by 2019.
- c. If above analyses suggest either reintroduction is feasible, complete a reintroduction plan by 2020.

Objective 56:

Evaluate the status of small, isolated bighorn herds in the northeastern part of the state (Hall Mountain and Vulcan Mountain), as well as the Tucannon herd in the southeastern part of the state, and formulate a long-term strategy for their management.

Strategies:

- a. Investigate whether ground-based sampling or capture of animals from these herds can be accomplished on a cost-effective basis.
- b. Test captured animals in Vulcan Mountain for disease, and equip a sample of animals with GPS collars to examine habitat relations relative to increasing human development.
- c. Explore feasibility and desirability of using Hall Mountain animals to supplement the Tucannon herd of Rocky Mountain bighorn sheep, and develop monitoring protocols that will allow us to assess the long-term success of any augmentation actions.

Objective 57:

Initiate assessment of the genetic diversity of, and genetic relatedness among Washington's bighorn sheep herds, and if necessary, develop strategies to minimize any effects of genetic drift or inbreeding and maximize bighorn herds' abilities to respond adaptively to future environmental stresses (Hogg et al. 2006; Luikart et al. 2008, 2010; Rioux-Paquette et al. 2010, 2011).

Strategies:

- a. Gather genetic samples from horn shavings obtained when hunter-harvested animals are permanently marked.
- b. Contract with internal or external genetics laboratory to conduct comparative analysis of genetic variability, and to recommend priority herds for genetic augmentation.
- c. Finalize a long-term plan for occasional genetic augmentation, including priority herds, potential donor sources, number and type of effective migrants needed, and follow-up monitoring.
- d. Gather and interpret additional data on the effects of selective harvest on bighorn rams by ageing harvested animals and measuring annual growth increments from trophies during mandatory inspection.

Issue Statement

To better manage bighorn sheep populations, managers strive to maintain sustainable and healthy populations of bighorns, while at the same time maintain sheep at levels that minimize the risk of disease and reduce agricultural damage on private lands.

Objective 58:

Develop habitat-based population objectives for each bighorn herd, taking into account wildlife conflicts, disease history, and risk of contact with domestic sheep and goats.

Strategies:

- a. Use existing GIS habitat data and local knowledge to quantify area (in km²) of summer and winter habitat in each bighorn range by 2015.
- b. Conduct a thorough literature review, and establish reasonable population density targets.
- c. Calculate new population objectives (to update Table 1).

Table 1. Approximate population sizes in early 2014, and previous plan objectives for Washington’s bighorn sheep herds. Objective 58 is to revise the right-hand column, based on habitat mapping and literature-based estimates of desired population densities.

Herd	Total Population Size	
	Approximate Current	Objective^b
Hall Mountain ^a	20-25	40-70
Vulcan	30-40	80-110
Lincoln Cliffs	105-125	90-100
Asotin Creek ^a	65-70	50-60
Black Butte ^a	40-50	300
Wenaha ^a	35-50	140
Mountain View ^a		
Tucannon ^a	20-30	60-70
Mt. Hull	90-100	55-80
Sinlahekin	35-45	50
Manson	105-115	100-150
Chelan Butte	110-120	
Swakane	130-140	50-60
Quilomene	150-180	250-300
Umtanum/Selah Butte	190-210	250-300
Cleman Mountain	180-210	140-160
Tieton	0	75-150
Total	1,270-1,490	1,750-2,130

^a Rocky Mountain bighorn sheep

^b From 2009-2015 GMP; to be revised by 2015.

Objective 59:

Use population objectives as a guide to harvest management (particularly with regard to ewe harvest opportunity), as well as translocation and augmentation.

Strategies:

- a. For herds that are exceeding population goals and disease has not been identified as an issue, trap and relocate sheep to an alternate area when budgets allow.
- b. For herds that are exceeding the desired population size, and disease has been identified as an issue or budgets constrain trapping opportunities, establish ewe harvest opportunities.
- c. For herds that are below the desired population size, consider restricting harvest and augmenting the population.

Issue Statement

There is a need to monitor herds annually or bi-annually to provide maximum recreational harvest opportunity consistent with maintaining an adequate number of large-sized, older-aged rams in a population for normal breeding behavior. While providing hunter opportunity, long-term evolutionary potential must not be compromised (Allendorf et al. 2008, Coltman et al. 2003, Harris et al. 2002, Hengeveld et al. 2011, Festa-Bianchet et al. 2014).

Objective 60:

Monitor bighorn sheep herds bi-annually (or annually where justified) with sufficient precision that: i) declines driven either by disease events can be identified rapidly, ii) declines driven by other external factors or by excessive harvest can be identified within a 4-year period, and iii) increases in the population sufficient to justify an increase in harvest opportunity can be identified within a 4-year period.

Strategies:

- a. Conduct big horn sheep surveys annually or bi-annually for each herd.
- b. Capture and equip a sample of ewes and rams with GPS radio collars to better delineate movements and ranges used where recent data are lacking.
 1. Priority herds for 2016-2021 are Vulcan Mountain, Chelan Butte, Quillomene, and Tucannon.
- c. Where identified as a high priority by district biologists, use radio-collars to develop herd-specific sightability models.
- d. Continue application of herd-specific sightability models for Blue Mountain herds, as well as other herds where biologically justified (Bodie et al. 1995).

Issue Statement

Like other wildlife, bighorn sheep are subject to periodic disease outbreaks. A respiratory disease that takes a toll on wild bighorns is pneumonia. Unlike in many wildlife situations, however, the bacteria causing pneumonia in bighorns are not native to North America, and thus bighorns have not had evolutionary time to adapt to it. Wildlife health researchers across the west have found that pneumonia in bighorns is most often associated with bacteria named *Mycoplasma ovipneumoniae*, although other bacteria in the family *Pasteurellaceae* typically take advantage of *M. ovipneumoniae* infection and cause death. Domestic sheep and goats carry both *M. ovipneumoniae* and the various species within *Pasteurellaceae*, but are not clinically affected. However, wild bighorn sheep infected by these bacteria often develop acute pneumonia and die; those that survive often transmit bacterial infection to lambs that subsequently succumb to pneumonia (Besser et al. 2008, 2012; Cassirer and Sinclair 2007; Wehausen et al. 2011; Wild Sheep Working Group 2012). Currently, there is no effective treatment or preventive vaccination for pneumonia in wild bighorn sheep. Pneumonia outbreaks have killed bighorn sheep in other western states and in some Washington herds. Most recently, infected bighorns were found in late 2009 and early 2010 in the Umtanum herd in the Yakima River Valley, in 2012 in the Asotin herd, and in early 2013 pneumonia decimated the Tieton bighorn herd west of Naches.

Objective 61:

Reduce to the degree feasible the probability of contact between bighorn sheep and domestic sheep and goats in all bighorn herds as well as in areas identified for repatriation of bighorn sheep.

Strategies:

- a. On federal and state managed public lands, work with public land agency counterparts to produce the best-scientifically possible analyses of risks of contact between wild bighorns and domestic sheep/goats (O'Brien et al. 2014).
- b. On federal and state managed public lands, work with public land agencies to develop management plans that minimize the risk of contact between wild bighorns and domestic sheep/goats.

- c. On WDFW managed public lands, prohibit grazing of domestic sheep or goats in areas occupied by bighorn sheep or plans for repatriation.
- d. On private lands where potential for contact with bighorns exists and where neither purchase nor conservation easements are possible, work toward minimizing probability of contact with domestic sheep/goats, by:
 1. Educating flock owners about the risks of disease transmission and how to contact Department personnel in a timely manner.
 2. Working with flock owners to provide effective physical barriers.
 3. Working with flock owners to develop disease-free domestic herds.
 4. Where feasible and other approaches have failed and extirpation of local bighorn herd is likely, consider buy-outs of domestic herds.

Recreation Management

Issue Statement

The demand for bighorn sheep hunting opportunity exceeds the allowable harvest for sustainable populations. Therefore, the Department restricts bighorn sheep harvest to a level compatible with long-term sustainability of each herd. With bighorn sheep, hunters typically select the largest, hence oldest, rams in the herd. Consequently, the Department manages sheep as a high quality hunting opportunity and takes precautionary steps to ensure that ample numbers of mature rams are left in the population. The result is a relatively high harvest success (mean = 92%) and post-season ram: ewe ratios that are favorable for growing bighorn sheep populations. At the same time, a few hunters are willing to increase their chances to procure a permit by participating in auctions and/or raffles, the proceeds of which are expended entirely on bighorn sheep management and conservation. Providing all of these opportunities on an equitable and sustainable manner is a challenge.

Objective 62:

Provide recreational hunting season opportunities for individual bighorn sheep herds using harvest strategies that maintain demographic stability, typical breeding behavior, and minimize the probability of undesirable evolutionary consequences.

Strategies:

- a. Conduct bighorn sheep hunts by permit only and allow harvest of any ram.

Table 2. Permit levels for all bighorn sheep herds.

Permit level is...	...when the herd has...			
	Population	Ram:ewe	Number rams with...	
	Size ^a	ratio	$\geq 1/2$ curl ^b	$\geq 3/4$ curl ^c
20% of the mature rams ^d	≥ 50	>50:100	8	2
15% of the mature rams ^d	≥ 50	25-50:100	8	2
10% of the mature rams ^d	≥ 50	<25:100	8	2

^a Total population size, excluding lambs. Population must be stable or increasing.
^b Used as a measure of >3-year-old rams.
^c Used as a measure of >6-year-old rams.
^d Rams $\geq 1/2$ curl.

- b. As a guideline, set ram permit levels as indicated in Table 2 above:

For example, if a herd was estimated at > 50 animals, the ram:ewe ratio was between 25-50 per 100 ewes, and the number of the number of rams with 1/2 curl was > 8 and at least 2 of those 8 rams were > 3/4 curl, ram permit level would be set at 15% of the estimated number of 1/2 curl or greater rams. Generally, no ram permits would be issued for populations with fewer than 50 animals, and/or with fewer than 8 1/2 curl or greater rams.

- c. Adjust permit levels for herds bordering other states and provinces to account for management activities of these other areas.
- d. Consider reducing permit levels or terminating all permits (depending on population size and rate of decline) for herds declining due to disease or high parasite loads.
- e. Consider providing ram permits in excess of Table 2, on a case-by-case basis, when evidence suggests that a high ratio of rams to ewes increases the risk of ram forays outside of normally used areas, and thus of contact with domestic sheep or goats.
- f. Use trap and relocation as the primary method of reducing overpopulated herds, nuisance activity, or agricultural damage. Consider ewe harvest as a secondary method, with the following conditions:
 - 1. Ewe permits should not exceed 10-20% of the adult ewe population.
 - 2. A harvested ewe would not count toward the one sheep a hunter can harvest in a lifetime.

Objective 63:

Provide opportunity for auction tags and raffle tags in a manner that enhances predictability for both bighorn herd managers and the hunting public, while maintaining or increasing the desirability of these unique opportunities.

Strategies:

- a. By 2016, develop and implement allocation formula for existing auction and raffle permits that provides for increased opportunity to take trophy-sized rams from bighorn herds that have not historically been available, while also minimizing the risk of excessive harvest.
- b. The Swakane herd will be managed as the state's sole "trophy quality" herd. Draw permit levels will be calculated based on Table 2, as with other herds. However, auction and/or raffle permits will be limited to 1-year. Other herds may sustain > 1 auction/raffle/year, but a point system will be developed to ensure long-term sustainability of old-aged rams.

Enforcement

Issue Statement

Because there are only about 1,300 bighorn sheep in Washington, illegal harvest or harassment has the potential to impact populations. Unfortunately, the rarity and majestic nature of mature rams (i.e., their horns) along with limited hunting opportunity makes them likely targets for illegal take.

Objective 64:

Account for all known bighorn sheep mortalities. Clarify rules and regulations to provide the Department and the public with clarity regarding the possessing of bighorn skulls, heads, and horns.

Strategies:

- a. Permanently mark the horns of all dead bighorn sheep rams that are recovered from the field.
- b. Continue existing mandatory reporting for all bighorn sheep hunters.
- c. Work with Washington Department of Transportation (WDOT) to increase awareness among motorists of the potential for encountering bighorn sheep along highways in specifically-identified areas.

Predation

Background

Black bears, cougars, coyotes, bobcats, and wolves all prey on bighorn sheep at times. Predator management by WDFW will be consistent with the predator/prey guidelines explained previously in the section pertaining to Objective 3.

If the WDFW determines that wolf predation is a primary limiting factor for an “at-risk” ungulate population, and the wolf population in that wolf recovery region has at least 4 successful breeding pairs, the WDFW can consider reducing wolf abundance in localized areas occupied by the ungulate population before state delisting of wolves occurs.

At-risk ungulate populations are any that are federal or state listed as threatened or endangered (e.g., Selkirk Mountain woodland caribou, Columbian white-tailed deer). An at-risk population would also include any ungulate population which falls 25% below its population objective for two consecutive years or if the harvest decreases by 25% below the 10-year average harvest for two consecutive years.

For ungulate populations lacking numeric estimates and/or without management objectives, the WDFW will rely on other information to assess a decline, such as harvest trends, hunter effort trends, sex and age ratios of the population, and others (WDFW 2011).

Objective 65:

Identify herds that are below population objectives where predation effects might be a limiting factor by 2015.

Strategies:

- a. Develop a prioritized list of herds where predators might be limiting factors.
- b. Identify the biological parameters that implicate predators as the factor.
- c. Population status, harvest history, etc.
- d. Invoke the predator-prey guidelines.

Research

Issue Statement

Bighorn sheep are vulnerable to parasites and diseases that significantly impact population levels. In addition, small population sizes create situations where predators and inbreeding can cause impediments to population growth.

Objective 66:

Continue active participation in research oriented toward understanding and ultimately managing limiting factors produced by disease, predation, and genetic factors.

Strategies:

- a. Continue participation in the multi-stakeholder Hells Canyon Bighorn Sheep Initiative.
- b. Work collaboratively with Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, Washington State University, or other research universities on disease research specifically addressing disease related issues between domestic and bighorn sheep.
- c. Collect data for each herd opportunistically for assessing herd health.
- d. Monitor situations where predation may be depressing bighorn populations below management goals, and if feasible and consistent with other WDFW objectives and policies, respond appropriately.

VI. LITERATURE CITED

- Allendorf, F.W., P. R. England, G. Luikart, P. A. Ritchie, and N., Ryman N. 2008. Genetic effects of harvest on wild animal populations. *Trends in Ecology and Evolution*. 23:327-337.
- Bailey, J. A. 1992. Managing bighorn habitat from a landscape perspective. Biennial symposium of northern wild sheep and goat council. 8:49-57.
- Besser, T.E., E. F. Cassirer, K.A. Potter, J. Vander Schalie, A. Fischer, D. P. Knowles, D. R. Herndon, F. R. Rurangirwa, G. C. Weiser, and S. Srikumaran. 2008. Association of *Mycoplasma ovipneumoniae* infection with population-limiting respiratory disease in free-ranging rocky mountain bighorn sheep (*Ovis canadensis canadensis*). *Journal of Clinical Microbiology* 46:423-430.
- Besser, T.E., M. A. Highland, K. Baker, E. F. Cassirer, N. J. Anderson, J. M. Ramsey, K. Mansfield, D. L. Bruning, P. Wolff, J. B. Smith, and J. A. Jenks. 2012. Causes of pneumonia epizootics among bighorn sheep, western United States, 2008–2010. *Emerging Infectious Diseases* 18:406-413.
- Bodie, W. L., E. O. Garton, E. R. Taylor, and M. McCoy. 1995. A sightability model for bighorn sheep in canyon habitats. *Journal of Wildlife Management* 59:832-840.
- Cassirer, E.F., and A.R.E. Sinclair. 2007. Dynamics of pneumonia in a bighorn sheep metapopulation. *Journal of Wildlife Management*: 71:1080-1088.
- Coltman, D.W., P. O'Donoghue, J.T. Jorgenson, J. T. Hogg, C. Strobeck C, and M. Festa-Bianchet. 2003. Undesirable evolutionary consequences of trophy hunting. *Nature*. 426:655-658.
- Festa-Bianchet, M., F. Pelletier, J. T. Jorgenson, C. Feder, and A. Hubbs. 2014. Decrease in horn size and increase in age of trophy sheep in Alberta of 37 years. *Journal of Wildlife Management* 78:133-141.
- Harris, R.B., W.A. Wall, and F.W. Allendorf. 2002. Genetic consequences of hunting: what do we know and what should we do? *Wildlife Society Bulletin* 30:634-643.
- Hengeveld, P.E., and M. Festa-Bianchet. 2011. Harvest regulations and artificial selection on horn size in male bighorn sheep. *Journal of Wildlife Management* 75:189-197.

- Hogg J. T., S.H. Forbes, B.M. Steele, and G. Luikart G. 2006. Genetic rescue of an insular population of large mammals. *Proceeding of the Royal Society B Biological Sciences*. 273:1491-1499.
- Luikart, G., Zundel, S., Rioux, D., Miquel, C., Keating, K. A., Hogg, J. T., Steele, B., Foresman, K. and Taberlet, P. 2008 Low genotyping error rates for microsatellite multiplexes and noninvasive fecal DNA samples from bighorn sheep. *Journal of Wildlife Management* 72:299-304.
- Luikart, G., K. Pilgrim, J. Vistry, V. O. Ezenwa, and M. K. Schwartz. 2010. Candidate gene microsatellite variation is associated with parasitism in wild bighorn sheep. *Biology Letters* 4:228-231.
- O'Brien, J. M., C. S. O'Brien, C. McCarthy, and T. E. Carpenter. 2014. Incorporating foray behavior into models estimating contact risk between bighorn sheep and areas occupied by domestic sheep. *Wildlife Society Bulletin (in press)*.
- Rioux-Paquette, E., M. Festa-Bianchet, and D. W. Coltman. 2010. No inbreeding avoidance in an isolated population of bighorn sheep. *Animal Behavior* 80:865-871.
- Rioux-Paquette, E., M. Festa-Bianchet, and D. W. Coltman. 2011. Sex-differential effects of inbreeding on overwinter survival, birth date and mass of bighorn lambs. *Journal of Evolutionary Biology*: 24:121-131.
- Wehausen, J. D. and R. R. Ramey II. 2000. Cranial morphometric and evolutionary relationships in the northern range of *Ovis canadensis*. *Journal of Mammalogy*, 81(1):145-161.
- Wehausen, J.D. S. T. Kelley, and R. R. Ramey II. 2011. Domestic sheep, bighorn sheep, and respiratory disease: a review of the experimental evidence. *California Fish and Game* 97:7-24.
- Wild Sheep Working Group. 2012. Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat. Western Association of Fish and Wildlife Agencies.

Revised Bighorn Sheep Herd Objectives

September 14, 2015

In the Washington Department of Fish and Wildlife (WDFW) Game Management Plan, July 2015-June 2021 (available online at <http://wdfw.wa.gov/publications/01676/>), Objective 58 calls for the Department to reassess the bighorn sheep herd-specific objectives that appears as Table 1 in the chapter devoted to bighorn sheep (*Ovis canadensis*).

Issue Statement:

To better manage bighorn sheep populations, managers strive to maintain sustainable and healthy populations of bighorns, while at the same time maintain sheep at levels that minimize the risk of disease and reduce agricultural damage on private lands.

Objective 58:

Develop habitat-based population objectives for each bighorn herd, taking into account public conflicts, disease history, and risk of contact with domestic sheep and goats.

Strategies:

- a. Use existing GIS habitat data and local knowledge to quantify area (in km²) of summer and winter habitat in each bighorn range by 2016.
- b. Conduct a thorough literature review, and establish reasonable population density targets.
- c. Calculate new population objectives (to update Table 1) by 2017.

The following table provides the results of that task, and should be viewed as superseding Table 1, p. 76 (Bighorn sheep chapter), of the 2015-2021 Game Management.

Biologists managing bighorn herds considered that the previous designation of a single “population objective” was not sufficiently precise and informative. Instead, biologists have now developed short-term objectives and long-term potential population sizes. The former represent targets that could realistically be achieved within the planning time-frame (i.e., by 2021), given current population sizes and existing constraints. The latter represent the best guess at the long-term capacity of the site to support bighorn sheep, assuming that current constraints (e.g., chronic pneumonia, land-owner concerns) can be resolved or ameliorated. In both cases, lower and upper values are provided, reflecting our level of uncertainty.

Herd Name	Region	District	(1)	(2)	(3)	(4)	(5)	(6)	Notes
			Recent low documented total population size	Recent high documented total population size	Short-term early winter herd size objective (lower bound)	Short-term early winter herd size objective (upper bound)	Long-term potential (lower bound)	Long-term potential (upper bound)	
Hall Mountain	1	1	21	30	25	35	nd	nd	1
Vulcan Mountain	1	1	31	107	70	90	80	110	2
Lincoln Cliffs	1	2	110	120	100	120	180	220	3
Asotin	1	3	30	120	130	170	240	240	4
Black Butte	1	3	30	50	60	100	585	585	5
Mountain View-Wenaha	1	3	30	50	130	170	375	375	6
Tucannon	1	3	21	21	40	80	160	160	7
Mount Hull	2	6	90	110	80	100	80	100	8
Sinlahekin	2	6	30	86	50	80	100	150	9
Chelan Butte	2	7	160	190	150	170	150	170	10
Manson	2	7	120	140	100	120	200	200	11
Swakane	2	7	135	150	130	170	150	180	12
Cleman	3	8	200	250	170	220	170	220	13
Quilomene	3	8	62	140	150	170	150	170	14
Tieton	3	8	0	250					15
Umtanum	3	8	180	300	250	300	300	350	16

Short term objectives (columns 3,4) account for estimated population size in 2014 and existing constraints on population growth (e.g., disease, private lands)

Long term, potential ideal winter herd sizes (columns 5,6) reflect the potential of habitat to support bighorns assuming disease and land-owner tolerance issues can be resolved

Notes

Hall Mountain	1	These numbers are only slightly larger than current estimates; they reflect 1) evident lack of growth of this population over past few years, for reasons as yet undetermined, and 2) possibility of capturing and moving some Hall Mtn animals to Tucannon Herd for genetic augmentation of next few years. The ideal size of this population has yet to be estimated. The current number is considered far less than habitat can support, but reasons for low population size remain unknown at this time. Highest number since 2001 was 81, but unlikely to reach that by 2021 even if all issues are resolved. Historic high was 107 animals, which may have been greater than limited habitat can support, as evidenced by failure to get close to that in recent years.
Vulcan Mountain	2	
Lincoln Cliffs	3	These numbers are only slightly larger than current estimates. They reflect the currently-largest historic population size, but with land-owner concerns increasing (land above cliffs is largely private), this is likely the largest feasible population size here. These figures came from approximately doubling what appeared to be historic high densities of population abundance in the Blue Mountains. At that point, there was no indication the population was negatively affected by density, and all indications it could grow to at least twice that size. The lower figure for the 2021 objective reflects the fact that this population is currently much lower than it could be (because of pneumonia), and further that pneumonia is
Asotin	4	

Black Butte	5	These figures came from approximately doubling what appeared to be historic high densities of population abundance in the Blue Mountains. At that point, there was no indication the population was negatively affected by density, and all indications it could grow to at least twice that size. The lower figure for the 2021 objective reflects the fact that this population is currently much lower than it could be (because of pneumonia), and further that pneumonia is
Mountain View-Wenaha	6	These figures came from approximately doubling what appeared to be historic high densities of population abundance in the Blue Mountains. At that point, there was no indication the population was negatively affected by density, and all indications it could grow to at least twice that size. The lower figure for the 2021 objective reflects the fact that this population is currently much lower than it could be (because of pneumonia), and further that pneumonia is
Tucannon	7	These figures came from approximately doubling what appeared to be historic high densities of population abundance in the Blue Mountains. At that point, there was no indication the population was negatively affected by density, and all indications it could grow to at least twice that size. The lower figure for the 2021 objective reflects the fact that this population is currently much lower than it could be, for reasons yet to be elucidated. WDFW will be The figures of 80-100 reflect currently high abundance; it is unlikely the habitat can support more than this (estimated density/habitat now is 6-7 sheep/km ² , among the highest); sheep have propensity to travel north and south along the Okanogan, putting the herd at risk of disease transmission. Herd is currently at objective (no evidence of disease - yet), but should not be allowed to grow larger.
Mount Hull	8	The ideal range of 100-150 reflects some uncertainty about the biological capacity of this area (fair amount of forested habitat; cliff habitat dispersed), as well as historic high numbers just below 100 (it is also similar, if slightly lower, than the density suggested for the Blue Mtns herds). We remain uncertain as to the population-level consequences of infection by <i>Psoroptes ovis</i> which is unlikely to abate during the planning period. Thus, the lower objective
Sinlahekin	9	
Chelan Butte	10	
Manson	11	
Swakane	12	
Cleman	13	
Quilomene	14	We view this population as forage limited (among the driest habitat, if not the very driest, of any population in the state), so these objectives and ideal herd sizes may be overly optimistic.
Tieton	15	This herd was eliminated during the disease event of 2013 to protect the adjacent Cleman Mtn herd; WDFW game management plan calls for restoration of bighorns in this area when the risk of disease transmission can be lowered to acceptable levels. The ideal population size of 300-350 reflects the recent historic high population size. Given the high density per habitat implied by this (5-6 sheep/km ²) it seems unlikely a long-term equilibrium could be much higher. The objective to 2021 is somewhat lower because 1) we expect to see a population decline over the next few years due to very poor recruitment during summers 2013 and 2014 (and likely in future), and land-owner tolerance on the Selah
Umtanum	16	

MOUNTAIN GOAT (*Oreamnos americanus*)

Mountain goat populations in Washington have declined considerably from their historic abundance. Historically, goat populations may have been as high as 10,000 animals. As of 2008, mountain goats in Washington were estimated to number approximately 2,800 (with uncertainty ranging from ~2,401 to ~3,200; Rice, 2012; although surveys during 2012-2014 suggest a modest upturn in population levels statewide. Hunting opportunity has decreased accordingly, and current permit levels are conservative and represent $\leq 4\%$ of the known population in herds that are large enough to sustain harvest. Despite reductions in hunting opportunity, many local goat populations remain low. However, a few populations are doing well. Goat populations in the Darrington area west of Glacier Peak, along the northern shore of Lake Chelan, surrounding Mount Baker, and in the Alpine Lakes Wilderness Areas appear to have increased in recent years. Other populations, for example in the upper elevation regions west of Methow, may have declined.

II. RECREATIONAL OPPORTUNITY

Mountain goats have been hunted in Washington State since 1897, when hunters could harvest two goats annually (Johnson 1983). Following several years of excessive hunting, seasons were restricted in 1917 and all hunting closed by 1925. Later, goat populations recovered and hunting resumed in 1948. Since 1948, mountain goat hunting opportunity has been limited by permit. However, managers continued to issue more permits than most goat populations could sustain. There is little doubt that excessive legal harvest played a large role in the decline of mountain goats in Washington, as occurred in other jurisdictions.

The number of mountain goats legally harvested in Washington decreased dramatically during the period 1960-2005 (Rice and Gay 2010). Hunting opportunity has also declined; from 218 permits in 1991 to 18 permits in 2008 and to 14 permits in 2013. In recent years, the number of permit applications per hunt area has varied from just under 1,000 to over 5,000, but because most applications include the maximum of 4 hunt choices, the average number of applications/mountain goat permit in 2013 was ~ 724. The hunting season for mountain goat is generally for two months (September 1 to October 31), and overall harvest success during 6 most recent years (2008-2013) was 81%.

Currently, mountain goat hunting is a once-in-a-lifetime opportunity. Hunters may harvest any adult goat with horns ≥ 4 inches. Hunters are urged not to harvest a nanny. During the 2013 season, only a fraction of the mountain goat range was open to hunting, with 14 permits in 10 goat units.



Figure 1. Primary areas of Mountain goat distribution (shaded, excluding Olympic and Mount Rainier National Parks) and areas open to hunting (crosshatch). 2008.

III. DATA COLLECTION

Limited funding continues to affect the Department's ability to conduct thorough and consistent surveys in all areas with mountain goats. Most surveys are conducted using a helicopter (a few populations allow for counts from the ground) and generally occur in July or August (Gonzales-Voyer et al. 2001). During the past few years, annual surveys have been conducted in areas supporting mountain goat hunts, but this has occurred at the expense of a better understanding of population dynamics elsewhere. The Department will continue to monitor hunted mountain goat populations to provide for hunting opportunity while guarding against possible over-harvest. During this planning period, increased attention will be given to better understand the status of mountain goats in areas where they were not hunted during 2009-2015. This may provide additional hunter opportunity, and may also help direct efforts to recover populations that continue to struggle. Results from the Department's long-term study of mountain goats are now all published (see literature cited below), and where applicable, these findings have been incorporated into management planning.

IV. MOUNTAIN GOAT MANAGEMENT GOALS

The statewide goals for mountain goats are:

1. Perpetuate and manage mountain goats and their habitats to ensure healthy, productive populations and long-term genetic connectivity.
2. Manage mountain goats for a variety of recreational, educational, and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography.
3. Enhance statewide mountain goat populations and manage goats for a sustained yield.
4. Where conflicts with recreationists have been documented and ongoing, minimize habituation and conditioning of mountain goats to humans, thus reducing the threat to both humans and mountain goats.

V. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Population Management

Issue Statement

Mountain goat populations typically occur as meta-populations scattered across the landscape on "habitat islands" where topographic and vegetative characteristics are suitable for goats. The sizes and distribution of these islands of suitable habitats have recently been documented in Washington (Wells 2006, Shirk et al. 2010, Parks 2013). Understanding the spatial relationship between these habitats and mountain goat use from a meta-population perspective is critical for sustainable management of mountain goats.

Objective 67:

Revise existing goat management units to better reflect movement patterns, human access, and aerial survey units, while providing for close control of harvest and hunting recreational opportunity.

Strategies:

- a. Examine existing information on mountain goat distribution and road access.
- b. Review options with district biologists, Game Management Advisory Council, and request input from the public.
- c. Publish revised maps and incorporate into WACs.

Issue Statement

Until recently, diseases have rarely been an important consideration in mountain goat management and conservation. As with any other species, mountain goats have their share of endemic diseases, some of which can kill individual animals, but none has been identified as a threat to populations. However, a dramatic decline among introduced mountain goats in the Ruby Mountains of Nevada due to pneumonia has elevated concern that goats elsewhere may contract or disseminate some of the same bacteria affecting bighorn sheep populations. The Nevada mountain goats are hypothesized to have been infected from sympatric bighorn sheep; subsequently, mountain goats moving into the Yellowstone National Park region have also been documented as carrying these bacteria. The potential for individually affected mountain goats to infect others, or possibly to serve as a vector of transmission to bighorn sheep is of concern, particularly as we consider reintroducing goats to currently unoccupied (or ‘under-occupied’) habitats.

Objective 68:

Continue opportunistic surveillance of mountain goats for bacterial pathogens that could cause disease and mortality in goats and/or in bighorn sheep should contact occur.

Strategies:

- a. Contact holders of mountain goat hunting permits before the hunting season and ask for their assistance in obtaining veterinary samples.
- b. Work with citizen groups to provide incentives to hunters in obtaining and providing veterinary samples.
- c. Submit samples to the Washington Animal Disease Diagnostic Laboratory at Washington State University.

Issue Statement

Mountain goat populations are sensitive to over-exploitation because of their low population growth rate and relatively low densities (Kuck 1977, Hamel et al. 2006, Festa-Bianchet and Côté 2008, Festa-Bianchet and Smith 2001). As such, assessing the status of each mountain goat population frequently is necessary to ensure sustainability. However, monitoring goats using helicopters is both expensive and stressful to the animals (Côté et al. 2013).

Objective 69:

Monitor abundance of mountain goats within management units supporting recreational harvest bi-annually (or annually where justified) with sufficient precision that i) declines driven by external factors or by overharvest can be identified within a 4-year period, and ii) increases sufficient to justify an increase in harvest opportunity can be identified within a 4-year period.

Strategies:

- a. Continue to improve and standardize mountain goat surveys (Rice et al. 2009).

- b. Prioritize areas for survey where mountain goat populations are currently insufficiently quantified.
- c. Where anecdotal evidence suggests recent increases or decreases in mountain goat populations not subject to regular aerial surveys, initiate, encourage existing, and/or cooperate with other government or non-government entities in ground-based surveys to provide data on geographic distribution and/or qualitative abundance estimates.

Issue Statement

Mountain goat populations have declined dramatically in some portions of the North Cascades. Research findings suggest historical hunting levels may have been too high and unsustainable for goats. As such, many of the areas that were historically hunted have been closed to hunting for several years. Although research on other potential causes of declines would be beneficial, there is a need to develop strategies for recovering the populations in these areas. Translocation efforts need to take place not only in the best possible habitats, but also be large enough (include sufficient number of animals) that success is likely (Harris and Steele, in press).

Objective 70:

Clarify the needs for recovery and/or augmentation of populations in the North Cascades by 2017. If the assessment (above) demonstrates a clear benefit to be gained from translocation, and mountain goats are available for such purposes, implement at least one translocation project (including monitoring capable of informing future projects) by 2020.

Strategies:

- a. Finalize existing assessment and prioritization scheme of candidate translocation sites in the North Cascades.
- b. Conduct site visits where feasible to confirm the site-specific attributes and appropriateness of top candidate sites.
- c. Participate in the National Environmental Policy Act (NEPA) planning by the National Park Service to remove mountain goats from Olympic National Park.
- d. Write an implementation plan for reintroducing mountain goats into areas identified through the planning process.

Recreation Management

Issue Statement

Mountain goat populations are sensitive to over-harvest (Hamel et al. 2006, Festa-Bianchet and Côté 2008); goats have a low reproductive potential, extended parental care, low juvenile survival, and relatively old age of sexual maturity. As a result, harvest levels for mountain goats should be restricted to levels that approximate recruitment (Rice and Gay 2010).

Objective 71:

Provide recreational hunting opportunities in individual mountain goat management areas at levels consistent with a stable or increasing population. In general, harvest of female goats (nannies) should be minimized to the degree possible, consistent with providing acceptable hunter opportunity.

Strategies:

- a. Provide all mountain goat hunters with both an educational video and an illustrated pamphlet on identifying mountain goat gender under field conditions.
- b. Continue to manage abundance and harvest on a population management area level.
- c. Initially, population estimates must be >100 goats within an identified hunting area before that group of mountain goats can be subject to recreational harvest. *See item d. below.*
- d. Re-evaluate the existing requirement that mountain goat populations exceed 100 animals before they can be considered for recreational harvest by 2017.
- e. Initially, for herds meeting the minimum abundance criteria, permits shall be issued to limit the goat harvest to 4% or less of the estimated local population aged one year-old and above. *See item g, below.*
- f. Recommend mandatory in-person registration by hunters of harvested mountain goats or other means by 2015 to allow WDFW inspection of sex and age of harvested animals (Harris et al.2012), as well as collection of biological samples for disease screening.
- g. Investigate, assess, and propose a “point” system that, reflecting the differences in their demographic consequences, scores the effects of female (nanny) harvest on goat populations more strongly than of male (billy) harvest. This system will be designed to both discourage hunting of nannies, and while doing so, to provide enhanced hunter opportunity to harvest billies, while still safeguarding the demographic and genetic health of individual mountain goat populations. The total number of goat permits could be allowed to rise above 4% if sufficient documentation is made of a series of sufficiently male-dominated harvests.
- h. Where mountain goats have been introduced to areas where they were not endemic, land management agencies view them differently than native species, and where goats can potentially become nuisances and safety concerns to people, reduce mountain goat density by providing hunter opportunity without the sustainability constraints imposed by the previous strategies.

Objective 72:

Provide opportunity for auction tags and raffle tags in a manner that enhances predictability for both mountain goat herd managers and the hunting public, while maintaining or increasing the desirability of these unique opportunities.

Strategies:

- a. By 2016, develop and implement allocation formula for existing auction and raffle permits that provides for increased opportunity to take older age class billies from mountain goat herds that have not historically been available, while also minimizing the risk of excessive harvest.

Research

Long-term research on mountain goats in Washington, conducted during 2002.-2011, is now complete and has been published (Bues 2010; Parks 2013; Rice and Hall 2007; Rice 2008, 2010, 2014; Rice et al. 2009; Rice and Gay 2010; Shirk et al. 2010; Wells et al. 2011, 2012).

Conflicts with Recreationists

Issue Statement

Mountain goats in certain locations within Washington have lost their natural wariness around humans (i.e., become habituated to human presence). In many cases, mountain goats have become conditioned to expect a reward (usually salt, but possibly also food) from humans. Although mountain goats are unlikely to be negatively affected directly by such habituation and conditioning, the combination of these behavioral changes with their natural inclination to be aggressive with one another, possess a risk of human injury. In turn, mountain goats may have to be lethally removed in deference to human safety.

Objective 73:

Reduce the potential for mountain goat/human conflict through decreasing the incidence of habituated and/or conditioned goats, as well as the intensity of habituation/condition of individual goats that frequent heavily used recreation areas.

Strategies:

- a. Work with land management partners at the federal and state level to develop and disseminate educational material to the public designed to improve compliance with recommended behaviors near mountain goats.
- b. Where feasible, work with land management partners to investigate seasonal dynamics, movements, and drivers of mountain goat habituation and/or conditioning at selected high-use recreational areas.
- c. Improve current systems of communication and coordination among land managers and wildlife managers to respond to reports of aggressive, inquisitive, or insistent mountain goats.
- d. Integrate communication and coordination in responding to dangerous goats.
- e. Where feasible and needs warrant, conduct hazing, aversive conditioning, and if necessary, lethal removal of nuisance mountain goats.

VI. LITERATURE CITED

- Beus, T. 2010. Habitat Modeling Using Path Analysis: Delineating Mountain Goat Habitat in the Washington Cascades. Unpublished M.S. Thesis, Western Washington University.
- Côté, S. D., S. Hamel, A. St-Louis, and J. Mainguy. 2013. Do mountain goats habituate to helicopter disturbance? *Journal of Wildlife Management* 77:1244-1248.
- Festa-Bianchet, M. and S. Côté. 2008. Mountain goats: ecology, behavior, and conservation of an alpine ungulate. Island Press, Washington D.C., USA.
- _____, and K. G. Smith. 2001. Compensatory reproduction in harvested mountain goat populations: a word of caution. *Wildlife Society Bulletin* 29:726-730.
- Gonzales-Voyer, A., K. G. Smith, and M. Festa-Bianchet. 2001. Efficiency of aerial censuses of mountain goats. *Wildlife Society Bulletin* 29:140-144.
- Hamel, S, S. D. Côté, K. G. Smith, and M. Festa-Bianchet. 2006. Population dynamics and harvest potential of mountain goat herds in Alberta. *Journal of Wildlife Management* 70(4):1044-1053.

- Harris, R.B., T. Lemke, and K. Loveless. 2012. Regional and climatic influences on growth of mountain goat horns in southwestern Montana. Northern Wild Sheep and Goat Council 18:3-14.
- Harris, R.B. and B. Steele. (in press). Success of mountain goat reintroductions. Northern Wild Sheep and Goat Council 19:xxx-xxx.
- Johnson, R. L. 1983. Mountain goat and mountain sheep of Washington. Washington State Game Department W-88-R. Biological Bulletin No. 18.
- Kuck, L. 1977. The impact of hunting on Idaho's Pahsimeroi mountain goat herd. Proceedings of the International Mountain Goat Symposium 1:114-125.
- Parks, L.C. 2013. Mountain goat genetic diversity and population connectivity in Washington and southern British Columbia. Unpublished M.S. Theses, Western Washington University.
- Rice, C.G. and B. Hall. 2007. Hematologic and biochemical reference intervals for mountain goats (*Oreamnos americanus*): effects of capture conditions. Northwest Science 81(3):206-214.
- Rice, C.G. 2008. Seasonal altitudinal movements of mountain goats. Journal of Wildlife Management 72(8):1706-1716.
- Rice, C.G., K.J. Jenkins, and W. Chang. 2009. A sightability model for mountain goats. Journal of Wildlife Management 73(3):468-478.
- Rice, C. G. 2010. Mineral lick visitation by Mountain Goats, *Oreamnos americanus*. Canadian Field-Naturalist 124(3):225-237.
- Rice, C.G. and D. Gay. 2010. Effects of mountain goat harvest on historic and contemporary populations. Northwest Naturalist 91:40-57.
- Rice, C.G. 2012. Status of mountain goats in Washington. Proceedings of the Northern Wild Sheep and Goat Council 18:64-70.
- Shirk, A.J., D.O. Wallin, S. A. Cushman, C.G. Rice, and K. I. Warheit. 2010. Inferring landscape effects on gene flow: a new model selection framework. Molecular Ecology 19:3603-3619.
- Wells, A. G., D. O. Wallin, C.G. Rice, and W.Y. Chang. 2011. GPS bias correction and habitat selection by mountain goats. Remote Sensing 3:435-459.
- Wells, A.G., J. L. Rachlow, E. O. Garton, and C.G. Rice. 2012. Mapping vegetation communities across home ranges of mountain goats in the North Cascades for conservation and management. Applied Vegetation Science 15:560-670.

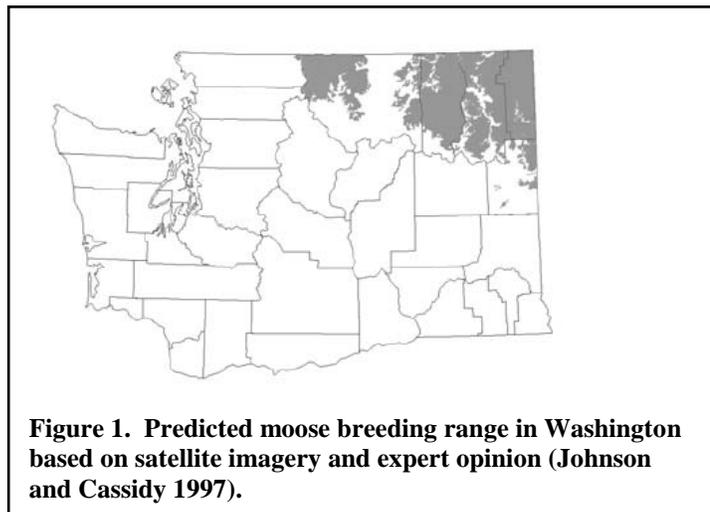
MOOSE (*Alces alces*)

I. POPULATION STATUS AND TREND

The number of moose in Washington increased from about 60 in 1972, to an estimated 850-1,000 in 2002 (Poelker 1972, Base et al. 2006). It has continued to increase since that time, and WDFW projected approximately 1,500-2,000 moose in 2008. This increase is the result of both increased moose density in prime habitats and colonization of moose into new areas. Today, moose occur primarily in the northeastern counties of Ferry, Pend Oreille, Stevens, and Spokane (Figure 1). Moose are occasionally documented in Chelan, Lincoln, Whitman, Okanogan, and Whatcom Counties, and a few animals have been documented in surrounding areas and in the Blue Mountains. This increase contrasts with a number of moose populations in other states of the U.S. that have recently declined, particularly non-introduced populations along the southern fringe of their native distribution. Causes for these declines have varied (and in many cases remain imperfectly known), but likely include habitat changes (particularly loss of early seral shrub-fields), increases in the effects of parasites (possibly induced by climate change), direct effects of climate change, and increases in predation.

II. RECREATIONAL OPPORTUNITY

Moose hunting in Washington began in 1977 with three permits in the Selkirk Mountains. Since then, moose populations have increased and expanded and the number of permits has increased accordingly. In 2013, approximately 140 moose permits were issued, all within Districts 1 and 2. Since 1977, moose hunting has been limited by permit and the demand for moose hunting is high. The number of applications for moose permits far exceeds the supply. In 2013, 32,097 applicants applied for the 140 available permits.



Currently, moose hunts are by permit only, and if drawn, it is a once-in-a-lifetime opportunity (except antlerless hunts). Hunting season dates are October 1 - November 30, and hunters may use any legal equipment. Moose hunts are either “any moose” or “antlerless only”. In “any moose” hunts, the majority of the harvest is adult bulls. Hunters typically see several moose/day and harvest success has been high (over 90%) during the past decade. All moose hunters are required to report their hunting activities online, regardless of whether they harvest a moose or not.

III. DATA COLLECTION

In recent years, the Department had conducted aerial surveys of moose in selected areas annually. Surveys have typically been conducted during early winter (prior to antler drop by bulls), with the data being used to estimate calf recruitment, sex ratio, and population trend. In addition to surveys, the Department monitors trends in harvest data, including number of hunters, total harvest, days hunted/kill, harvest success, moose seen while hunting, antler spread (if harvested a bull), and age of harvested moose.

IV. MOOSE MANAGEMENT GOALS

The statewide goals for moose are:

1. Preserve, protect, perpetuate, and manage moose and their habitats to ensure healthy, productive populations.
2. Manage moose for a variety of recreational, educational, and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography.
3. Manage statewide moose populations for a sustained yield.
4. Manage moose populations with a rigorous, data-based system.

V. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Habitat Management

Issue Statement

Habitat quality influences moose reproduction, survival, and abundance. Unfortunately, habitat conditions are deteriorating in some areas important for moose, primarily due to the spread of noxious weeds, human development, forest succession, use of herbicides to reduce shrub competition with tree seedlings, and fire exclusion. Improving habitat quality for moose, where possible, is likely to improve reproduction and growth, particularly among young animals. WDFW manages little moose habitat directly. However, WDFW has a responsibility to work with landowners, and voice concerns about forest maturation and use of herbicides in shrub-fields.

Objective 74:

Ensure that moose habitat requirements are incorporated into land-use planning and practices.

Strategies:

- a. Work with land-owners responsible for moose habitat to ensure that moose habitat requirements are incorporated into land-use planning and practices.

Population Management

Issue Statement

Currently, the status of moose populations is estimated through aerial surveys. Surveys have occurred annually, but have covered only selected portions of the known moose distribution (and only within Region 1). Although these surveys have most likely reflected gross population trends,

they have lacked a statistical foundation, and have had an uncertain relationship to areas not surveyed. They have also not provided data that could be used to estimate population size with a statistical basis. Sightability approaches, used for moose in some states and provinces (Anderson and Lindzey 1996, Quayle et al. 2001, Guidice et al. 2012) are likely to be unreliable for moose in northeastern Washington (Harris et al., in review). In 2013, the Department initiated a pilot-project incorporating more intensive and rigorous sampling approaches. However, this approach is expensive and probably not sustainable economically over the long-term.

Objective 75:

Produce a statistically-valid estimate of moose abundance within moose habitats in Districts 1 and 2 (Ferry, Pend Oreille, Spokane, and Stevens counties) by 2017.

Strategies:

- a. Continue to develop, test, and employ the most effective and efficient survey techniques for moose.
- b. Continue mark-recapture distance sampling surveys from a helicopter platform through winter 2014-15, and through 2015-16 if funding allows.
- c. Produce peer-reviewed publication on abundance estimation approach by 2017.

Objective 76:

Develop alternative approaches to population assessment that do not require annual helicopter surveys for estimating moose population trends by 2021.

Strategies:

- a. Initiate hunter-reporting based metrics of moose abundance, and assess their predictive efficiency of moose population trends by calibrating them to trends estimated using aerial surveys (e.g., Ericsson and Wallin 1999, Solberg and Saether 1999, Boyce et al. 2012).

Objective 77:

Obtain initial, rough estimates of abundance and population trend in District 3 (Region 1), and District 6 and 7 (Region 2) by 2019.

Strategies:

- a. Initiate surveys, incorporating lessons learned during 2013-16 in Districts 1 and 2, in District 3's (Region 1), and Districts 6 and 7 (Region 2) by 2019.

Issue Statement

Parasitism is a known component of moose ecology; in many cases, individual moose may succumb but populations remain little affected. However, in recent years parasites have been suspected as causative agents in large-scale moose declines. One ectoparasite, the winter tick (*Dermacentor albipictus*; Samuel 2004, 2007), and one endoparasite, an arterial worm *Eleaophora schneideri*; Henningsen et al. 2012), are known to be present in Washington. Both winter ticks and arterial worms (Pessier et al. 1998) are known to afflict Washington moose, although their importance to individuals and populations in Washington remains unstudied. Other diseases and parasites may affect moose populations (Murray et al. 2006, Lankaster and Samuel 2007). If moose population density increases or decreases, habitat characteristics change, predation pressures fluctuate, and climate change continues. Understanding the role of parasites in moose demographics will aid the Department's response.

Objective 78:

Monitor the effects of diseases and parasites on moose populations by surveillance of samples provided by hunters as well as opportunistically obtained carcasses.

Strategies:

- a. Continue, improve, and expand veterinary surveillance of hunter-supplied moose carcasses for parasites and diseases hypothesized to be endemic and capable of inducing mortality.
- b. Work with WDFW enforcement to procure additional samples for veterinary testing when opportunities arise.
- c. Work with other agencies (e.g., Department of Transportation) to procure additional samples for veterinary testing when opportunities arise.

Objective 79:

Monitor changes in the geographic distribution of moose throughout Washington.

Strategies:

- a. Maintain and improve citizen-science web-based monitoring of moose observations.

Issue Statement

Moose occasionally come into conflict with, and pose a danger to humans, particularly at the wildland/urban interface. Dealing with such conflicts in a cost-effective and biologically sustainable manner is a challenge.

Objective 80:

Minimize risks to human safety and property by managing moose conflicts at the wildland-human interface.

Strategies:

- a. Continue to translocate, and where no other options exist, humanely euthanize moose that cannot be safely hazed away from dangerous encounters with human in urban and suburban settings.
- b. Evaluate history of problem moose control efforts to identify patterns and recommend strategies to minimize future conflicts by 2017.

Research

Issue Statement

Although moose have increased in both density and geographic distribution within Washington during the past few decades, we expect to see a tempering, and perhaps reversal of this dynamic over the next few years as moose colonize suitable habitat and reach carrying capacity. Adding to stresses we would expect to individual moose are continued forest succession with the attendant reduction of shrubby browse that form the staple of most moose diets (Vartanian 2011), warming temperatures (Lenarz et al. 2010, Brown 2011; see also Lowe et al. 2010, Murray et al. 2012), and predation from wolves (Kunkel et al. 1999, Hayes et al. 2000), which will add to existing levels of predation from bears (Ballard et al. 1990) and cougars (Ross and Jalkotzy 1996, Bartnick et al. 2013). Harvest management in the future will require better information than currently exists on how moose interact with the non-human environment (Nilsen et al. 2005).

Objective 81:

Complete a study of moose demography in identified study areas within Districts 1 and 2, with the objectives of better understanding determinants of moose population dynamics with respect to bottom-up (habitat) and top-down (predation) factors.

Strategies:

- a. Assess calf recruitment and survival as functions of biotic and abiotic drivers.
- b. Evaluate the relative importance of predation, habitat changes, moose population density, and climate-related factors in influencing vital rates.
- c. Produce peer-reviewed publications with academic partner (University of Montana) by 2018.

Recreation Management**Issue Statement**

The demand for moose hunting opportunity exceeds the allowable harvest for sustainable moose populations. As such, the Department restricts moose harvest to a level compatible with long-term sustainability, and offers permits only through drawings. This strategy allows the Department to manage moose harvest as a high quality hunting opportunity, with moderate densities of moose and opportunity to harvest mature bulls. Periodically adjusting antlerless permit numbers also allows the Department to reduce moose density where conflicts with humans are unacceptable, and to encourage moose population growth if non-harvest factors induce declines. This strategy has produced relatively high harvest success, as well as post-season bull:cow ratios that are conducive to natural dynamics of reproduction. An increase in the number of moose permits would help to satisfy some of the pent-up demand among some hunting constituencies, but might come at the expense of hunting success rate and/or bull trophy quality.

Objective 82:

Develop moose harvest strategies that take advantage of new objective and accountable modeling approaches, and that use emerging data on local demography and population trend.

Strategies:

- a. Re-visit and revise current harvest strategies (see Table 1, below, used since 2003).
- b. Evaluate the risks and benefits of currently-used “any moose” permits compared with “antlered moose” permits.
- c. Evaluate the applicability of integrated modeling approaches (either maximum likelihood or Bayesian approaches), given newly emerging data on population abundance, trend, survival, and recruitment.
- d. Continue to offer maximum hunter opportunity, consistent with the goals of maintaining a sustainable yield, as well as the ecological role of moose within their native ecosystems.
- e. Maintain “permit only” moose hunting, but assess whether increasing the number of permits can be accomplished while addressing other objectives.

Table 1. Moose harvest guidelines used in previous two Game Management Plans. These guidelines will be assumed to apply until data-based models are developed, assessed, and applied.

Parameter ^a	Harvest		
	Liberalize	Acceptable	Restrict
Average bull:100 cow ratio	>75 bulls	60-75 bulls	<60 bulls
Average calf:100 cow ratio ^b	>45 calves	30-45 calves	<30 calves
Median age of harvested bulls	>5.5 years	4.5-5.5 years	<4.5 years
^a Averaged over a 3-year period			
^b Modified from Courtois and Lamontagne 1997			

Predation

Background

Black bears, cougars, and wolves all prey on moose especially calves. Predator management by WDFW will be consistent with the predator/prey guidelines explained previously in the section pertaining to Objective 3.

If the WDFW determines that wolf predation is a primary limiting factor for an “at-risk” ungulate population, and the wolf population in that wolf recovery region has at least 4 successful breeding pairs, the WDFW can consider reducing wolf abundance in localized areas occupied by the ungulate population before state delisting of wolves occurs.

At-risk ungulate populations are any that are federal or state listed as threatened or endangered (e.g., Selkirk Mountain woodland caribou, Columbian white-tailed deer). An at-risk population would also include any ungulate population which falls 25% below its population objective for two consecutive years or if the harvest decreases by 25% below the 10-year average harvest for two consecutive years.

For ungulate populations lacking numeric estimates and/or without management objectives, the WDFW will rely on other information to assess a decline, such as harvest trends, hunter effort trends, sex and age ratios of the population, and others (WDFW 2011).

Objective 83:

Identify herds that are below population objectives where predation effects might be a limiting factor by 2015.

Strategies:

- a. Develop a prioritized list of local populations where predators might be limiting factors.
- b. Identify the biological parameters that implicate predators as the factor.
- c. Population status, harvest history, etc.
- d. Invoke the predator-prey guidelines.

VI. LITERATURE CITED

- Anderson Jr, C. R., and F. G. Lindzey. 1996. Moose sightability model developed from helicopter surveys. Wildlife Society Bulletin:247-259.
- Ballard, W. B., S. D. Miller, and J. S. Whitman. 1990. Brown and black bear predation on moose in southcentral Alaska. Alces 26:1-8.

- Bartnick, T. D., T. R. Van Deelen, H. B. Quigley, and D. Craighead. 2013. Variation in cougar (*Puma concolor*) predation habits during wolf (*Canis lupus*) recovery in the southern Greater Yellowstone Ecosystem. *Canadian Journal of Zoology* 91:82-93.
- Base, D.L., S. Zender, and D. Martorello. 2006. History, status, and hunter harvest of moose in Washington state. *Alces* 42:111-114.
- Boyce, M. S., P. W. J. Baxter, and H. P. Possingham. 2012. Managing moose harvests by the seat of your pants. *Theoretical Population Biology* 82:340-347.
- Brown, G. S. 2011. Patterns and causes of demographic variation in a harvested moose population: evidence for the effects of climate and density-dependent drivers. *Journal of Animal Ecology* 80:1288-1298.
- Courtois, R., and G. Lamontagne. 1997. Management systems and current status of moose in Quebec. *Alces* 33:97-114.
- Ericsson, G., and K. Wallin. 1999. Hunter observations as an index of moose *Alces alces* population parameters. *Wildlife Biology* 5:177-185.
- Giudice, J. H., J. R. Fieberg, M. S. Lenarz. 2012. Spending degrees of freedom in a poor economy: a case study of building a sightability model for moose in northeastern Minnesota. *Journal of Wildlife Management* 76:75-87.
- Harris, R. B. Ferguson, H., M. Atamian, and I. Keren. (in review). Estimating moose abundance and trends in northeastern Washington State: Index counts, sightability models, and uncertainty. *Alces*.
- Hayes, R. D., A. M. Baer, U. Wotschikowsky, and A. S. Harestad. 2000. Kill rate by wolves on moose in the Yukon. *Canadian Journal of Zoology* 78:49-59.
- Henningsen, J. C., A. L. Williams, C. M. Tate, S. A. Kilpatrick, and W. D. Walter. 2012. Distribution and prevalence of *Elaeophora schneideri* in moose in Wyoming. *Alces* 48:35-44.
- Johnson, R. E., and K. M. Cassidy. 1997. Terrestrial mammals of Washington State. Location data and predicted distributions. Volume 3 in K. M. Cassidy, C. E. Grue, M. R. Smith, and K. M. Dvornich, editors. *Washington State Gap Analysis – Final Report*. Washington Cooperative Fish and Wildlife research Unit, University of Washington, Seattle, Washington, USA.
- Kunkel, K. E., T. K. Ruth, D. H. Pletscher, and M. G. Hornocker. 1999. Winter prey selection by wolves and cougars in and near Glacier National Park Montana. *The Journal of Wildlife Management*:901-910.
- Lankaster, M. W., and W. M. Samuel. 2007. Pests, parasites, and disease. Pages 479-517 in *Ecology and management of the North American moose*, 2nd edition. University Press of Colorado, Boulder, Colorado.
- Lenarz, M. S., J. Fieberg, M. W. Schrage, and A. J. Edwards. 2010. Living on the edge: viability of moose in northeastern Minnesota. *The Journal of Wildlife Management* 74:1013-1023.
- Lowe, S.J., B.R. Patterson, and J.A. Schaefer. 2010. Lack of behavioral response of moose (*Alces alces*) to high ambient temperatures near the southern periphery of their range. *Canadian Journal of Zoology*. 88:1032-1041 (2010).

- Murray, D. L., E. W. Cox, W. B. Ballard, H. A. Whitlaw, M. S. Lenarz, T. W. Custer, T. Barnett, and T. K. Fuller. 2006. Pathogens, nutritional deficiency, and climate influences on a declining moose population. *Wildlife Monographs* 166:1-30.
- Murray, D. L., K. F. Hussey, L. A. Finnegan, S. J. Lowe, G. N. Price, J. Benson, K. M. Loveless, K. R. Middel, K. Mills, D. Potter, A. Silver, M.-J. Fortin, B. R. Patterson, and P. J. Wilson. 2012. Assessment of the status and viability of a population of moose (*Alces alces*) at its southern range limit in Ontario. *Canadian Journal of Zoology* 90:422-434.
- Nilsen, E. B., T. Pettersen, H. Gundersen, J. M. Milner, A. Myrsterud, E. J. Solberg, H. P. Andreassen, and N. C. Stenseth. 2005. Moose harvesting strategies in the presence of wolves. *Journal of Applied Ecology* 42:389-399.
- Quayle, J. F., A. G. MacHutchon, and D. J. Jury. 2001. Modeling moose sightability in southcentral British Columbia. *Alces* 37:43-54.
- Pessier, A. P., V.T. Hamilton, W. J. Foreyt, S. Parish, and T. L. McElwain. 1998. Probable elaeophorosis in a moose (*Alces alces*) from eastern Washington state. *Journal of Veterinary Diagnostic Investigation* 10:82-83.
- Poelker, R. J. 1972. The Shiras moose in Washington. Technical Report. Washington Department of Fish and Wildlife, Olympia, Washington.
- Ross, P. I., and M. G. Jalkotzy. 1996. Cougar predation on moose in southwestern Alberta. *Alces* 32:1-8.
- Samuel, W. M. 2004. *White as a Ghost*. Federation of Alberta Naturalists. ISBN 0-9696134-6-6. Altona, Manitoba.
- Samuel, W.M. 2007. Factors affecting epizootics of winter ticks and mortality of moose. *Alces* 43:39-48.
- Solberg, E. J., and B. E. Saether. 1999. Hunter observations of moose *Alces alces* as a management tool. *Wildlife Biology* 5:107-117.
- Vartanian, J. M. 2011. Habitat condition and the nutritional quality of seasonal forage and diets: demographic implications for a declining moose population in northwest Wyoming, USA. University of Wyoming, Laramie, Wyoming.

PRONGHORN ANTELOPE (*Antilocapra americana*)

I. POPULATION STATUS AND TREND

Pronghorn antelope are native to the Columbia Basin of eastern Washington, but were extirpated sometime prior to the mid-nineteenth century (Lyman 2007). Based on archeological data, Lyman (2007) concluded that pronghorns were never numerous in Washington, but that herds may have drifted in and out depending on large-scale climatic fluctuations or migratory patterns. Washington does not constitute part of the core geographic distribution of pronghorn, but does form part of their historic range. Reasons for their earlier extirpation are not entirely clear.

From 1938 to 1968, WDFW conducted 6 releases at 4 sites in eastern Washington, but all attempts failed to establish a sustainable population. The small number of adult animals released, questionable habitat quality at release sites, and minimal monitoring likely hindered those early attempts. The Department remains interested in exploring the potential for re-establishing pronghorn in Washington. A habitat assessment suggested that suitable pronghorn habitat does exist in eastern Washington (Tsukamoto et al. 2006). However, most land suitable for pronghorns is either located primarily on private lands or government-owned land on which wildlife conservation is not a high priority, is fragmented by lands unsuitable for pronghorns, or both.

In January 2011, the Yakama Nation released 99 pronghorns on the Yakama Reservation; these animals have since expanded their range to areas outside the reservation. Reproduction among these animals has been documented, and preliminary indications are that the reintroduction has been successful. As of early 2014, at least one small group of pronghorn from this reintroduction effort appeared to have established themselves on private land south of the Yakama Reservation. Independently, a very small band of pronghorns has been documented recently in Asotin and Garfield counties; these are hypothesized to have originated from the nearest population in northeastern Oregon.

II. RECREATIONAL OPPORTUNITY

Pronghorns are currently classified in the state of Washington as a game animal. As such, they may be taken only in the context of an authorized season. There are currently no hunting seasons established by the Fish and Wildlife Commission for pronghorns. At present, pronghorns cannot be legally hunted on lands under jurisdiction of the state of Washington. Opportunity for viewing pronghorns in Washington is currently limited because of their scarcity and presence primarily on private lands.

III. DATA COLLECTION

Because there are currently so few pronghorns, no formal protocols exist to monitor or survey pronghorns.

IV. MANAGEMENT GOALS

The statewide goals for pronghorns are:

1. As time and funding permits, monitor existing fragmentary pronghorn populations to anticipate the point at which more active management may be necessary.
2. As time and funding permits, work with private land-owners to ensure that conflicts with agriculture are minimal.
3. As time and funding permits, work with interested private parties to investigate the biological, social, and economic feasibility of landowner-driven pronghorn reintroductions.

V. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Habitat Management

Issue Statement

Currently, pronghorns in Washington are primarily found on private land (in contrast to pronghorn distribution in most other states, where approximately half are found on public lands, Yoakum 2004). Although forage competition between pronghorns and cattle tends to be minor, overlap among food items does occur in specific circumstances.

Objective 84:

Communicate with owners of private lands on which small groups of pronghorns have been documented, to understand the degree to which pronghorns present a conflict to agricultural interests.

Strategies:

- a. Maintain documentation of specific land-owners with frequent pronghorn interactions.
- b. Investigate complaints to forage competition.
- c. Develop a mechanism for assessing and mitigating damage.

Population Management

Issue Statement

Small, scattered, and possibly non-viable groups of pronghorns have recently moved onto lands under Departmental jurisdiction, typically on private lands. To maintain a positive attitude among land-owners toward pronghorns, it is important that agricultural damage be minimized. At the same time, should these populations increase to the point that they may become established and sustainable, monitoring and understanding their dynamics will become increasingly important.

Objective 85:

Keep current on the status of small, fragmented populations of pronghorns in Washington by keeping a database of reports obtained from the public and agency sources.

Strategies:

- a. Maintain and update Departmental databases.

- b. If populations increase, and/or move to areas with higher potential for conflict, develop mechanism for funding and implementing direct monitoring system (e.g., radio-telemetry, targeted surveys).

Issue Statement

Pronghorn recovery in Washington would be hastened by a successful reintroduction onto lands that are both biologically and socially suitable. However, reintroduction is expensive and will only succeed where supported by local communities.

Objective 86:

As time and funding permits, work with private parties prepared to take the lead in reintroducing pronghorns to investigate the biological, social, and economic feasibility of specific proposals.

Strategies:

- a. Coordinate necessary biological feasibility studies.
- b. Coordinate necessary (SEPA or NEPA) public processes.
- c. If both biological feasibility and public processes indicate that pronghorn reintroduction is suitable and funding sources are identified, develop site-specific plans.

VI. LITERATURE CITED

- Lyman, R. L. 2007. The Holocene history of pronghorn (*Antilocapra americana*) in eastern Washington State. Northwest Science 81:104-111.
- Tsukamoto, G. K., H. L. Wang, and S. Snyder. 2006. Assessment of pronghorn habitat potential in eastern Washington. Washington Department of Fish and Wildlife report, Olympia, WA. 84 pp.
- Yoakum, J. D. 2004. Relationships with other herbivores. Pp. 503-538 in O’Gara, B.W. and J.D. Yoakum. Pronghorn Ecology and Management. University Press of Colorado, Boulder, Colorado. 903 pp.

BLACK BEAR (*Ursus americanus*)

I. POPULATION STATUS AND TREND

Washington State has an abundant and healthy black bear population, however currently there is no formal estimate of black bear population size in Washington. For management purposes, the state is divided into nine black bear management units (BBMUs) (Fig. 1). Harvest levels vary between BBMU depending on hunter effort and local population size and habitat conditions. To maintain stable bear populations, modifications to harvest levels are made on a three-year rotation. The total harvest, the percentage of females in the total harvest, and median ages of harvested males and females are used by WDFW as general indicators of exploitation (Beecham and Rohlman 1994).

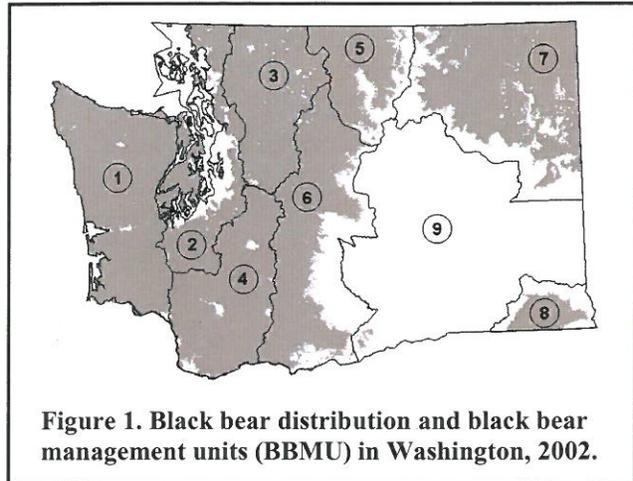


Figure 1. Black bear distribution and black bear management units (BBMU) in Washington, 2002.

II. RECREATIONAL OPPORTUNITY

The majority of bear hunting opportunity is in the fall, but a limited permit-only spring hunt is available. Spring hunts are designed to address emerging management needs, such as bear damage to trees in commercial timberlands, bear-human conflict, or to more evenly distribute harvest compared to fall seasons. Since 2006, the average harvest during fall and spring (excludes bears harvested under depredation permits) seasons were 1,549 and 21 bears, respectively (Table 1).

III. DATA COLLECTION

Assessing the status of a bear population is extremely difficult given their secretive nature. Nonetheless, WDFW has conducted some important black bear research. From 1963 to 1969, WDFW studied black bear damage in coniferous forests and gathered basic demographic information that was used to establish management guidelines (Poelker and Hartwell 1973); this led to the black bear becoming protected as a game species in 1969. Lindzey et al. (1986) monitored black bears on Long Island in southwestern Washington for eleven years beginning in 1972 and estimated population size in response to habitat changes that occurred after intensive timber harvest. The next study occurred from 1994-1999, when WDFW studied survival, habitat use, home range size, and cause specific mortality in three ecoregions in Washington (Koehler et al. 2001; Koehler and Pierce 2003; Koehler and Pierce 2005). In the late 1990s, WDFW also conducted bait station surveys to evaluate the technique as a population index of bear abundance (Rice et al. 2001). However, an analysis of statistical power indicated that at the level of survey intensity, WDFW would not be able to detect a change in bear abundance. As part of a baseline survey prior to the Elwha dam removal on the Olympic peninsula, Sager-Fradkin et al. (2008) studied bears from 2002-2006 in the Elwha Valley to estimate home range size and habitat use.

Finally, WDFW conducted some preliminary research on survival and population size in Capitol Forest from 2005-2011 (Beausoleil et al. 2012).

Table1: Statewide black bear harvest, hunter effort, and median age information, 2003-12, Washington Department of Fish and Wildlife.

Year	Male	Female	Total Harvest	# of Hunters	% Success	# Hunter Days	# Days per kill	Median Age		% Females
								Males	Females	
2003	989	583	1,556	22,510	7%	192,544	123	3.5	4.5	37%
2004	1,093	561	1,654	21,573	8%	186,626	113	3.5	5.5	34%
2005	940	333	1,333	20,724	6%	172,527	129	3.0	5.0	25%
2006	1,061	581	1,642	21,801	8%	168,237	103	3.0	4.0	35%
2007	1,096	489	1,585	23,667	7%	168,237	106	3.0	5.0	31%
2008	1,450	758	2,208	26,347	8%	215,032	102	3.0	5.0	34%
2009	931	465	1,396	23,767	6%	192,347	147	3.0	6.0	33%
2010	1,254	718	1,972	24,118	8%	185,389	98	2.9	4.7	37%
2011	N/A	N/A	1,503	21,852	7%	166,814	111	N/A	N/A	N/A
2012	1,054	499	1,633	21,656	7%	161,459	104	N/A	N/A	32%

In 2013, WDFW launched a study, in collaboration with WSU, to assess population size on 2 study areas (in both eastern and western WA) using 2 techniques simultaneously (capture/collar and DNA) to obtain information on the parameters needed to model and estimate the statewide black bear population.

IV. HUMAN-BEAR CONFLICT

Human-bear conflict occurs statewide given the distribution of bears in Washington, their adaptability to suburban environments, and the prevalence of attractants. Approximately 525 human-bear interactions are documented annually (Washington Dept. of Fish and Wildlife 2012). There is a tendency to equate levels of human-bear interactions with bear abundance. However, bear conflict activity is not a good indicator of population status, as it more likely reflects the variability of environmental conditions. For example, in 2010 human-bear complaints were at an all-time high, the same year Washington experienced a late spring with poor forage conditions for black bear, followed by a poor fall huckleberry crop.

V. MANAGEMENT

Washington has a unique and challenging situation when it comes to management of our black bear population. Washington is the smallest of the 11 western states, yet has the second highest human population; a population that continues to grow at record levels. Given that approximately 75% of the black bear habitat is in federal or private industrial ownership, a large portion of core black bear habitat is relatively secure. This means that the long-term outlook for black bears is generally good.

VI. BLACK BEAR MANAGEMENT GOALS

The statewide goals for black bear are:

1. Preserve, protect, perpetuate, and manage black bear and their habitats to ensure healthy, productive populations.

2. Minimize human-bear conflicts while at the same time maintaining a sustainable and viable bear population.
3. Manage black bear for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography.
4. Manage statewide black bear populations for a sustained yield.
5. Improve our understanding of predator-prey relationships.

VII. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Population Management

Issue Statement

Managers often use sex and age structure data of harvested bears as an index to population growth (Pelton 2000). However, examining just sex and age structure may provide misleading interpretations (Caughley 1974, Bunnell and Tait 1981, Garshelis 1991, Clark 1999). That is, the age structure of a declining bear population can be the same as the age structure in an increasing population. In addition to this shortcoming, there is often a time lag between when a population begins to decline and when that decline is evident in sex and age structure data (Harris 1984). In some cases, by the time a decline is detected, bear numbers may have been reduced to a point where it could take as long as 15-years to recover the population. However, detecting a decline early can enable managers to make a quicker recovery or retain stability.

Sensitivity analyses of bear populations indicate that adult female and cub survival are the most influential parameters to population growth rates (Clark 1999). As such, managers should focus survey efforts on improving the estimates of these parameters, as well as changes in population size and evaluation of harvest data (Clark 1999).

Objective 87:

Monitor population demographics and determine population densities in at least two ecoregions of Washington.

Strategies:

- a. Use current and past black bear research conducted in WA to estimate black bear abundance.
- b. Estimate population growth using data from long-term monitoring projects, research projects, and modeling.
- c. Use sex and age ratios of harvested bears as a secondary indicator of population change.
- d. Evaluate the current voluntary hunter submission of bear teeth and kill information and ways to improve reporting percentages (e.g., incentives, mandatory compliance).

Harvest Guidelines

Issue Statement

Hunting is the largest source of mortality for bear populations where hunting is allowed (Bunnell and Tait 1985, Pelton 2000). Coupled with the relatively low reproductive potential of bears, this makes bear populations especially sensitive to over-exploitation. For that reason, managers use a variety of biological and population trend data to assess the impacts of hunting on bear

populations. In Washington, managers have used sex and age data from harvested bears as an indicator of exploitation levels (Washington Dept. of Fish and Wildlife 1997). The premise of this method is based on the vulnerability of different sex and age classes of black bears (Beecham and Rohlman 1994). If the ages of harvested bears decline and percentage of females in the harvested population increases, then the exploitation level of the bear population is likely increasing. A drawback of this method is that sex and age data alone are not necessarily accurate measures of population status. A supplemental measure of population status is needed to better manage bear populations in Washington.

Objective 88:

Provide recreational hunting opportunities while at the same time maintaining a sustainable bear population in each BBMU.

Strategies:

- a. Provide black bear hunting opportunities in each BBMU, and as opportunities occur focus harvest in areas where public safety, property damage, and pet and livestock depredation are evident.
- b. Evaluate the current BBMUs as appropriate data analysis units with regards to percent female harvest and age with emerging management priorities.
- c. Evaluate the current voluntary reporting system with emerging management priorities.
- d. Develop harvest criteria that incorporate survey and monitoring data.
- e. Until more robust harvest criteria are developed, consider liberalizing or restricting bear hunting opportunity in each BBMU as indicated below:

Table 2. Black bear harvest guidelines.

Parameter	Harvest		
	Liberalize	Acceptable	Restrict
% Females in harvest	< 35%	35-39%	> 39%
Median age of harvested females	> 6 years	5-6 years	< 5 years
Median age of harvested males	> 4 years	2-4 years	< 2 years

Note: Thresholds outlined in strategy “e” above are currently implemented.

Issue Statements

Impacts to black bear populations and other native wildlife. The harvest guidelines above favor a stable and healthy bear population and are consistent with long-term sustainability. The corresponding bear population should remain at or near current levels and it is unlikely it will result in greater impacts to other wildlife species (i.e., deer and elk) or habitat communities. However, if black bears are determined to be the likely cause of prey population declines or suppression, then consideration of predator management by WDFW will be consistent with the predator/prey guidelines explained previously in the section pertaining to Objective 3.

Black bear harvest impacts on native species. The public has voiced concern about potential impacts of black bear hunting on grizzly bears. With the prohibition on the use of dogs and bait for recreational hunting of bears, potential impacts to grizzly bears were greatly reduced. Nonetheless, the Department developed an online tutorial to educate black bear hunters on how to identify and distinguish a black bear from a grizzly bear.

Public Safety

Issue Statement

A primary objective of WDFW is to minimize conflict with people and wildlife, including black bears. While eliminating bear conflict with people is impossible, the Department does implement activities to reduce human-bear interactions.

Objective 89:

Minimize negative human-bear interactions so that the “number of negative interactions per capita” is constant or declining over the term of this plan.

Strategies:

- a. Implement statewide and/or regional black bear education and outreach programs.
- b. Distribute updated educational materials to key entities and locations.
- c. Evaluate the efficacy of capture-relocation and hazing of bears involved in conflict for mitigating conflict.
- d. Utilize agency kill authority and depredation permits for problem bear incidents.
- e. Promote rules, activities, and programs (e.g., fines, bear proof containers) that reduce the likelihood of bears encountering accessible garbage and other attractants.

Black Bear Tree Depredation on Commercial Timberlands

Issue Statement

During the spring, when black bears are emerging from dens, high nutritional value food resources are limited. Bears will often seek sapwood as a preferred food resource because of its high sugar content. Trees with high growth rates, typically found on commercial timberlands, contain the highest sugar content and therefore are the most vulnerable to depredation. Damage to commercial timberlands can, at times, exceed one-third of the trees in a given stand; resulting in economic losses for landowners (Washington Department of Fish and Wildlife 2008).

See Wildlife Conflict chapter for objective and strategies for improving WDFW’s black bear tree damage program.

VIII. LITERATURE CITED

- Beausoleil, R. A., W. A. Michaelis, and B. T. Maletzke. 2012. Black bear research in Capitol State Forest-Final Report. Washington Department of Fish and Wildlife, Olympia, WA, USA.
- Beecham, J. J., and J. Rohlman. 1994. A shadow in the forest: Idaho’s black bear. University of Idaho Press, Moscow, Idaho, USA.
- Bunnell, F. L., and D. E. N. Tait. 1980. Bears in models and in reality—implications to management. *International Conference Bear Research and Management* 4:15-23.
- _____, and _____. 1981. Population dynamics of bears – implications. Pages 75-98 in C. W. Fowler and T. D. Smith, Eds. *Dynamics of large mammal populations*. John Wiley and Sons, New York, New York, USA.

- Caughley, G. 1974. Interpretation of age ratios. *Journal of Wildlife Management* 38:557-562.
- Clark, J. D. 1999. Black bear population dynamics in the Southeast: some new perspectives on some old problems. *Eastern Workshop of Black Bear Research and Management* 15:97-115.
- Duda, M. D., P. E. De Michele, M. Jones, W. Testerman, C. Zurawski, J. Dehoff, A. Lanier, S. J. Bissell, P. Wang, and J. B. Herrick. 2002. Washington residents' opinions on and attitudes toward hunting and game species management. Harrisonburg, Virginia, USA.
- Garshelis, D. L. 1991. Monitoring effects of harvest on black bear populations in North America: A review and evaluation of techniques. *Eastern Workshop of Black Bear Research and Management* 10:120-144.
- Harris, R. B. 1984. Harvest age structure as an indicator of grizzly bear population status. Thesis, University of Montana, Missoula, Montana, USA.
- Koehler, G. M., P. Briggs, M. H. Norton, and D. J. Pierce. 2001. Implant vs collar transmitter use on black bears. *Wildlife Society Bulletin* 29 (2):600-605.
- Koehler, G.M. and D.J. Pierce. 2003. Black bear home-range sizes in Washington: climatic, vegetative, and social influences. *Journal of Mammology*, 84(1):81-91.
- Koehler, G.M. and D.J. Pierce. 2005. Survival, cause-specific mortality, sex and ages of American black bears in Washington state, USA. *Ursus* 16(2):157-166.
- Lindzey, F.G., K.R. Barber, R.D. Peters, and E.C. Meslow. 1986. Responses of a black bear population to a changing environment. *International Conference for Bear Research and Management*. 6:57-63.
- Poelker, R.J. and H. D. Hartwell. 1973. Black bear of Washington. Bulletin 14. Washington State Game Department, Olympia, WA USA.
- Pelton, M. R. 2000. Black Bear. Pages 389-408 in Demarais, S. and P. R. Krausman, Eds. *Ecology and management of large mammals in North America*. Prentice Hall, Upper Saddle River, New Jersey, USA.
- Rice, C. G., J. Rohlman, J. Beecham, and S. Pozzanghera. 2001. Power analysis of bait station surveys in Idaho and Washington. *Ursus* 12:227-236.
- Sager-Fradkin, K.A., K.J. Jenkins, P.J. Happe, J.J. Beecham, R.G. Wright, and R.A. Hoffman. 2008. Space and habitat use by black bears in the Elwha Valley prior to dam removal. *Northwest Science*, 82:164-178.
- Washington Department of Fish and Wildlife. 1997. Washington State management plan for black bear. Wildlife Management Program, Washington Department of Fish and Wildlife, Olympia, Washington, USA.
- _____. 2001. 2001 Game status and trend report. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, Washington, USA.
- Williamson, D. F. 2001. In the black: Status, management, and trade of the American black bear (*Ursus americanus*) in North America. TRAFFIC North America, Washington D.C., USA.: World Wildlife Fund.

COUGAR (*Puma concolor*)

I. POPULATION STATUS AND TREND

Cougar occur throughout most of the forested regions of Washington State, encompassing approximately 88,000 km² or 49% of the state (Figure 1). For management purposes, the state is divided into forty-nine population management units (PMUs) (Figure 1, Table 1).

Cougars in Washington can breed at any time of year, although birth pulses have been observed in June through August and the average litter size is 2-3 (Cooley et al. 2009b). Kittens are spotted at birth, but these spots begin to fade at about 12 to 14 weeks and continue to fade as the kitten gets older before disappearing completely in about 18 months. Kittens remain with their mother on average for about 16 months. Because of this parental care, individual female cougars breed every other year. Cougars become sexually mature at about 24 months of age. However, sexually mature cougars seldom breed until they have established a home range.

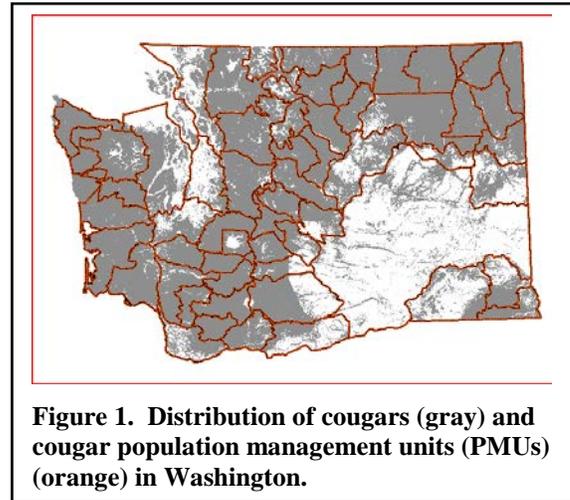


Figure 1. Distribution of cougars (gray) and cougar population management units (PMUs) (orange) in Washington.

Except for females with kittens, cougars are solitary the majority of their life, making it difficult to accurately estimate statewide cougar populations. However, based on densities from six long-term research studies in Washington over a 13-year period, the Department has estimated the adult (>24 months of age) cougar population size at 1,800 animals statewide. The total population size, including adults, subadults, (i.e., independent, dispersing animals), and kittens is more difficult to estimate, but is likely around 3,600.

In recent years the importance of cougar behavior (e.g., territoriality and social structure) has been recognized and incorporated into management (Beausoleil et al. 2013, Wielgus et al. 2013, Maletzke 2010). Territory size in Washington averages from 348 km² for males and 200 km² for females (Kertson et al. 2013, Maletzke et al. 2014). Territories of male cougars are strongly defended against other males and often overlap the ranges of multiple females. Due to this social behavior, the territories of adult males are often arranged on the landscape like pieces of a puzzle, with relative low overlap. Adult female home ranges display an average overlap of 10–30% (Maletzke et al. 2014). Through this behavioral-based organization, cougar population size is limited by the available habitat. With a greater understanding of this type of social organization, managers now incorporate and consider the impacts of different levels of cougar harvest on population growth as well as social organization.

II. RECREATIONAL OPPORTUNITY

Cougar have been classified as a protected game animal since 1966 (Figure 2) and cougar harvest methods have changed over that time. Prior to 1996, cougar hunting with hounds comprised the

majority of sport hunting. Since 1996, the use of dogs was banned for sport hunting by a voter initiative, except during a limited pilot project granted by the State Legislature between 2004-2010. Since 2010, dogs have not been used to aid in sport hunting, except during periodic management removals to address emerging areas of reoccurring cougar conflict with livestock and pets.

III. DATA COLLECTION

Historically, cougar harvest data were used to evaluate the impact of harvest on long-term sustainability. However, trend analyses from harvest data are only useful when the parameters being monitored are proven indicators of population status, and when the collection methods are constant over time (Caughley 1977). Neither of these two requirements has been satisfied for

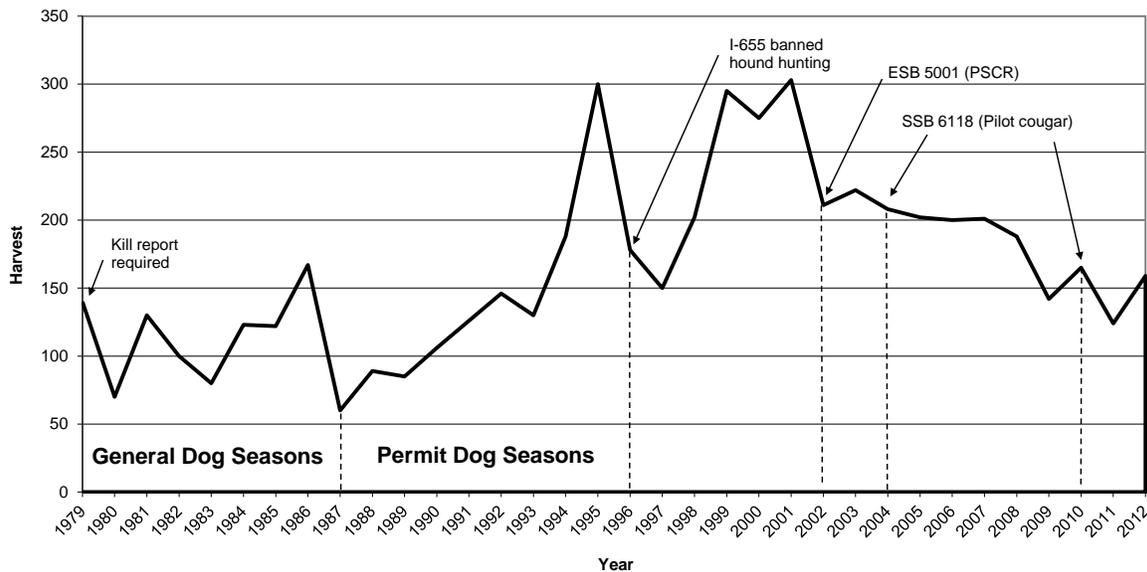


Figure 2. Trends in cougar season structure and harvest in Washington, 1979-2012.

cougars in Washington using this technique. Since 2000, six cougar research projects have been conducted collaboratively over a 13-year period between WDFW, Washington State University, and University of Washington. The scientific findings from those projects have resulted in numerous publications in peer-reviewed science journals and have been incorporated into how the Department currently manages cougar (Lambert et al 2006, Robinson et al. 2008, Cooley et al. 2009a, Cooley et al. 2009b, White et al. 2010, Kertson et al. 2011, Beausoleil et al. 2013, Kertson et al. 2013, Peebles et al. 2013, Wielgus et al. 2013, Maletzke et al. 2014).

IV. COUGAR MANAGEMENT GOALS

The statewide goals for cougar are:

1. Preserve, protect, perpetuate, and manage cougar and their habitats to ensure healthy, productive populations.
2. Minimize human/cougar conflict.
3. Manage cougar for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography.

4. Manage statewide cougar populations for a sustained yield.
5. Improve our understanding of predator-prey relationships.

V. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Population Management Areas

Issue Statement

Cougar distribution across the landscape varies seasonally; that is, cougar territories are fairly uniformly distributed across most suitable habitats on an annual basis, but in winter cougar use is typically more concentrated around wintering deer and elk populations along valley bottoms. Cougar distribution is also affected by factors such as prey availability and human development. Combining these geographic layers, managers are able to establish cougar population management units (PMUs).

Objective 90:

Evaluate and update cougar PMUs by 2015.

Strategies:

- a. Evaluate cougar PMUs based on habitat use, prey availability, and human activities.
- b. Compare cougar PMUs to information on genetic population structure.
- c. Identify PMUs with emerging management priorities (e.g., cougar-livestock conflict, cougar-ungulate interactions).

Population Objectives

Issue Statement

Wildlife managers are frequently asked to balance the desire for abundant wildlife populations and other equally important objectives. Given the variety of interests in cougars, cougars are managed in some areas of Washington to minimize cougar-human conflicts, while at the same time maintaining long-term sustainable populations. Previously, harvest levels were increased in areas with high human-cougar conflict in an effort to reduce these conflicts. However, recent analysis comparing number of complaints and previous year's harvest levels suggests that increased harvest up to 24% of the estimated population had no effect on reducing the overall number of cougar-human conflicts (Peebles et al. 2013).

Objective 91:

Manage for a stable cougar population in each PMU (see exceptions).

Strategies:

- a. Implement a harvest guideline that corresponds to a stable cougar population at the PMU level.
- b. Implement a harvest guideline for a maximum harvest while at the same time providing an overall stable growth rate plus an age structure with adequate adult males for social stability.
- c. Modify harvest strategies and objectives consistent with management objectives and new scientific information.
- d. Implement education and outreach on living with carnivores.

Impacts

Prey impacts on cougar. It is unlikely that cougar populations will be negatively impacted by management strategies for deer, elk, and other prey species. The current population levels for deer and elk populations are compatible with the cougar population objectives for each PMU.

Cougar impacts on prey. The cougar population objectives have the potential to impact some prey species. Because actual cougar mortality rates vary, local cougar populations may also fluctuate, which could impact predation rates (increase or decrease). However, if there is a change in the predation rate, it's uncertain whether the increase would be additive (additional prey killed by cougars causing total prey mortality to increase) or compensatory (as predation by cougars increases, another prey mortality source decreases, so total mortality remains constant), or whether the net result would be large enough to detect. While there is evidence that cougar populations can impact a prey population's growth rate, this is typically associated with a small, isolated prey population, or a prey population that suffers from other environmental stressors.

Some hunters voice concerns about the impacts of cougar predation on deer and elk herds. The primary prey species for cougars are deer and elk, and in some cases cougar populations can influence the growth rates of deer and elk populations. Reducing cougar abundance temporarily in a specific area is a management action that has been used to address deer or elk populations. Recognizing the role of cougars in the ecosystem and public attitudes, WDFW manages for stable cougar populations in most management units. However, if cougars are determined to be the likely cause of prey population declines or suppression, then consideration of predator management by WDFW will be consistent with the predator/prey guidelines explained previously in the section pertaining to Objective 3.

Population Status

Issue Statement

Since 2000, six cougar research projects have been conducted collaboratively with WDFW, Washington State University, and University of Washington. The scientific findings from those projects have resulted in numerous publications in peer-reviewed science journals and have been incorporated into how the Department currently manages cougar. A key contribution of those findings was better understanding on the impacts of harvest on population growth as well as on the social structure and territoriality of cougars. This research culminated in a recommended maximum harvest rate (12-16%) for cougars (excluding dependent young) that maintains long-term sustainable populations.

Objective 92:

Evaluate the current harvest strategy by 2017 to determine if the harvest guideline, season structure, and lethal actions associated with conflicts achieve stable populations based on estimated growth rates and maintain adult male social structure.

Strategies:

- a. Estimate the impacts of harvest on cougar populations through research and modeling.
- b. Evaluate the demographics and spatial organization of cougars living near human populations.

Harvest Guidelines

Issue Statement

Cougars are managed for long-term sustainability, while at the same time maximizing recreational opportunities, and minimizing conflict with people. In terms of hunting opportunity, cougars are managed at the maximum harvest level without substantial risk of causing a measurable population decline or break down in adult male territoriality (see exceptions). To achieve this, cougar are managed geographically in PMUs with fall seasons, where specific PMUs close to hunting once 12-16% harvest levels are reached, which is the maximum harvest to achieve the population objective.

Objective 93:

Provide recreational harvest opportunity at a 12-16% annual harvest rate of the cougar population, excluding kittens in each PMU (see exceptions).

Strategies:

- a. Establish recreational hunting seasons that target the harvest guideline for each PMU.
- b. Evaluate the cougar harvest structure and harvest guidelines every three-years, corresponding to the three year hunting season package.

Table 1. 2014 Population and harvest guideline by PMU (this information is subject to change over time as new information becomes available).

PMU (Hunt Area)	Estimated population size (excluding kittens)	Harvest Guideline
GMU 101	57	7-9
GMU 105	15	2
GMU 108, 111	38	5-6
GMU 113	37	4-6
GMU 117	48	6-8
GMU 121	38	5-6
GMUs 124, 127, 130	57	7-9
GMUs 133, 136, 139, 142, 248, 454, 260, 262, 266, 269, 272, 278, 284, 290, 330, 334, 371, 372, 373, 379, 381	N/A	N/A
GMUs 145, 166, 175, 178	27	3-4
GMU's 149, 154, 157, 162, 163	35	4-6
GMUs 169, 172, 181, 186	24	3-4
GMU 203	35	4-6
GMU 204	50	6-8
GMUs 209, 215	29	4-5
GMUs 218, 231	35	4-6
GMUs 224	16	2-3
GMUs 233, 239	26	3-4
GMUs 242, 243	35	4-6
GMUs 244, 246, 247	39	5-6
GMUs 245, 250	40	5-6
GMUs 249, 251	40	5-6

Table 1. Population and harvest summaries by current PMUs during 2012-2013 and 2013-2014 seasons, Washington. (Continued)

PMU (Hunt Area)	Estimated population size (excluding kittens)	Harvest Guideline
GMUs 328, 329, 335	50	6-8
GMUs 336, 340, 342, 346	43	5-7
GMUs 352, 356, 360, 364, 368	44	5-7
GMUs 382, 388	24	3-4
GMU 407	43	none
GMUs 418, 426, 437	91	11-15
GMUs 448, 450	78	9-13
GMU 454	14	none
GMU 460	41	5-7
GMUs 466, 485, 490	20	2-3
GMUs 501, 504, 506, 530	61	7-10
GMUs 503, 505, 520, 550	49	6-8
GMUs 510, 513	24	3-4
GMU 516	29	3-5
GMUs 522, 524, 554, 556	24	3-4
GMU 560	38	5-6
GMU 564, 568	24	3-4
GMU 572	24	3-4
GMUs 574, 578	29	3-5
GMUs 601, 602, 603, 612	42	5-7
GMUs 607, 615	29	4-5
GMUs 618, 636, 638	33	4-5
GMUs 621, 624, 627, 633	62	none
GMUs 642, 648, 651	51	6-8
GMUs 652, 666	23	none
GMUs 653, 654	36	4-6
GMUs 658, 660, 663, 672, 673, 681, 684, 699	76	9-12
GMU 667	26	3-4
Total	1,849	205-277

Issue Statement

To properly manage cougar populations for sustainability, prevent harvest in excess of guidelines, and minimize cougar-human conflict, it’s imperative to know how many animals are lethally removed each year, the kill location, and biological data related to the animal (e.g., age, sex, weight).

Objective 94:

Account for all human related cougar mortalities every year.

Strategies:

- a. Continue with mandatory carcass check that has been conducted for decades of all harvested cougar and provide a summary in the harvest report each year.
- b. Continue to mark all harvested cougar with a unique pelt identification tag.
- c. Continue to collect biological information from all harvested cougar.
- d. Establish mandatory online reporting of hunter effort consistent with other big game species.

Public Safety

Issue Statement

A primary objective of WDFW is to protect people from dangerous wildlife, including cougars. While guaranteeing that cougars will never negatively impact people is impossible, the Department does implement activities that attempt to minimize human-cougar interactions in areas with a demonstrated history of conflict (Conover 2001).

Objective 95:

Minimize negative human-cougar interactions so that the “number of interactions per capita” is constant or declining from 2007 levels.

Strategies:

- a. Distribute educational materials to key entities and locations.
- b. Conduct targeted cougar removals in GMUs with human-cougar interactions.
- c. Implement actions identified in agency policy for problem cougar incidents.
- d. Law Enforcement will maintain dangerous wildlife reporting per RCW 77.12.885.

Research

Issue Statement

Cougars and people live in close proximity to each other in several areas of the state, which can result in conflict. Understanding cougar dynamics in these environments is critical, as the potential for conflict will likely increase as human populations continue to increase and expand into rural environments (Spencer et al. 2001, Kertson et al. 2011, Kertson et al. 2013).

Objective 96:

By 2020, develop a report that describes the demographic and behavioral characteristics of cougars in suburban environments that compares and contrasts those involved in conflict to those not involved in conflict.

Strategies:

- a. Develop publications documenting the results of completed research.
- b. Utilize research findings to modify policy and management as appropriate.
- c. Update educational materials to incorporate research findings.
- d. Investigate the role of corridor design for facilitating or discouraging cougar movements.
- e. Determine the relationship between the level of human-cougar conflict in a stable versus unsustainable cougar population.
- f. Evaluate the propensity of specific sex and age class of cougar to be involved in human-cougar conflict.

VI. LITERATURE CITED

Ackerman, B. B., F. G. Lindzey, and T. P. Hemker. 1986. Predictive energetics model for cougar. Pages 333-352 *In* S. D. Miller and D. D. Evertt. Editors. Cats of the world: biology, conservation, and management. National Wildlife Federation, Washington D. C., USA.

- Beausoleil, R. A. and K. Warheit 2014. Using DNA to evaluate cougar gender identification in the field by dog hunters and agency staff. *Wildlife Society Bulletin*: In press
- Beausoleil R. A., G. M. Koehler, B. T. Maletzke, B. N. Kertson, and R. B. Wielgus. 2013. Research to regulation: cougar social behavior as a guide for management. *Wildlife Society Bulletin*: 37(3):680-688; 2013.
- Caughley, G. 1977. *Analysis of vertebrate populations*. John Wiley and Sons, New York, New York, USA.
- Clark, J. D. 1999. Black bear population dynamics in the Southeast: some new perspectives on some old problems. *Eastern Workshop of Black Bear Research and Management* 15:97-115.
- Conover, M. R. 2001. *Resolving human-wildlife conflicts: the science of wildlife damage management*. Lewis publishers. Boca Raton, Florida, USA.
- Cooley, H.S., Robinson, H.S., Wielgus, R.B., and Lambert, C.S. (2008) Cougar prey selection in a white-tailed deer and mule deer community. *Journal of Wildlife Management* 72(1), 99-106.
- Cooley, H.S., Wielgus, R.B., Koehler, G.M., and Maletzke, B.T. (2009a) Source populations in carnivore management: cougar demography and emigration in a lightly hunted population. *Animal Conservation*, 1, 1-8.
- Cooley, H.S., Wielgus, R.B., Robinson H.S., Koehler, G., and Maletzke. B.T. (2009b) Does hunting regulate cougar populations: a test of the compensatory mortality hypothesis. *Ecology*, 90, 2913-2921.
- Duda, M. D., P. E. De Michele, M. Jones, W. Testerman, C. Zurawski, J. Dehoff, A. Lanier, S. J. Bissell, P. Wang, and J. B. Herrick. 2002. Washington residents' opinions on and attitudes toward hunting and game species management. Harrisonburg, Virginia, USA.
- Lambert, C. M. S., R. B. Wielgus, H. S. Robinson, D. D. Katnik, H. S. Cruickshank, R. Clarke, and J. Almack. 2006. Cougar population dynamics and viability in the Pacific Northwest. *Journal of Wildlife Management* 70:246-254.
- Kertson, B.N., R.D. Spencer, J.M. Marzluff, J. Hepinstall-Cymerman, and C.E. Grue. 2011. Cougar space use and movements in the wildland-urban landscape of western Washington. *Ecological Applications* 21: 2866-2881.
- Kertson, B.N., Spencer, R.D., and Grue, C.E., (2013) Demographic influences on cougar residential use and interactions with people in western Washington. *Journal of Mammalogy*, 94(2), 269-281.
- Lindzey, F. G., B. B. Ackerman, D. Barnhurst, and T. P. Hemker. 1988. Survival rates of mountain lions in southern Utah. *Journal of Wildlife Management* 54:664-667.
- Logan, K. A., and L. L. Sweanor. 2000. Puma. Pages X-X, *In Ecology and management of large mammals in North America*. S. Demarais, S. and P. R. Krausman. Editors. Prentice Hall, New Jersey, USA.
- Logan, K. A., and L. L. Sweanor. 2001. *Desert puma: evolutionary ecology and conservation of an enduring carnivore*. Island Press, Washington D. C., USA.

- Maletzke, B.T, Wielgus, R.B., Koehler, G., Swanson, M., Cooley, H., Alldredge, R. 2014, Effects of hunting on cougar spatial organization. *Ecology and Evolution*, doi: 10.1002/ece3.1089.
- Martorello, D. A., and R. A. Beausoleil. 2003. Cougar harvest characteristics with and without the use of hounds. Pages 129-135 *In* S. A. Becker, D. D. Bjornlie, F. G. Lindzey, and D. S. Moody, editors. *Proceedings of the 7th Mountain Lion Workshop*. Wyoming Game and Fish Department, Lander, USA.
- Peebles, K.A., Wielgus, R.B., Maletzke, B.T., and Swanson, M.E. (2013) Effects of remedial sport hunting on cougar complaints and livestock depredations. *PLoS ONE*, 8(11) 1-8.
- Robinson, H.S., Wielgus, R.B., Cooley, H.S., and Cooley, S.W. (2008) Sink populations in carnivore management: cougar demography and immigration in a hunted population. *Ecological Applications*, 18, 1028-1037.
- Ross, P. I., and M. G. Jalkotzy. 1996. The quota system of cougar harvest management in Alberta. *Wildlife Society Bulletin* 24:490-495.
- Spencer, R. D., D. J. Pierce, G. A. Schirato, K. R. Dixon, and C. B. Richards. 2001. Mountain lion home range, dispersal, mortality, and survival in the Western Cascades Mountains of Washington. Final Report. Washington Department of Fish and Wildlife, Olympia, Washington, USA.
- Spreadbury, B. R., K. Musil, J. Musil, C. Kaiser, and J. Novak. 1996. Cougar population characteristics in southern British Columbia. *Journal of Wildlife Management* 60:962-969.
- Warren, M. J. D. O. Wallen, K. M. Warheit, and R. A. Beausoleil. 2014 Cougar gene flow in a heterogeneous landscape in the Pacific Northwest. *Molecular Ecology*: Submitted
- Washington Department of Fish and Wildlife. 2008. Pilot cougar control program: a legislative report. Washington Department of Fish and Wildlife, Olympia, Washington, USA.
- White, K.R., Koehler, G.M., Maletzke, B.T., and Wielgus, R.B. (2011). Differential prey use by male and female cougars in Washington. *Journal of Wildlife Management*, 75(5):115-1120.
- Wielgus, R.B., Morrison, D.E., Cooley, H.C., Maletzke, B, and Koehler, G.M. (2013) Effects of male trophy hunting on female carnivore population growth and persistence. *Biological Conservation*, 167 (2013), 69-75.

WATERFOWL (*Family Anatidae*)

I. POPULATION STATUS AND TREND

Washington provides wintering habitat for approximately 750,000 ducks, 130,000 geese, and 11,500 swans annually (see Figure 1). In addition, the state provides habitat for approximately 150,000 breeding ducks and 50,000 breeding geese each spring and summer. The Pacific Flyway waterfowl population contains almost six million ducks, geese, and swans, and many of these birds pass through the state during fall and spring.

Duck management programs are complex, due to the wide variety of species that occur here. Ducks are classified in the subfamily *Anatinae*, and the 27 species occurring in Washington belong to 4 tribes and 12 genera. The most common duck species in the winter, in the harvest, and during breeding season is the mallard.

Management of Washington's geese and swans is also complex. Geese and swans are classified in the subfamily *Anserinae*, and Washington's 8 species belong to 2 tribes and 4 genera. Canada geese found in Washington include 7 subspecies. The most common goose during the breeding season and in the harvest is the western Canada goose. The most common swan using Washington wintering habitats is the tundra swan.

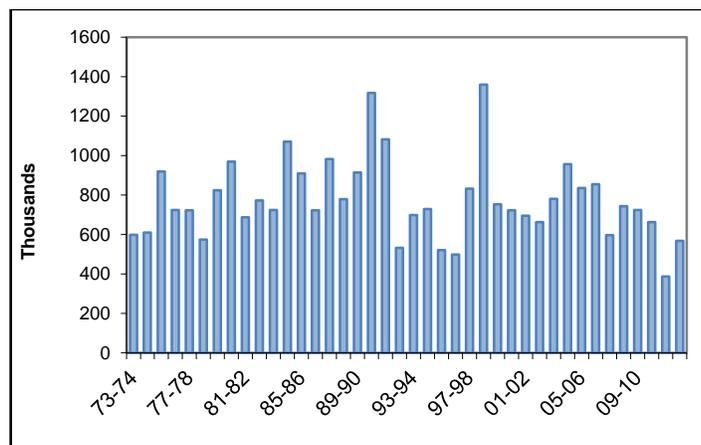


Figure 1: Washington midwinter waterfowl survey: total ducks.

II: RECREATIONAL OPPORTUNITY

Waterfowl are hunted from the early September goose season through special damage hunts in March. Seasons are based on frameworks established by U.S. Fish and Wildlife Service (USFWS), in conjunction with the Pacific Flyway Council (composed of wildlife agencies from the 11 western states). Approximately 40,000 hunters purchase migratory bird permits each year, and annually harvest over 400,000 ducks and 65,000 geese in Washington, providing over 300,000 days of recreation annually. Washington ranks second among the 11 Pacific Flyway states and usually ranks in the top ten states in the U.S. based on waterfowl harvested and number of hunters.

III. DATA COLLECTION

The Department conducts a variety of activities to estimate the size of the waterfowl population, production, migration patterns, and harvest. Breeding surveys are completed in April and May to measure status of the breeding population; waterfowl are marked during molting periods in the summer to document movements; duck production surveys are conducted in July to measure recruitment; migration counts are completed from October-December to track seasonal trends; and winter index counts are completed in January to document population status. Duck and goose hunter numbers and harvest are estimated using a mail questionnaire, special card survey, and mandatory harvest reports for some species (see Figure 2).

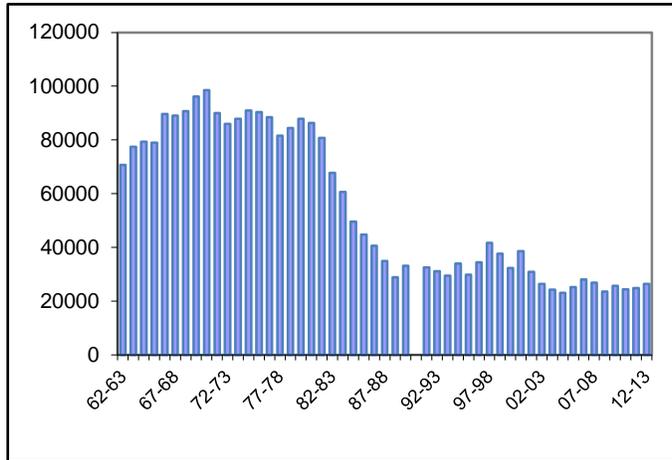


Figure 2. Washington waterfowl hunters.

IV. MANAGEMENT

Statewide management of Washington waterfowl is linked to numerous long-term interagency and international management programs. Although the USFWS has nationwide management authority for migratory birds, effective management of these resources depends on established cooperative state programs developed through the Pacific Flyway Council and North American Waterfowl Management Plan (NAWMP) Joint Ventures. Goals and objectives described in this plan follow interagency and other cooperative planning efforts. Strategies identified in this plan will guide work plan activities and priorities, and must be accomplished to meet the goals and objectives.

V. WATERFOWL MANAGEMENT GOALS

The statewide goals for waterfowl are:

1. Manage statewide populations of waterfowl for a sustained yield consistent with Pacific Flyway management goals.
2. Manage waterfowl for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography.
3. Preserve, protect, perpetuate, and manage waterfowl and their habitats to ensure healthy, productive populations.

VI. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Habitat Management

Issue Statement

Wetlands and other waterfowl habitats are being lost throughout Washington due to development, natural succession, invasive plant species, and conversion to other uses.

Objective 97:

Provide funding through state migratory bird stamp/print revenues and outside grants to conserve/enhance 1,000 acres of new habitat annually for all migratory birds.

Strategies:

- a. Determine habitat conservation and enhancement needs considering habitat trends, Joint Venture plans, Pacific Flyway plans, literature, focused research projects, and regional expertise.
- b. Solicit project proposals from department staff and external organizations.
- c. Utilize an evaluation team from a statewide cross-section of department experts to rank projects.
- d. Present and solicit input on project proposals from the Waterfowl Advisory Group (WAG).
- e. Provide emphasis on projects to increase waterfowl recruitment in wintering habitat and access in western Washington.
- f. When allocating migratory bird stamp funds, consider fund allocation goals presented to the Legislature when the program was established: habitat acquisition - 48%; enhancement of wildlife areas - 25%; project administration - 18%; and food plots on private lands - 9%.
- g. Develop a stamp/print program expenditure plan before the start of each new biennium.
- h. Monitor effectiveness of projects through focused evaluation of projects before and after implementation.
- i. Participate in and support organizations designed to deliver habitat improvements via partnerships (e.g., Pacific Coast Joint Venture, Intermountain West Joint Venture, Ducks Unlimited).
- j. Seek outside funding sources to leverage state migratory bird stamp revenues, through habitat improvement grants (e.g., National Coastal Wetlands Conservation Grants, North American Wetlands Conservation Act, RCO Washington Wildlife and Recreation Program).

Population Management

Issue Statement

Documentation of population size, movements, and mortality factors is difficult due to the highly migratory nature of waterfowl species.

Objective 98:

Manage waterfowl populations consistent with population objectives outlined in Table 1, developed considering NAWMP, Pacific Flyway Council, and Joint Venture plans.

Table 1. Waterfowl population objectives (3-year averages, unless noted).

Species / subsp. / pop.	Area	Current Index (2014)	Population Objective	Measure
Mallard	N. America	10.9million (annual)	7.7 million (annual)	breeding index
Pintail	N. America	3.2 million (annual)	5.7 million (annual)	breeding index
Western Canada goose	W. Wash.	8,140 geese	N/A	goose index
Western Canada goose	E. Wash.	2,177	2,000	nest index
Cackling goose	Flyway	265,281	250,000	breeding index
Dusky Canada goose	Flyway	13,678	10,000-20,000	breeding index
Wrangel Island snow goose	Skagit/Fraser	69,009	50,000-70,000	winter index
Wrangel Island snow goose	Flyway	145,833	120,000	spring index
Black brant	Flyway	160,948	162,000	winter index
Black brant	Wash. Bays	17,147	25,000	winter index
White-fronted goose	Flyway	616,124	300,000	breeding index
Tundra swan	Flyway	86,911	60,000	winter index
Trumpeter swan	Flyway	26,790 (2010)	25,000	breeding index

Strategies:

- a. Monitor annual status and trends of waterfowl populations through coordinated surveys with other agencies, including USFWS, flyway states, and Puget Sound Assessment and Monitoring Program (PSAMP) including:
 1. Midwinter Waterfowl Survey
 2. Canada goose nest surveys
 3. Duck breeding population surveys
 4. Periodic fall waterfowl surveys
 5. Age-ratio surveys
- b. Work with other agencies to improve estimates of waterfowl in other areas of the flyway important to Washington.
- c. Provide ongoing training for new observers in waterfowl population estimation techniques.
- d. Provide regular training and necessary resources for aerial survey crews to improve safety.
- e. Evaluate and revise surveys to optimize accuracy and precision, including review of current literature and peer review.
- f. Determine detection rates for species composition and abundance parameters related to aerial surveys, for refinement of population estimates.

Objective 99:

Document distribution, movements, and survival in accordance with flyway management goals by achieving annual banding objectives.

Strategies:

- a. Band a minimum of 750 mallards each year to provide survival estimates for inclusion in western mallard management model.
- b. Participate in goose marking and observation programs to estimate distribution, survival, abundance, and derivation of harvest.
- c. Conduct focused banding emphasis on select species (e.g., western Canada geese-ongoing, lesser Canada geese–2014-16, scoters–2014-16).

Objective 100:

Monitor mortality due to disease and contaminants each year and take corrective action as indicated.

Strategies:

- a. Identify sources of disease and contaminants associated with mortality events (e.g., lead shot mortalities of swans in north Puget Sound).
- b. In cooperation with other management agencies, (e.g., National Wildlife Health Research Center, USFWS) take corrective action to minimize exposure to disease and contaminant sources).

Recreation Management

Issue Statement

Federal harvest management strategies are not specific to Washington duck populations, although states are given more flexibility in developing goose harvest management strategies.

Objective 101:

Obtain accurate and precise estimates of waterfowl harvest, number of hunters, and effort, accurate to $\pm 10\%$ at the 90% CI.

Strategies:

- a. Participate in federal Harvest Information Program (HIP) for migratory birds.
- b. Provide supplemental estimates to determine regional differences in harvest:
 1. Small game hunter questionnaire
 2. Daily waterfowl card survey
 3. Mandatory harvest reports for waterfowl species of management concern: (brant, snow goose, SW Canada goose, and seaduck)
 4. Brant color composition

Objective 102:

Continue current policies to maximize duck hunting recreation consistent with USFWS Adaptive Harvest Management (AHM) regulation packages, considering duck availability during fall and winter.

Strategies:

- a. Establish regulations to maximize effective season days and bag limits, locating most season days later in the framework period.
- b. When federal and flyway harvest strategies prescribe shortened seasons for canvasback, pintail, or scaup, schedule season days as follows:
 1. Scaup: All season days as late as possible
 2. Canvasback and Pintail: Seven (7) days starting with the general duck season opener, remainder as late as possible

Table 2. AHM Regulation Packages and Washington Season Timing.

Regulation package	EASTERN WASHINGTON			WESTERN WASHINGTON		
	Days	Limit total/mall/ ♀ mall	Season Timing*	Days	Limit total/mall/ ♀ mall	Season Timing*
Liberal	107	7/7/2	mid-Oct. thru late Jan.	107	7/7/2	mid-Oct. thru late Jan.
Moderate	93	7/5/2	mid-late Oct. – 9 days; remainder early-Nov. thru late-Jan.	86	7/5/2	mid-late Oct. – 9 days; remainder mid-Nov. thru late-Jan.
Restrictive	67	4/3/1	mid-late Oct. – 9 days; remainder mid-Nov. thru mid- Jan.	60	4/3/1	mid-late Oct. – 9 days; remainder mid-Nov. thru early-Jan.
Very Restrictive	45	4/3/1	mid-Nov. thru early Dec.; late Dec. thru mid-Jan.	38	4/3/1	mid-Nov. thru early Dec.; late Dec. thru early-Jan.

* USFWS rules on duck season timing:

- Washington zones (2) – E. Washington and W. Washington
- Season dates must be the same within each zone
- Seasons may only be split into 2 segments
- Youth days in addition to above days, except for liberal package

- Continue to assist in refining USFWS duck harvest management programs to reflect regional population differences (e.g., western mallards).
- Maintain state harvest restrictions, in addition to federal frameworks, on waterfowl species of management concern in Washington (e.g., sea ducks, snow geese, brant), depending on harvest rates and population status.

Objective 103:

Maximize goose-hunting recreation consistent with Pacific Flyway Council plans, considering goose availability during fall and winter.

Strategies:

- Continue to establish regulations to follow flyway and state harvest thresholds (see Table 1 for current population indexes).
- Utilize recreational harvest as the primary method to address depredating/nuisance goose populations above management objectives (e.g., implement Pacific Flyway SW Wash./NW Oregon Goose Depredation Control Plan).

Table 3. Flyway and State Harvest Thresholds (3-yr. averages unless noted).

Species	Area	Flyway Harvest Thresholds	Additional WDFW Harvest Thresholds	Measure
Western Canada goose	E. Wash.	Restriction level: 1,300 Liberalization level: 2,000	<1,300: reduce days/limit <2,000: eliminate Sept. season	nest index

Table 3. Flyway and State Harvest Thresholds (3-yr. averages unless noted) (Continued)

Species	Area	Flyway Harvest Thresholds	Additional WDFW Harvest Thresholds	Measure
Dusky Canada goose	Flyway	Closure level: 5,000 Restrict level 1: 5,000-10,000 Restrict level 2: 10,000-20,000 Liberalization level: 20,000	None	breed. pop. index
Cackling Canada goose	Flyway	Closure level: 80,000 Reopening level: 110,000	None	projected fall index
Wrangel Island snow goose	Flyway	Closure level: 60,000 Restriction level: 120,000 Liberalization level: 160,000	None	spring pop. index
	Skagit-Fraser	Closure level: 30,000 Restriction level: 50,000 Liberalization level: 70,000	S-F <50K or Flyway <120K: season ends 1st wk. Jan. S-F >70K: season extends past late Jan. and/or increased bag limit	winter index
Brant	Flyway	Closure level: <100,000 Very Restrictive: 100-120,000 Restrictive: 120-145,000 Moderate: >145,000	None	winter index
	Skagit	None	Closure level: 6,000 (annual)	winter index
	Others	None	Closure level: 1,000	winter index
White-fronted goose	Flyway	Closure level: 80,000 Reopening level: 110,000	None	projected fall index
Scoter	W. Wash	None	Closure level: 45,000 Restrict level: 45,000-67,500 Mod level: 67,500-135,000 Liberal level: >135,000	winter index

Objective 104:

Maintain hunter numbers between 35,000-45,000 and recreational use days between 300,000-500,000, consistent with population objectives.

Strategies:

- a. Periodically survey hunter opinion to determine and recommend optimal season structures within biological constraints to reduce the percentage of hunters who are very dissatisfied with waterfowl hunting to less than 15%.
- b. Work with USFWS to simplify hunting regulations and minimize annual hunting regulation changes.
- c. To reduce confusion, minimize closed periods within seasons, maximize overlap between duck and goose seasons, and reduce the number of zones with different season structures.
- d. Provide special opportunity for youth by providing special recreational opportunities separate from regular seasons (e.g., youth hunts two weeks before regular season opener).

- e. Modify regulations to reduce crowding and increase hunt quality on wildlife areas (e.g., shell limits, regulated access, reserved hunts, established blind sites, limited open days), without reducing total use days.
- f. Work with local governments to maintain opportunity in traditional hunting areas, minimizing or finding alternatives to no shooting zones.
- g. Maintain diversity of recreational hunting and viewing opportunities.

Information and Education Goal

Issue Statement

Members of the general public and recreational users are sometimes uninformed about management issues and waterfowl hunting opportunities.

Objective 105:

Generate at least five information and education products each year to improve transfer of information to public.

Strategies:

- a. Increase public awareness of management issues and waterfowl hunting opportunities through brochures, news releases, district hunting season prospects, internet (e.g., GoHunt), and pamphlets.
- b. Update web site information regarding migratory bird stamp projects and provide web page links to other organizations (every two years).
- c. Continue to discuss waterfowl population management at Waterfowl Advisory Group meetings, public meetings, and select sports group forums.

VII. LITERATURE CITED

North American Waterfowl Management Plan, 1998. USFWS, Washington DC.

Pacific Coast and Intermountain West Joint Venture Management Plans, USFWS, Portland, OR.

Pacific Flyway Council Management Plans for Pacific Population of Western Canada Goose, Cackling Canada Goose, Dusky Canada Goose, Wrangel Island Snow Goose, Brant, White-fronted Goose, Tundra Swan, Pacific Coast Population of Trumpeter Swans, USFWS, Portland, OR.

MOURNING DOVE, BAND-TAILED PIGEON, COOT, AND SNIPE (OTHER MIGRATORY GAME BIRDS)

I. POPULATION STATUS AND TREND

Washington provides habitat for a variety of migratory game birds other than waterfowl. This includes mourning doves, band-tailed pigeons, coots, and snipe. Mourning doves and band-tailed pigeons are monitored by cooperative breeding surveys in Washington, which provide indices but not estimates of actual abundance (see Figure 1). Coots and snipe population trends are monitored by U.S. Fish and Wildlife Service (USFWS) standardized surveys on breeding areas.

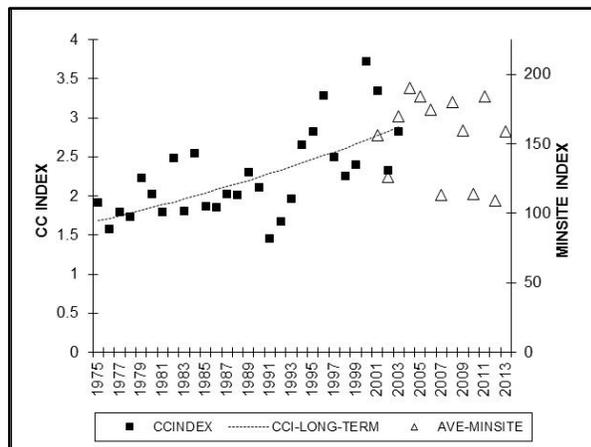


Figure 1. WA band-tailed pigeon survey information.

II. RECREATION OPPORTUNITY

Mourning doves, hunted during a September season, provide late summer recreational opportunity for bird hunters. Seasons are based on frameworks established by USFWS, in conjunction with the Pacific Flyway Council (composed of wildlife agencies from the 11 western states). Approximately 4,000 hunters harvest 50,000 doves annually in Washington.

III. DATA COLLECTION

The Department maintains several surveys to estimate the size of dove and band-tailed pigeon populations. The federal Harvest Information Program (HIP) survey and flyway banding programs are currently used to monitor trends in dove populations, and band-tailed pigeon mineral sites surveys are conducted in July. Winter index counts for coots are completed with waterfowl surveys in January, in cooperation with USFWS. Harvest of these species is monitored by a variety of state and USFWS questionnaire surveys.

IV. MOURNING DOVE, BAND-TAILED PIGEON; COOT, AND SNIPE MANAGEMENT GOALS

This section describes the statewide management direction for mourning doves, band-tailed pigeons, coot, and snipe. Management of these species in Washington is accomplished through the Waterfowl Section of WDFW. Although the U.S. Fish and Wildlife Service (USFWS) has nationwide management authority for migratory birds, effective management of these resources depends on established cooperative programs developed through the Pacific Flyway Council. Goals and objectives described in this plan follow interagency and other cooperative planning efforts. Strategies identified in this plan will guide work plan activities and priorities, and must be accomplished to meet the goals and objectives.

The statewide goals for mourning doves, band-tailed pigeons, coots, and snipe are:

1. Manage statewide populations of mourning doves, band-tailed pigeons, coots, and snipe for a sustained yield consistent with Pacific Flyway management goals.
2. Manage mourning doves, band-tailed pigeons, coots, and snipe for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography.
3. Preserve, protect, perpetuate, and manage mourning doves, band-tailed pigeons, coots, and snipe and their habitats to ensure healthy, productive populations.

V. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Habitat Management

Issue Statement

Habitats for mourning doves, band-tailed pigeons, coots, and snipe are being lost throughout Washington due to development and conversion to other uses.

Objective 106:

Quantify habitat loss by developing habitat maps and management guidelines. These maps and guidelines should be posted on the agency web site by 2016.

Strategies:

- a. Provide resource information to other agencies and organizations to influence land use decisions (e.g., WDFW Priority Habitats and Species [PHS] management guidelines for band-tailed pigeons).
- b. In cooperation with other agencies, track critical habitat status and trends (e.g., mineral sites, freshwater wetlands).

Objective 107:

Provide funding through state migratory bird stamp/print revenues to conserve/enhance 50 acres of habitat annually for doves, pigeons, coots, and snipe.

Strategies:

- a. Determine habitat conservation and enhancement needs considering habitat trends, Joint Venture plans, literature, and regional expertise.

- b. Solicit stamp/print project proposals from regional staff and external organizations.
- c. Utilize an evaluation team from a statewide cross-section of department experts to rank projects.
- d. Develop a stamp/print program expenditure plan before the start of each new biennium.
- e. Monitor effectiveness of projects through focused evaluation projects before and after implementation.

Population Management

Issue Statement

Documentation of population size, movements, and mortality factors is difficult due to the highly migratory nature of dove, band-tailed pigeon, coot, and snipe species.

Objective 108:

Conduct annual surveys and participate in studies to monitor whether Pacific Flyway Council population objectives are being met for mourning doves and band-tailed pigeons.

Strategies:

- a. Participate in the Pacific Flyway dove-banding project by marking a minimum of 700 doves each year to provide survival and population estimates.
- b. Monitor annual status and trends of band-tailed pigeons through coordinated breeding ground surveys with other agencies, including USFWS and flyway states.
- c. Monitor annual status and trends of coots through the midwinter inventory, coordinated with other agencies including USFWS and flyway states.
- d. Provide training aids for new survey observers and banders.

Recreation Management

Issue Statement

Management of limited populations requires refined harvest estimates.

Objective 109:

Obtain accurate and precise estimates of statewide harvest, number of hunters, and effort, accurate to $\pm 10\%$ at the 90% CI.

Strategies:

- a. Participate in federal Harvest Information Program (HIP) for migratory birds, including new focus on providing estimates for lightly harvested species (e.g., snipe).
- b. Provide supplemental measures to refine harvest estimates (e.g., small game harvest questionnaire, band-tailed pigeon harvest report).

VI. LITERATURE CITED

Pacific Flyway Council, Management Plans for Band-tailed Pigeons and Mourning Doves, USFWS, Portland, OR.

WILD TURKEY (*Meleagris gallopavo*)

I. POPULATION STATUS AND TREND

Efforts to introduce wild turkey, which are not native to Washington, occurred as early as 1913. However, these early release efforts (1913–1959) did not result in established populations. In 1960, 12 wild-trapped Merriam’s turkeys from New Mexico were released in Klickitat County. This release resulted in establishment of Washington’s largest, most stable turkey population from 1960 through 1990. In addition, 15 Merriam’s turkeys were released in 1961 in the Rice area of Stevens County and a population became established. From the mid-1960s through the early 1970s, turkeys were released in several Washington counties, including Okanogan, Chelan, Whitman, Pend Oreille, Kittitas, Ferry, Spokane, Clallam, Thurston, San Juan, and Lewis. Many of these releases did not result in established populations.

From 1984 through 2003, major transplant projects were undertaken to establish wild turkey populations in eastern and southwestern Washington. Wild turkeys trapped in Texas, South Dakota, Missouri, and Pennsylvania were brought into the state and released in suitable habitats in eastern and southwestern Washington. By the early 1990s, wild turkey populations in eastern Washington had increased to the point that WDFW began to transplant Washington birds into other suitable habitats within several eastern Washington counties. Western Washington wild turkey populations also received additional augmentation in the 1990s when several hundred wild-trapped birds from Iowa were released in Thurston, Lewis, Cowlitz, and Grays Harbor counties.

According to harvest trend information, most turkey populations in Washington are increasing with Stevens County having the highest population density. Other northeastern and southeastern Washington counties also have substantial turkey populations. Populations in central Washington counties also appear to have expanded but not as rapidly as in other parts of eastern Washington. Wild turkey populations in western Washington have not experienced the same level of expansion as eastern Washington; however, there are areas in Thurston, Cowlitz, Mason, and Grays Harbor counties that support huntable populations of the eastern sub-species of wild turkey.

II. RECREATIONAL OPPORTUNITY

Hunting seasons for wild turkeys have expanded from a 2-day fall season in 1965 to the current season structure that includes: a 47-day spring season statewide, 21-day early fall and 26 day late fall either sex general seasons in WDFW Region 1, and fall permit-only seasons in north central Washington and the Columbia River Gorge area. The addition of seasons occurred over time in response to expanding populations that could support additional harvest and address conflicts with agricultural and other landowners.

Before turkey augmentation activity in the late 1980s, hunter numbers fell to a low of 428 (1987) and turkey harvests averaged 65 birds per year (1983-1987). Statewide spring harvest, which is the best long-term indicator of population, has been on an increasing trend since 1996 (Figure 1) but did drop in 2012. These estimates suggest that the extremely fast growth in Washington’s turkey population ended around 2002. Hunter interest peaked between 2002 and 2009 with an average of

over 15,000 hunters, but hunter numbers have since declined to 11,700 hunters during spring seasons.

In 2006, the State Legislature changed the small game hunting laws to require turkey hunters to purchase their first turkey tag, which previously had been included with the purchase of a small game license from 1999 through 2005. The legislation changed the price of all turkey tags to \$14 and dedicated 1/3 of the revenue to turkey management, 1/3 to upland bird management, and 1/3 to the Wildlife Fund in general. This revenue has helped the Department provide more focus on turkey and upland game bird management.

A Wild Turkey Management Plan that was developed through the Washington State Environmental Policy Act (SEPA) process, which included a 30-day public review and comment

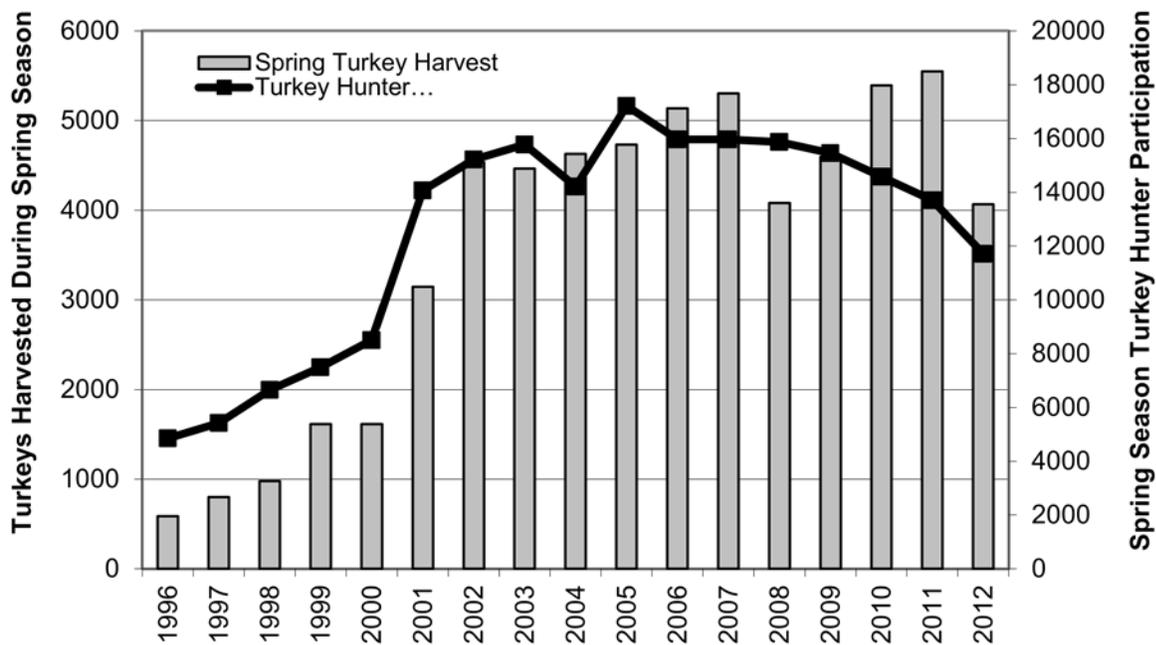


Figure 1: Spring turkey harvest and hunter participation 1996 to 2012.

period, was completed in 2005. The Upland Game Advisory Committee and the Fish and Wildlife Commission reviewed the plan before adoption by the Director of the Department of Fish and Wildlife. Detailed historical and biological information and data are included in the plan, along with specific goals, objectives, and strategies for wild turkey management in Washington. The plan has not been updated but is still viewed as giving current direction to management of turkeys in the state.

III. DATA COLLECTION

The primary data collected to monitor wild turkey populations has been estimated harvest and hunter effort. Some limited radio tracking was done in Pend Oreille, Yakima, Chelan, and western Washington counties to help evaluate survival and production of recently released birds. WDFW staff began implementing a monitoring protocol in northeast Washington that uses wintertime

driving route turkey counts as a harvest independent indicator of population status and trend. Winter surveys of turkeys also occur in parts of central Washington through counts at winter concentration areas. Future efforts to collect these types of monitoring data are described in the population management section below.

IV. MANAGEMENT GOALS

The statewide goals for wild turkeys are:

1. Preserve, protect, perpetuate, and manage wild turkeys and their habitats to ensure healthy, productive populations.
2. Manage wild turkeys for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, wildlife viewing cultural and ceremonial uses by Native Americans, and photography.
3. Manage statewide wild turkey populations for a sustained harvest.

V. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Population Management

Issue Statement

Turkey populations in some areas of eastern Washington have expanded substantially. WDFW continues to receive damage complaints from residents in some of these areas. A response matrix to use in landowner/turkey conflict situations was included in the Wild Turkey Management Plan that was completed in 2005.

Objective 110:

Monitor conflicts each year and implement effective conflict management strategies to help resolve issues as they arise. Report activities in the annual Game Status and Trend Report.

Strategies:

- a. Include documentation of turkey conflicts and actions taken in a reporting system to be developed to monitor statewide wildlife conflicts and related activities.
- b. Provide public education materials that address feeding and other practices that can lead to conflict situations with wild turkeys.
- c. Encourage planting alternate food sources to keep nuisance or damage-causing turkeys away from habitual problem areas.
- d. Utilize general season harvest as the preferred method of addressing chronic conflict areas.
- e. Work with landowners who experience damage caused by turkeys to allow public hunting access.

Issue Statement

Turkey seasons have expanded recently and more intensive monitoring may help determine the need to make future season modifications and identify other population management needs.

Objective 111:

Where fall seasons are in place, and other areas where an emphasis is needed, expand monitoring of turkey populations utilizing the protocol developed in NE Washington population management unit (PMU) or other appropriate methods, to track changes in populations over time.

Strategies:

- a. Evaluate other turkey PMUs and implement monitoring where needed.
- b. Track changes over time in relationship with season and other changes to identify needs for adaptive management.
- c. Consider implementation of spring surveys where recruitment appears to be a concern and if warranted investigate causes that may be limiting production.
- d. Consider citizen based monitoring as an option that may contribute to knowledge of the status of populations.
- e. By 2017, establish population, harvest, or recreational objectives for each turkey PMU or smaller geographic units to guide season setting recommendations.
- f. Where populations decline below desired objectives, recommend season adjustments to the Fish and Wildlife Commission.

Issue Statement

Turkeys occupy almost all suitable habitats in Washington. In the Turkey Management Plan, one area in Skagit and Whatcom counties was identified as a potential introduction area. After an evaluation and public input, it was determined to not move forward with an introduction. No other new introductions of turkeys are envisioned although augmentation of existing populations may be appropriate in some local areas. The goal of a wild turkey release is to establish a self-sustaining, huntable population in habitats and locations that do not result in significant conflict problems.

Objective 112:

By 2017, develop a list of release sites within established turkey range that may benefit turkey populations and minimize human conflicts. Release turkeys at these locations when relocation is necessary to abate damage or other conflict.

Strategies:

- a. As relocation needs arise, to address wildlife conflict issues, identify release sites that may have the greatest benefit in terms of augmenting populations that are below desired levels.
- b. Maintain the integrity of subspecies distribution by limiting releases to areas where a given subspecies already occurs.

Issue Statement

The 2005-2010 Wild Turkey Management Plan (WTMP) has not been updated. As described in the WTMP, many areas of the state have strong, self-sustaining populations. However, in some areas of the state, particularly southwest Washington, turkey introductions have not resulted in robust populations. Factors limiting turkey population growth in these areas have not been identified and evaluated. Wildlife conflict and other issues exist in other parts of the state where turkey populations are more robust.

Objective 113:

Monitor turkey population trends in each Wild Turkey Population Management Unit (PMU) annually. Identify limiting factors and modify management strategies as needed to address population, harvest, or recreational objectives to increase populations.

Strategies:

- a. Use harvest and other monitoring data to track population trends in each PMU.
- b. Identify and evaluate potential factors affecting population levels in PMUs with low or negative population growth.
- c. Evaluate whether an updated statewide WTMP is needed to address future management needs. Update the plan or develop an alternative strategy to prioritize and communicate management objectives.

Recreation Management

Issue Statement

Turkey populations in some portions of Washington have increased and expanded hunting opportunities were recently added. WDFW commonly receives comments in favor of allowing hunting methods that are currently prohibited in the state such as the use of dogs or rifles to harvest turkeys.

Objective 114:

Monitor spring turkey harvest where fall seasons occur to determine if fall harvest is affecting spring hunter success, and evaluate potential changes to allowed hunting methods.

Strategies:

- a. Attempt to determine if either sex fall hunting affects male turkey harvest during the following spring hunt.
- b. Monitor hunter participation, success rates, and opinions.
- c. Identify and evaluate potential fall season modifications each year and recommend changes when necessary to meet population or recreation needs.
- d. Evaluate public opinion and any potential management benefits of expanding the methods that can be used to hunt turkey and make recommendations for changes to the Fish and Wildlife Commission as appropriate.

Issue Statement

Turkey hunters and district biologists report that turkey-hunting opportunities in some areas of eastern Washington are limited due to large acreage owned by private landowners. Private land access was also identified as an important issue in hunter opinion surveys conducted by WDFW.

Objective 115:

Over the next five years, increase the number of acres of private land available in WDFW's access programs for public turkey hunting by 10% from 2013 levels within priority turkey range.

Strategies:

- a. Encourage landowners experiencing damage from turkeys to consider allowing open or controlled hunting access as a primary option to mitigate conflicts.
- b. Place a particular emphasis from WDFW's private lands access program within turkey PMU 10 and 15.
- c. Partner with local chapters of the National Wild Turkey Federation and other sportsman's groups to find landowners who would allow public hunting.
- d. Offer enhanced incentives to landowners in high priority areas especially where public lands are limited.

Habitat Management

Issue Statement

Opportunities to enhance wild turkey habitat exist on private and public lands throughout areas supporting turkey populations. Improving habitat conditions for turkeys can also have additional values to other wildlife species that utilize the same resources. Habitat enhancements can also mitigate conflicts with turkey populations on private lands.

Objective 116:

Conduct 10 habitat improvement projects in key wild turkey management areas to accomplish multiple goals including addressing conflict issues, improving public recreational opportunities, and improving habitat conditions for multiple species by 2021.

Strategies:

- a. Identify and prioritize key areas and strategies for habitat improvement.
- b. Work with the National Wild Turkey Federation and others to combine funding and resources to achieve maximum benefits.
- c. Facilitate habitat enhancement projects on private and public properties within identified high priority areas (e.g., oak habitat enhancement in Klickitat County, aspen regeneration in northeast Washington, cottonwood regeneration and riparian enhancement across the turkey range).
- d. Develop habitat enhancement projects to help address issues related to winter conflict complaints with a particular emphasis in Region 1.
- e. Prioritize enhancement projects on areas open to public hunting and in areas that benefit species of concern or benefit a wide variety of wildlife species.

Research

Issue Statement

Research on wild turkeys in the western United States is not common. If research were to be done in western habitats, managers would have better information to use when managing the species. Hunters and some biologists express concerns that the expansion of the turkey range may have potential effects on native wildlife populations, but linkages are difficult to document.

Objective 117:

Support at least one research project that increases knowledge of wild turkeys in western habitats.

Strategies:

- a. Cooperate with public and private entities (e.g., National Wild Turkey Federation) to develop research projects in Washington.
- b. Develop and/or participate in inter-specific competition research projects funded through the National Wild Turkey Federation and other public or private entities.
- c. Consider a project that seeks to identify limiting factors for the eastern subspecies in western Washington and actions that may address those needs.

MOUNTAIN QUAIL (*Oreortyx pictus*)

I. POPULATION STATUS AND TREND

Historically, mountain quail have existed in western Washington and along the southern border of the state in eastern Washington. Populations in western Washington are thought to have been introduced and introductions may have once expanded their range in eastern Washington as well. However, mountain quail populations in Washington have been low for some time. While there are a few areas in western Washington that hold birds, eastern Washington populations have all but disappeared. The last known mountain quail populations in eastern Washington were in southeastern Asotin County. Although several releases of translocated birds have occurred in this vicinity and nearby areas in Idaho and Oregon, the current status of this population is largely unknown but is assumed to be at a low density as sightings are rarely reported.

II. RECREATIONAL OPPORTUNITY

The current mountain quail hunting season extends from the last weekend in September or the first weekend in October through November 30 in western Washington; however, there have been no hunting seasons for mountain quail in eastern Washington since 1997. The 2012 quail harvest in western Washington was less than 400 birds with mountain quail representing an unknown portion of that harvest. Mountain quail do not represent a major recreational opportunity in the state of Washington for hunters although they do represent a unique opportunity for hunters wanting to harvest multiple species and birders who travel to add this bird to their checklists.

III. DATA COLLECTION

Currently, only incidental data on statewide mountain quail populations in Washington is being collected. These observations, which include periodic monitoring of online birding reports, indicate that mountain quail continue to be limited in distribution and abundance. For this reason, the species has been identified as a “species of greatest conservation need” within its native range by WDFW. The Department, in cooperation with the University of Idaho, and State of Oregon has translocated mountain quail on several occasions to the Blue Mountains area as part of a population re-establishment project. Most of these releases have included monitoring of a subset of the released birds. Data collected through these efforts included survival, nest success, and habitat use.

IV. MOUNTAIN QUAIL MANAGEMENT GOALS

The statewide goals for mountain quail are:

1. Preserve, protect, perpetuate, and manage mountain quail and their habitats to ensure healthy, productive populations.
2. Manage mountain quail for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, wildlife viewing, cultural and ceremonial uses by Native Americans, and photography.
3. Manage western Washington mountain quail populations for a sustained harvest.

V. MANAGEMENT ISSUES, OBJECTIVES, AND STRATEGIES

Habitat Management

Issue Statement

Mountain quail reintroduced into the Blue Mountains region have not flourished, possibly indicating a habitat deficiency. Degradation of riparian and brush habitats due to hydroelectric development, past grazing practices, and fire exclusion is believed to be the primary factor leading to the decline of mountain quail (Brennan, 1990), but direct links have not been confirmed. Others have speculated that introduced species may be a contributing factor but this has not been investigated. Further work is needed to develop prescriptions to guide habitat management and enhancement for this species. Mountain quail released into southeastern Washington in 2005 and 2006 were monitored through a cooperative effort with the University of Idaho, resulting in a student producing a master's thesis that included habitat use information, which will be helpful in defining future habitat management efforts.

Objective 118:

Utilize existing information to help determine distribution of suitable mountain quail habitat and the need for enhancement within the bird's native range in Washington by 2016.

Strategies:

- a. Develop a map showing potential mountain quail habitat.
- b. Conduct an evaluation of eastern Washington mountain quail habitat conditions and suitability based on results of monitoring released quail and historical information.
- c. Develop prescriptions for enhancement projects based on the evaluation that consider the potential effects of climate change.

Objective 119:

Much of the habitat believed to be within the historic range of mountain quail is on public lands. Work with WDFW, USFS, and other public land managers to assure the habitat needs of mountain quail are considered in planning and management decisions and opportunities for enhancements are not foregone.

Strategies:

- a. Include provisions for mountain quail in appropriate WDFW wildlife area plans.
- b. Participate in US Forest Service and other federal land management planning and work with local managers to assure that mountain quail are considered.
- c. Identify and implement at least two habitat enhancement projects for mountain quail by 2021.

Population Management

Issue Statement

Mountain quail occupy little of their historic range in eastern Washington. On several occasions, wild-trapped mountain quail from southwestern Oregon have been released in southeastern Washington. These projects were part of an effort to re-establish mountain quail populations in part of their historic range. Because this species is believed to be present and low densities in relatively remote locations, determining a population trend is very difficult.

Objective 120:

Evaluate results from re-introduction efforts in Asotin County by 2016 and the need to modify release strategies. Consider additional reestablishment projects in historic range in eastern Washington if suitable habitat is determined to be present.

Strategies:

- a. Evaluate past reintroduction attempts to determine if they have, or are contributing to, development of a self-sustaining population.
- b. Coordinate with, and consider information and results of reintroduction efforts in other states in evaluating methods and the need for adaptive strategies.
- c. If the probability of success is determined to be sufficient, continue to coordinate with Oregon and Idaho on additional transplant efforts.
- d. Secure additional funding to support research or additional reintroduction efforts.
- e. Implement short term monitoring of any released birds and attempt to monitor long term population trends.

VI. LITERATURE CITED

Brennan L. A. 1990. What happened to the mountain quail in Idaho? Quail Unlimited 9:42-43, 69.

FOREST GROUSE: Dusky Blue Grouse (*Dendragapus obscurus*), Sooty Blue Grouse (*Dengragapus fuliginosus*), Ruffed Grouse (*Bonsa umbellus*), and Spruce Grouse (*Falcipennis canadensis*)

I. POPULATION STATUS AND TREND

Forest grouse in Washington include dusky blue grouse (*Dendragapus obscurus*), sooty blue grouse (*Dendragapus fuliginosus*) and ruffed grouse (*Bonsa umbellus*), which occur throughout the forested lands in Washington, and spruce grouse (*Falcipennis canadensis*) that are closely tied to higher elevation spruce/fir habitats. Statewide biological surveys designed to estimate forest grouse populations have not been conducted in Washington for many years. Population monitoring has been based on the long-term harvest trend (Figure 1). Harvest estimates are based on a mailed hunter survey following each season. This trend shows an apparent long-term decline in statewide forest grouse populations. Both harvest and hunter numbers were relatively stable from 1998 to 2010 but have both dropped during each of the last two seasons. It is difficult to draw concrete conclusions because harvest estimation methods have changed over time and other factors such as hunter effort and access to forest lands may be biasing results.

A wing collection study in 1997 revealed that hunters did not accurately report the species of grouse harvested. Because hunters have not been able to accurately report the species harvested, evaluating harvest, and population trends for individual species is very difficult. Although it is apparent that there has been a decline, current grouse populations are thought to be relatively healthy. However, loss and fragmentation of habitat due to urban expansion and changes in plant communities resulting from new forest management techniques, wildfires and other factors may impact population status over time.

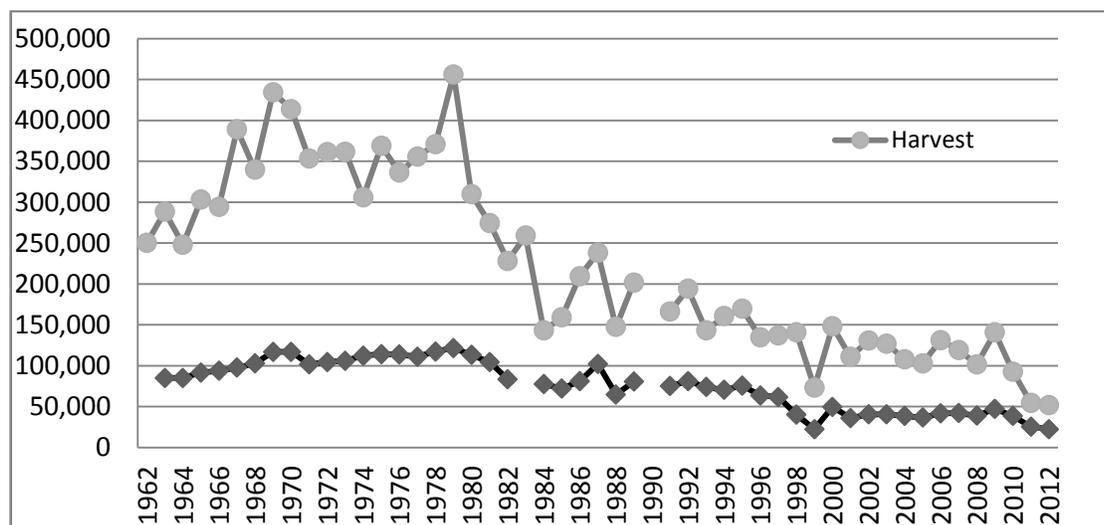


Figure 1: Estimated statewide forest grouse harvest and hunter participation 1962 to 2012.

II. RECREATIONAL OPPORTUNITY

The current Sept. 1 to Dec. 31 forest grouse hunting season has been in place since 1987. This is similar to seasons in eastern Oregon (Sept. 1 – Dec. 31) and most of Idaho (Aug. 30 – Dec. 31). Northern Idaho and western Oregon have longer seasons which extend to January 31. The daily bag limit of three of any species (mixed or straight bag), that had been in place since 1952, was changed to four birds per day in 2009. This change was made primarily to increase interest in grouse hunting but has been a topic of controversy with some hunters and biologists.

Estimated hunter numbers slowly declined from the late 1980s through 1997, then fell sharply in 1998 and 1999 (Figure 1). The decline seen in 1999 may be a result of sampling difficulties that made data collection inconsistent with previous and subsequent years. Hunter numbers rebounded in 2000 and were fairly consistent through 2009 when a drop that also may be related to changes in survey methods occurred. Both grouse harvest and hunter numbers reached all-time lows in 2012.

III. DATA COLLECTION

Statewide population surveys for forest grouse have not been conducted for some time. However, forest grouse wings have been collected since 1998 by placing barrels in strategic locations in north-central Washington where hunters voluntarily deposit one wing from each grouse killed. Wings were classified as to species, sex, and age and the results potentially give some insight to changes in age structure and harvest, which varied among three grouse species. The changes observed may be related to habitat alteration by a major forest fire in the region but a direct linkage cannot be made.

Statewide wing collections from 1993-95 provided several pieces of important information, such as, more than 70% of forest grouse harvest occurs in September and early October, before modern firearm deer seasons. Therefore, current seasons that extend through December probably have very little impact on grouse populations. In addition, there is a tendency for hunters to misidentify grouse species, which has resulted in forest grouse species being combined for current harvest survey purposes.

The most extensive data set held for forest grouse is harvest estimation, which has been collected since 1963. Hunter harvest data initially was collected by surveying approximately 10% of hunting license buyers, but the survey is now sent to 25,000 individuals each year and includes buyers of both big game and small game licenses as grouse can be harvested with either license. These data are reported in the annual WDFW Game Harvest Reports and summarized in annual Game Status and Trend Report.

IV. FOREST GROUSE MANAGEMENT GOALS

The statewide goals for forest grouse are:

1. Preserve, protect, perpetuate, and manage forest grouse and their habitats to ensure healthy, productive populations.
2. Manage forest grouse for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, wildlife viewing, cultural, and ceremonial uses by tribes, and photography.

3. Manage statewide forest grouse populations for a sustained harvest.

V. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Population Management

Issue Statement

Currently, forest grouse harvest is used as an indicator of population trend and is monitored at the WDFW regional level. However, this monitoring method has not allowed WDFW to determine the cause of harvest declines, which could be due to declines in either grouse populations, or hunter participation, or a combination of both. Additionally, the regional level of data collection has not been adequate to evaluate harvest or population changes at smaller scales.

Objective 121:

Using existing harvest data, build a dataset to evaluate harvest changes at the county level by 2016 and evaluate factors that may have contributed to changes in harvest by 2021. Consider including broader scale wing collections to evaluate individual species status and age structure in the evaluation.

Strategies:

- a. Compile county level harvest data and attempt to identify factors that may be associated with changes in local harvest. Annually monitor for shifts in harvest that may be associated with human or naturally caused factors such as landscape level habitat alteration or access limitations such as road closures.
- b. Investigate the potential to report grouse harvest on the WDFW website or through the Department's mandatory reporting system to increase precision and implement if appropriate.
- c. Evaluate past research, existing data and information, and compile a report outlining potential causes of forest grouse harvest declines and the need for additional research and monitoring.
- d. If called for in the report above, implement new monitoring strategies to track harvest by individual species or to address other data needs.
- e. Implement targeted monitoring or a research study that attempts to determine if forest grouse population density and age structure for each grouse species in appropriate habitats has declined from historic levels and how hunter harvest, habitat changes and other factors may be affecting populations.
- f. Develop citizen based monitoring approaches as an option to track changes in grouse populations.

Recreation Management

Issue Statement

Forest grouse harvest and hunter participation have declined. Hunters and some biologists have expressed concerns related to season timing, harvest methods, habitat changes, and declining opportunity.

Objective 122:

Investigate potential causes of declining participation by 2017 and if not related primarily to confirmed declines in grouse populations, take appropriate measures to increase interest and opportunity. Recommend changes to harvest strategies if needed to address population declines.

Strategies:

- a. Work with private and public landowners to maintain and expand hunting opportunity especially in areas where road access has been restricted.
- b. Make information available to hunters regarding Washington's variety of grouse hunting opportunities and the identifying characteristics of each species.
- c. If hunting is found to be a contributing factor to declines in forest grouse under objective 119, make recommendations for season or bag limit changes to the Fish and Wildlife Commission to address population needs.

Objective 123:

Conduct a survey by 2017 to evaluate hunter opinions related to allowed forest grouse harvest methods and seasons from a social perspective and their effect on populations. Based on the results, and grouse population management needs, consider making recommendations to modify regulations.

Strategies:

- a. Conduct a survey to evaluate hunter opinions on season structure and weapons used to harvest forest grouse and summarize the results.
- b. Make recommendations to the Fish and Wildlife Commission to address specific issues that result from the survey and evaluation.

UPLAND GAME BIRDS: Pheasant (*Phasianus colchicus*), California Quail (*Callipepla californica*), Chukar (*Alectoris chukar*) and Gray (Hungarian) Partridge (*Perdix perdix*)

I. POPULATION STATUS AND TREND

According to harvest estimates, used as an index of population, upland bird populations in Washington have been declining since the early 1980s. Although both are well below historical highs, recent exceptions include quail where harvest increased from 1995-2003 and gray partridge which has been increasing since 2008. Harvest estimation techniques were consistent between 1984 and 2000, so estimates made during that time should be comparable. Since harvest estimation methods changed, to increase precision, downward trends have continued. Some concern does exist with the use of harvest as a population indicator as it can also be influenced by other factors such as reduced hunting access and a variety of economic and social factors.

Long-term pheasant harvest (Figure 1) tracks the changes in population levels which are believed to be due primarily to changes in the amount of quality habitat available in Eastern Washington and long-term/short-term climatic changes. In addition, crowing count surveys and brood index surveys conducted between 1984 and 1998 also indicated a decrease in pheasant populations in many areas of eastern Washington (Cliff Rice, pers. comm.). Reports from hunters and biologists support the theory that pheasant populations have decreased over time. Western Washington does not support self-sustaining populations of pheasants primarily due to the wetter climate. Hunting on the west side of the state is dependent upon releases of pheasants in the fall.

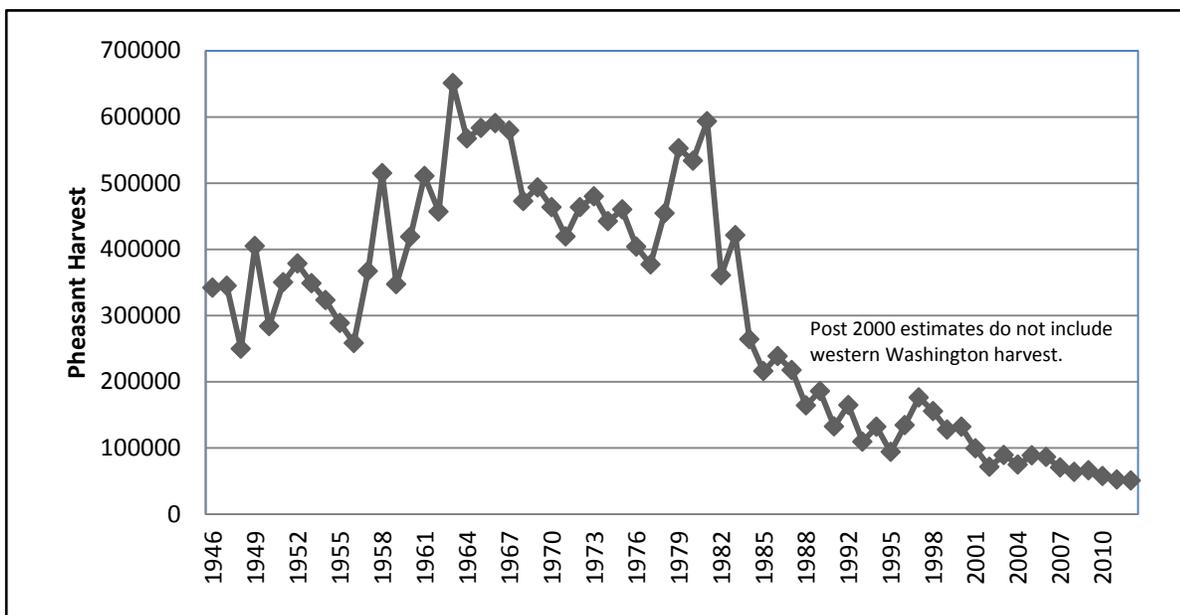


Figure 1: Washington State Pheasant Harvest 1946-2012.

Upland game bird fall population densities and related harvest are often dependent on spring weather conditions and available cover since chicks have a difficult time thermo-regulating in cold, wet weather conditions. In addition, chicks need high protein diets based on insects which also are highly dependent upon weather and plant stand composition. Although variable from year to year, harvest estimates for gray partridge and chukar have not dropped as dramatically in the last ten years. Currently, gray partridge and quail harvest is about equal to 1995 levels but chukar harvest is at an all-time low (Figure 2). In general, department biologist opinions of upland game bird populations correlate with the harvest estimates seen in Figures 1 and 2, but some have suggested that chukar may be an underutilized resource from a recreational harvest perspective in some portions of the state. Breeding Bird Survey (Sauer et al., 2014) summary results suggest a stable or recent slightly increasing trend for chukar in Washington but this result is based upon a small sample size.

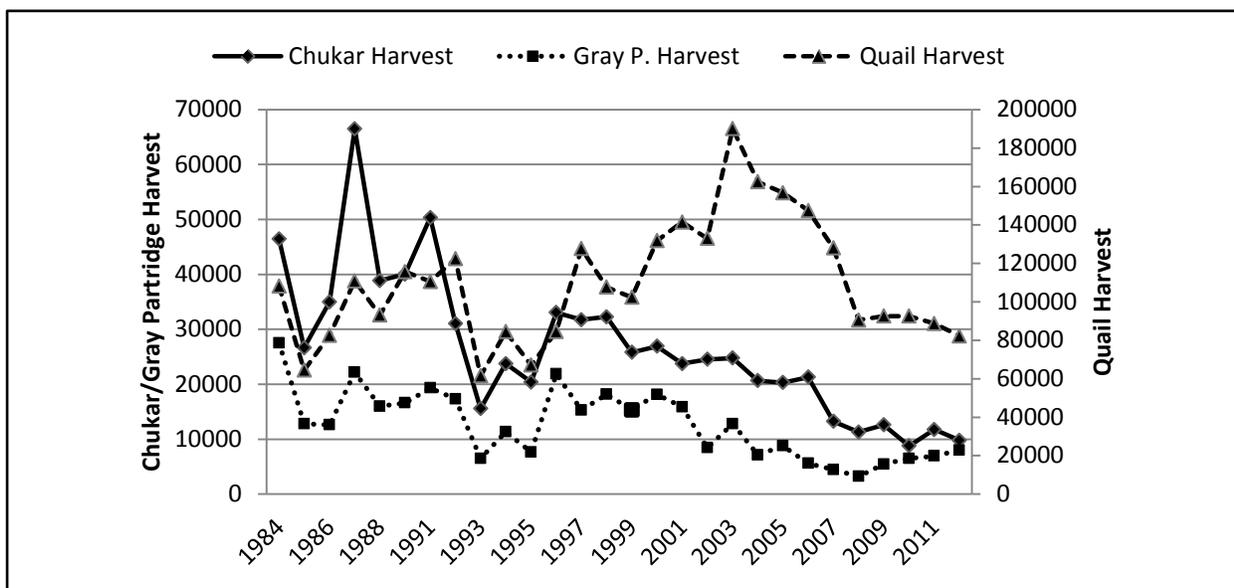


Figure 2: Quail, Chukar and Gray Partridge Harvest 1984-2012.

Current upland bird management efforts focus largely on pheasant in an identified focus area that includes portions of Whitman, Walla Walla, Columbia, and Garfield Counties. This area was chosen due to high populations of pheasants that had previously occupied the area, adequate rainfall to conduct enhancements without the need to irrigate, and anticipated cost effectiveness. Specific enhancement efforts target establishment of forbs and diversification of permanent herbaceous cover to increase insect availability during the brood rearing period which is believed to be the key factor limiting reproduction and population size. These efforts expanded in scope significantly in 2013 on private lands and agreements with landowners include hunting access as well.

II. RECREATIONAL OPPORTUNITY

Eastern Washington pheasant season timing has varied over time but has been relatively consistent over the past 10 years. For many years, the season started in early to mid-October and lasted through December 31, providing hunters 11 or 12 weeks of hunting, depending on the year. In 2004, the pheasant opener was moved to the weekend after general deer season, one week later

than previous years. With that move, the season ended up shortened in 2004. In 2005, the season was extended into January to maintain the number of hunting days.

In 2012, an estimated 14,950 people hunted pheasant in eastern Washington. The 2012 Western Washington Pheasant Licenses sales totaled 4,461. It is unknown how many hunters hunt on both sides of the state. Both of these participation levels have declined significantly over the past decade. The largest decline in western Washington was associated with the new license, but hunter numbers have increased slowly since that change went into effect. This is in contrast with the estimated high of 142,000 in the early 1950s and a more recent high of 109,000 in 1979 (Figure 3). A spike in hunter participation in 1997 may have been due to the initiation of rooster pheasants releases in the fall through the Eastern Washington Pheasant Enhancement Program.



Figure 3: Estimated Pheasant hunter Participation in Washington 1949-2012.

Hunting seasons for other upland game birds have also varied in length over the years. During the 1960s and 1970s, the chukar season was split into early and general seasons, depending on geographic area. In 1997, the early-general season was eliminated in favor of a standardized season running from early October to mid-January, which is the current regulation. The bag limit for chukar was reduced after the population crash in the early 1980s, from 10 birds per day to six. Currently, the daily bag limits for chukar and gray partridge are six of each species, and quail has a bag limit of 10. In 2012, an estimated 10,097 people hunted quail, 3,004 hunted chukar, and 2,343 hunted gray partridge.

III. DATA COLLECTION

Three types of pheasant surveys were conducted up until the mid to late 1990s in most areas of the state; 1) sex ratio counts in February and March; 2) crow counts (a male pheasant population index) in late April and early May; and 3) production counts in late July and August. In addition, aerial population surveys for chukar were completed through the late 1990s. All of these surveys

were discontinued which was primarily due to the limited time and funding for district biologists considering all game species priorities.

A post-season mail survey of hunters is conducted to estimate harvest and hunter effort. Recent improvements are believed to have increased the precision of the estimates. The improvements centered on how hunters who receive the survey are selected based on their responses to a preseason survey at the time they purchase their license.

Pheasant call count and brood surveys were reinitiated in 2010 in the pheasant focus area as a mechanism to monitor changes in this area where enhancement efforts are focused. Data analysis, as of the third year of crowing surveys, had not detected either an upward or downward trend. Brood surveys were discontinued after the first year due to limited staff availability to complete survey routes.

IV. UPLAND GAME BIRD MANAGEMENT GOALS

The statewide goals for upland game birds are:

1. Preserve, protect, perpetuate, and manage upland game birds and their habitats to ensure healthy, productive populations.
2. Manage upland game birds for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, wildlife viewing cultural and ceremonial uses by Native Americans, and photography.
3. Manage statewide upland game bird populations for a sustained harvest.

V. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Habitat Management

Issue Statement

Pheasant habitat in eastern Washington continues to be lost, altered, or degraded over time. This is considered a major factor in the decline in pheasant populations (Flaherty 1979). In order to maximize the benefits and likelihood of success in enhancing populations, a pheasant focus area has been identified in southeastern Washington. The premise behind this approach is that individual projects spread across a wide landscape are less likely to have a meaningful impact on increasing the population than efforts focused in a smaller area. Three major factors influenced identification of this area: 1) cost of improving habitat is relatively low when compared to irrigated agriculture areas; 2) annual rainfall in the area is conducive to producing quality habitat without irrigation; and 3) availability of federal Farm Bill programs (e.g., Conservation Reserve Program). The pheasant focus area lies in the Snake River basin, one of the three major pheasant producing areas in the state where there is little public land managed for conservation or wildlife. Conversely, the Yakima and Columbia basins both have significant land dedicated to fish and wildlife habitat where upland birds should do well. By working with private landowners in the pheasant focus area, WDFW can help assure that the area remains a major contributor to pheasant production and recreational harvest.

Objective 124:

Continue to focus enhancement efforts in the pheasant focus area. Work with and/or provide incentives to private landowners to enhance a minimum of 5,000 acres of habitat especially for nesting and brood rearing. Maintain existing agreements that foster quality habitat.

Strategies:

- a. Work with public and private landowners and funding agencies (e.g., United States Department of Agriculture (USDA)) to increase quality pheasant habitat acreage through programs like the Conservation Reserve Program (CRP). Specific emphasis will be put on “mid-contract management” to maintain diverse plant stands in conservation cover.
- b. Improve pheasant habitat quality by funding habitat improvement projects through the Eastern Washington Pheasant Enhancement Program (EWPEP) and the Partnerships for Pheasants program. Seek grants when available to increase enhancements.
- c. Integrate pheasant habitat improvements and priorities with projects designed to improve native species needs (e.g., sharp-tailed grouse and salmon).
- d. Partner with non-governmental organizations (e.g., Pheasants Forever) to enhance habitat and produce and distribute habitat enhancement informational material to landowners.

Objective 125:

Maintain or improve conditions for all upland game birds within their primary ranges.

Strategies:

- a. Participate in public land management planning processes to assure that upland bird habitat conditions are considered in decisions.
- b. Continue to assist landowners in implementation of Conservation Reserve and other farm bill programs to enhance habitat conditions.
- c. Partner with non-governmental organizations (e.g., Pheasants Forever) to enhance habitat and produce and distribute habitat enhancement informational material to landowners.

Population Management

Issue Statement

Harvest trends indicate that upland bird populations continue to decline.

Objective 126:

Monitor pheasant population status and trend to be able to detect a 20% change over three years within the pheasant focus area and any other key areas identified for habitat improvement. Document results in the annual Game Status & Trend Report.

Strategies:

- a. Continue to conduct annual pheasant crow count surveys in the pheasant focus area as the primary mechanism to monitor for population trends.
- b. Consider use of methods to monitor pheasant brood size as a measure of the effectiveness of current enhancement strategies and a predictor of fall harvest opportunities.
- c. Evaluate or apply other survey types that may assist in developing a better understanding of population changes and influencing factors.

Recreation Management

Issue Statement

Hunters and district biologists report that upland game bird hunting opportunities in some areas of eastern Washington are limited due to large acreage owned by private landowners who limit access to the public. Private land access has also been identified as an important issue in hunter opinion surveys conducted by WDFW. From 2010 to 2012 Snake River Basin (pheasant focus area) hunter numbers averaged 5,500 per year. Some field reports and Breeding Bird Survey summaries suggest that chukar hunter participation rates may have declined more rapidly than bird populations in some areas leading some to believe that chukar represent an underutilized resource.

Objective 127:

Increase pheasant hunter numbers in the pheasant focus area to 9,000 by 2021.

Strategies:

- a. As funding allows, offer incentives to private landowners to encourage participation in WDFW hunter access programs on sites with quality pheasant habitat.
- b. Continue to improve and expand information available to hunters on where public hunting access is available through the agency website, written materials, and other sources and applications.
- c. Include the use of the reservation program and other measures to provide quality-hunting areas on a portion of the lands enrolled.
- d. Conduct at least one random survey to assess eastern Washington pheasant hunter satisfaction and opinions as was done in 2003 and 2007.

Objective 128:

By 2021, investigate whether chukar population declines or other factors are the primary cause of chukar harvest and chukar hunter participation.

Strategies:

- a. Conduct hunter surveys and other investigations or inventories to determine if declining hunter access or unavailability of information are primary causes of the reduction in chukar hunter numbers.
- b. Based on survey results, implement targeted hunter access outreach to landowners or marketing to hunters to encourage participation.

Issue Statement

Some upland bird hunters are dissatisfied with the current season structure which may not be the most conducive to encourage participation and recruit new hunters.

Objective 129:

Evaluate potential changes to the current season structure that may expand interest and participation in upland bird hunting by 2017. Make recommendations to the Fish and Wildlife Commission if changes are found to be beneficial.

Strategies:

- a. Seek hunter opinions and preferences through surveys and the Upland Game Advisory Committee.
- b. Evaluate earlier or split seasons as options to increase interest and participation.

Issue Statement

Estimated harvest figures indicate that there has been a decline in upland bird harvest for all species over the past 10 years. Harvest estimates are used as an indicator of overall harvest and population status, as well as hunter effort, and are the best long-term data set held by WDFW.

Objective 130:

Estimate and monitor upland game bird harvest through a random survey on a yearly basis and assess other ongoing surveys as indicators of population trends by 2018. Consider changes to harvest monitoring strategies that may improve precision and reduce costs.

Strategies:

- a. Continue to collect harvest information on a yearly basis, such that it is comparable to previous seasons.
- b. Through a process that includes public involvement, assess the potential benefit and costs of implementing a mandatory reporting requirement for all upland bird hunters to improve harvest estimation.
- c. Evaluate Christmas Bird Count, National Breeding Bird Survey, or other citizen based approaches to monitor upland bird population trends.

Issue Statement

Lead is a well-documented environmental toxin and lead shot use has been prohibited for all waterfowl, coot, and snipe hunting in Washington since a nationwide phase-in was implemented in 1986-1991. WDFW has expanded nontoxic shot requirements to pheasant release sites and other specific areas, based on a high potential for ingestion of lead by wildlife.

Objective 131:

As new information and nontoxic alternatives become available, make nontoxic shot use recommendations to the Fish and Wildlife Commission through the season setting processes.

Strategies:

- a. Research, develop, and present recommendations to the Fish and Wildlife Commission regarding bird hunting with nontoxic shot.
- b. Develop and implement a public outreach and communication plan regarding nontoxic shot use regulations.
- c. Consider programs that promote voluntary use of nontoxic shot by hunters in lieu of lead.

Issue Statement

Some upland game birds exist in areas where sharp-tailed grouse and sage grouse can be found. Concerns over misidentification of game birds have been expressed, and it is important that hunters know the differences between upland game birds and non-game upland wildlife.

Objective 132:

Post WDFW managed properties and distribute educational materials to hunters that describe the differences between upland game species and non-hunted upland birds each year.

Strategies:

- a. Improve the quality and availability of information describing the differences between pheasants and sharp-tailed grouse and sage grouse currently included in the annual Migratory Waterfowl and Upland Game Seasons Pamphlet.
- b. Continue to post signs notifying hunters of sage or sharp-tailed grouse being present in areas where upland game bird hunting occurs.

Research

Issue Statement

Implementation of habitat enhancement in the pheasant focus area is designed to improve pheasant numbers, hunter harvest, and hunter participation. Different habitat enhancement techniques can have variable effectiveness on improving pheasant numbers and it is important to understand and utilize the most effective techniques. In addition, past efforts in working with landowners have shown that a variety of programs are necessary to meet individual needs and provide quality-habitat and hunting opportunity.

Objective 133:

Conduct research and include results in annual reports that describe efforts to evaluate habitat enhancement effects on pheasant population levels.

Strategies:

- a. Complete the ongoing investigation designed to determine the best vegetation enhancement approaches to improving brood habitat for pheasants in the pheasant focus area.
- b. Provide annual progress reports in the Game Status and Trend Report.
- c. Update pheasant habitat management publications, USDA techniques publications, and informational brochures based on the results.
- d. Continually assess the need for further investigations or targeted monitoring to assess habitat enhancements or upland bird responses to landscape changes.

Eastern Washington Pheasant Enhancement Program (EWPEP)

Issue Statement

The EWPEP was originally developed “to improve the harvest of pheasants by releasing pen-reared rooster pheasants...and by providing grants for habitat enhancement...” Initially, the majority of funding was allocated to the purchase of birds for release during the hunting seasons but harvest in eastern Washington continued to decline. Based on this observation and a State Auditor’s Office sanctioned performance audit, the program was changed to gradually shift funding from bird purchases to reach a point where the majority of the fund income would be used to enhance habitat which is believed to be a more effective approach.

Objective 134:

Continue to release rooster pheasants in eastern Washington at a level that devotes most of the fund income to habitat enhancements to produce wild pheasants.

Strategies:

- a. Monitor annual program income and expenditures to determine appropriate levels.
- b. Evaluate release program operations, public use of the program, and potential efficiency measures to maximize the value of the release program to hunters.
- c. Focus habitat enhancements in identified key management areas (pheasant focus area).
- d. Provide dedicated pheasant management and habitat improvement staff within the pheasant focus area.

Western Washington Pheasant Program

Issue Statement

In 1997, WDFW closed the Whidbey Island game farm to increase the efficiency of the program. Following that decision, the program went from being 61% self-funded to 78% with the remainder being paid for by general hunting license revenue. In 2009, the program was facing elimination due to impending budget reductions. To avoid the program's elimination, the State Legislature created the Western Washington Pheasant License with a higher cost which was designed to make the program self-supporting. Initially, even though "buyer resistance" resulted in lower hunter numbers, the program income was more in line with expenses. Since that time, due to unanticipated operating cost increases associated primarily with bird feed, the funding balance remains negative with about 70% of operating costs covered by license revenue. It is important that this program become 100% self-funded since it is a recreational program serving a specific group of hunters and it is appropriate to ensure the program does not have a financial impact on general hunting license revenues. One positive sign is that since the new license went into effect hunter numbers have increased but at a slow rate. In response to the shortfalls, the number of birds produced for the program and staffing levels were reduced as cost saving measures. Even with the reduction in birds produced, the program is currently releasing more birds per hunter than before the new license went into effect. Another key issue for the program has been the loss of several popular release sites which have been difficult to replace.

Objective 135:

Monitor license revenue generated and consider efficiencies and other changes necessary to make the program self-supporting.

Strategies:

- a. Evaluate expenditures and look for efficiencies to reduce operating costs at the game farm.
- b. Consider measures to reduce the costs of transporting birds to release sites.
- c. If needed, adjust the number of birds produced to reach expenditure goals.
- d. Conduct or encourage targeted marketing to attract hunters back to the program and recruit new hunters resulting in increased revenue.
- e. Consider changes to the license fees or structure that may recruit hunters or increase net revenue.

Objective 136:

Secure at least four replacement and new release sites by 2021 and attempt to strategically locate them to increase interest and participation in the program.

Strategies:

- a. Secure suitable release sites near Longview, Montesano/Aberdeen, Mount Vernon, and near a population center on the northern Olympic Peninsula.
- b. Support acquisition projects that could provide recreational release site hunting for upland birds.
- c. Enter into release site agreements with other landowners.
- d. Improve the quality of existing release sites to avoid the need for future replacement.

VI. LITERATURE CITED

- Flaherty, D.C. 1979. Phasianus c. and the Farmer. State of Washington Water Research Center Publication. 17 pp.
- Offerdahl, S.D. and A.J. Fivizzani. 1987. The Development of Thermoregulation in Gray Partridge Chicks. In Proceedings of Perdix IV: Gray Partridge Workshop. 155 pp.
- Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2012. Version 02.19.2014 USGS Patuxent Wildlife Research Center, Laurel, MD

SMALL GAME, FURBEARERS, AND UNCLASSIFIED SPECIES

I. CLASSIFICATION

In Washington, there are approximately 31 mid-to-small sized mammals or mammal groups that can be hunted or trapped (Table 1). Of these, 5 species are classified as game species (including 3 cross-classified as furbearers) that can be hunted (RCW 77.12.020; WAC 232-12-007). Eleven of the 31 species or groups are classified as furbearers (indicating that their hide has a commercial value in the fur industry). These 11 species can be trapped but not hunted unless seasons have been established (i.e., 3 species cross-classified as game species). The remaining species or species groups are “unclassified,” and can be trapped or hunted year-around.

Table 1. Mid-to-small sized mammals that can be hunted or trapped in Washington.

Species	Genus species	Classification	Trapped	Hunted
Cottontail rabbits	<i>Sylvilagus spp.</i>	Game animal		X
Snowshoe hare	<i>Lepus americanus</i>	Game animal		X
Bobcat	<i>Lynx rufus</i>	Game animal & furbearer	X	X
Raccoon	<i>Procyon lotor</i>	Game animal & furbearer	X	X
Red fox	<i>Vulpes vulpes</i>	Game animal & furbearer	X	X
American beaver	<i>Castor canadensis</i>	Furbearer	X	
American badger	<i>Taxidea taxus</i>	Furbearer	X	
Ermine	<i>Mustela erminea</i>	Furbearer	X	
Long-tailed weasel	<i>Mustela frenata</i>	Furbearer	X	
Marten	<i>Martes americana</i>	Furbearer	X	
Mink	<i>Mustela vison</i>	Furbearer	X	
Mountain beaver	<i>Aplodontia rufa</i>	Unclassified	X	X
Muskrat	<i>Ondatra zibethicus</i>	Furbearer	X	
River otter	<i>Lutra canadensis</i>	Furbearer	X	
Coyote	<i>Canis latrans</i>	Unclassified	X	X
European rabbit	<i>Oryctolagus spp.</i>	Unclassified	X	X
Gophers ^c	<i>Thomomys spp.</i>	Unclassified	X	X
Gray and fox squirrels ^a	<i>Sciurus spp.</i>	Unclassified	X	X
Ground squirrels ^b	<i>Urocitellus, Otospermophilus Callospermophilus spp.</i>	Unclassified	X	X
Mice	<i>Mus, Onychomys, Reithrodontomys, Peromyscus, Perognathus, Zapus spp.</i>	Unclassified	X	X
Moles	<i>Scapanus spp.</i>	Unclassified	X	X
Nutria	<i>Myocastor coypus</i>	Unclassified	X	X
Virginia opossum	<i>Didelphis virginiana</i>	Unclassified	X	X
Porcupine	<i>Erethizon dorsatum</i>	Unclassified	X	X
Rats	<i>Dipodomys, Neotoma, Rattus spp.</i>	Unclassified	X	X
Shrews	<i>Sorex, Neurotrichus spp.</i>	Unclassified	X	X
Spotted skunk	<i>Spilogale gracilis</i>	Unclassified	X	X
Striped skunk	<i>Mephitis mephitis</i>	Unclassified	X	X
Voles	<i>Clethrionomys, Lemmings, Microtus, Phenacomys spp.</i>	Unclassified	X	X

Table 1. Mid-to-small sized mammals that can be hunted or trapped in Washington. (Continued)

Yellow-bellied marmot	<i>Marmota flaviventris</i>	Unclassified	X	X
^a Except western gray squirrels (<i>S. griseus</i>) are protected and cannot be hunted or trapped. ^b Except golden-mantled ground squirrels (<i>S. saturatus</i> and <i>S. lateralis</i>) and Washington ground squirrels (<i>S. washingtoni</i>) are protected and cannot be hunted or trapped. ^c Except mazama pocket gophers (<i>T. mazama</i>) are protected and cannot be hunted or trapped.				

II. POPULATION STATUS AND TREND

The abundance of individual small game animals, furbearers, and unclassified wildlife is largely unknown. However, because these animals typically have high population growth rates and often experience compensatory mortality, the risk of over-exploitation is low. Biological data on individual species populations are limited and concern with regard to harvest effects on some populations exists. With changes that occurred to Washington’s trapping regulations in 2000 that made harvest of some furbearers impractical or difficult, harvest numbers which were the primary indicator of population trends became less useful.

While statewide population of the animals listed in Table 1 are not believed to be at risk, declines or extirpations may have occurred in some geographic areas. Examples include marten in the Coast Range and Olympics and river otter in parts of eastern Washington. Further monitoring or data collection may be needed to better assess the status of some species.

III. RECREATIONAL OPPORTUNITY

A combination of hunting and trapping seasons are provided for small game and furbearing animals, respectively. Hunting seasons for small game animals typically extend from September to early spring of the following year. In 2012, approximately 7,070 snowshoe hares and cottontail rabbits were harvested by hunters. Hunter harvest of bobcat has not been estimated recently. However, bobcat was added to the statewide small game survey in 2013 and a reorganization of the CITES tagging program should provide better insight to bobcat harvest by hunters.

The trapping season for furbearers occurs during the winter months. There are currently about 400 fur trappers licensed in the state each year. In 2009, the total harvest of furbearers totaled 3,180 with beaver comprising most of the harvest. These figures represent a substantial decrease from the 1999 level of 12,116 animals taken when body gripping traps were still in general use. More recent harvest figures have not been fully summarized although staff has been working to correct this issue.

Unclassified wildlife can be hunted or trapped year-around (with appropriate license), and no bag limits are set. Harvest pressure is low for the majority of these animals, as there is little to no documented harvest for 12 of the 16 species or groups. Those that are harvested or trapped are often associated with human-wildlife conflict and lethal take is a mitigating tool for property damage or nuisance activities. Coyotes may be the most hunted unclassified species and much of this harvest is with the intention of harvesting fur. Coyotes were also added to the small game survey in 2013 in an effort to obtain a better idea of harvest levels.

IV. DATA COLLECTION

There are no formal population surveys for small game mammals, furbearers, or unclassified wildlife. Trends in total harvest and catch-per-unit-effort, which are collected annually using a hunter questionnaire or mandatory “Trapper’s Report of Catch” form are used as a general indicator of population status and trend for some species. Factors such as fur prices and changes in allowed trapping methods, such as occurred in 2000, should be considered when comparing harvest from different years.

A system is under development to collect data related to wildlife conflict with humans. Once in place, this information will be useful in expanding knowledge of some species of furbearer and unclassified species abundance and range. Over time, it may also be used to help assess trends in wildlife populations and identify species distributions at the local scale.

V. ALL GAME, FURBEARERS, AND UNCLASSIFIED WILDLIFE MANAGEMENT GOALS

1. Preserve, protect, perpetuate, and manage species and their habitats to ensure healthy, productive populations.
2. Manage wildlife species for a variety of recreational, educational and aesthetic purposes including hunting, trapping, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography.
3. Manage statewide populations for a sustained yield.

VI. ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

Population Management

Issue Statement

There is little documentation on the current distribution and relative densities of individual small game and furbearer species in Washington. In some instances, more detailed information is needed to assess population status on a local or regional basis.

Objective 137:

Revise the distribution maps for select small game and furbearer species by 2017.

Strategies:

- a. Revise the distribution maps from harvest and trapping data, citizen observations, and regional biologist interpretations.
- b. Verify distribution as necessary from survey and ground truthing activities.
- c. Evaluate the relative abundance and distribution of River Otter in eastern Washington to evaluate whether current harvest closures and limits are still necessary.
- d. Consider restrictions on harvest in areas where declines in a species have been documented.
- e. If harvest or other information indicates a substantial decline in furbearing species, initiate or propose studies to determine causes of decline.

Issue Statement

In 2011, the State Legislature created a program that directs WDFW to permit the relocation of beaver to areas in eastern Washington with the goal of deriving ecosystem benefits such as water storage, suspended sediment reduction, and improved fish habitat. The Department may condition or decline to permit releases in areas where there may be threats to property, habitat conditions are not suitable, or other issues may exist. Once reduced to very low population levels, beaver have reestablished across much of their former range where suitable habitat is present. Habitat changes in some areas may be limiting the reestablishment of beaver populations. Proponents of beaver relocation have suggested that beaver trapping for fur harvest could compromise their goals but this has not been verified.

Objective 138:

Current criteria for evaluating beaver release locations are mostly subjective. The documentation of beaver presence/absence prior to release and post release monitoring varies widely among projects. Develop stronger science based criteria for assessment of release sites and begin utilizing citizen observations of beaver activity to assess where projects are appropriate by 2016.

Strategies:

- a. Review pertinent literature and develop enhanced guidelines relating to habitat for release evaluation.
- b. Encourage monitoring of released animals and their effect on ecosystems.
- c. Include beaver in a program-wide citizen wildlife reporting system.
- d. Monitor beaver harvest at a more local scale where beaver introductions are occurring.
- e. Provide information to trappers about reestablishment efforts and areas.
- f. Encourage habitat enhancement as a primary mechanism to attract beaver back into historically occupied habitat.

Recreation Management

Issue Statement

Currently, there is no harvest reporting mechanism for unclassified wildlife, except those that are reported as non-target or nuisance captures on trapper's report of catch forms. An online system for reporting trapping harvest was developed but due to programming issues no longer functions. Moreover, the trapper report of catch forms have been problematic in terms of ease of reporting and data entry. Information for persons interested in trapping in Washington is currently difficult to obtain. Concerns have arisen that misidentification by hunters could result in harvest of protected species, particularly wolves being mistaken for coyotes.

Objective 139:

Develop an improved web based reporting system for harvest of furbearers and unclassified wildlife and improve the availability and applicability of information available to trappers and persons interested in becoming trappers by 2016. Improve and provide identification information to avoid accidental harvest of protected species.

Strategies:

- a. Develop a new interim solution, but pursue a long-term option of including trapper reporting in the WDFW license system by 2018.

- b. Attempt to spatially enable the reporting system to expand the ability to evaluate species range and presence at a local scale.
- c. Provide a mechanism for reporting capture of non-target species.
- d. Evaluate mechanisms to document and monitor harvest of bobcat, coyote, and several other unclassified species by hunters and depredation control activities.
- e. Develop new webpages related to trapping laws, methods, and techniques by 2016.
- f. By 2016, improve materials to aid and educate hunters on how to distinguish coyotes from wolves and provide on the agency website, in hunting pamphlets, and in written materials distributed to hunters.

Conflict Management

Issue Statement

A 2014 survey found that more than a quarter of Washingtonians (29%) had experienced problems with wild animals or birds during the previous 2-year period. Raccoons were among the top two species cited as causing problems (deer was the top species cited). A small but substantial percentage of residents (10%) also indicated that coyotes cause problems (Responsive Management 2014). This means that an estimated 1.5 million Washington residents experience negative interactions with wildlife every two years (Responsive Management 2014; U.S. Census Bureau 2014).

Objective 140:

Improve information and strategies to reduce wildlife conflict related to small game, furbearers, and unclassified wildlife by 2017, and reduce the need for lethal removal of native species and leave animals in place when possible.

Strategies:

- a. Increase legal harvest (trapping and hunting) in areas prone to furbearer and unclassified wildlife complaints by providing complaint information to hunters and trappers, and work with landowners to allow hunting or trapping. Use harvest during the trapping season as the preferred method of removing animals where conflicts exist.
- b. Develop training materials describing long-term avoidance measures dealing with issues related to beaver dams and foraging activity for distribution to road management agencies, forest owners and other landowners. Train WDFW staff who work with landowners in these situations on the application of these measures to facilitate appropriate recommendations to landowners.
- c. Work with other WDFW programs and other agencies to facilitate timely or streamlined processes to permit installation of in-water devices, where they are not likely to compromise other species needs such as fish passage to avoid the need to remove beaver to mitigate conflict situations.

VII. LITERATURE CITED

Duda, M. D., P. E. De Michele, M. Jones, W. Testerman, C. Zurawski, J. Dehoff, A. Lanier, S. J. Bissell, P. Wang, and J. B. Herrick. 2002. Washington residents' opinions on and attitudes toward hunting and game species management. Harrisonburg, Virginia, USA.

_____. 2008. Hunters' opinions on wildlife management and other hunting issues in Washington. Responsive Management, Harrisonburg, Virginia, USA.

Duda, M. D., M. Jones, T. Beppler, S. Butzen, S. J. Bissell, Ph.D., A. Criscione, P. Doherty, G. L. Hughes, P.E., E. Meadows, A. Lanier. 2014. Washington Residents' Opinions on Bear and Wolf Management and Their Experiences With Wildlife That Cause Problems, conducted for the Washington Department of Fish and Wildlife by Responsive Management.

DISTRIBUTION LIST

This document was sent to all counties, tribes, and other interested parties in Washington State.

Appendix A - POLICY-5302 Feeding Wildlife During Winter

Department of Fish and Wildlife

Effective Date: 7/11/08

Page: 1 of 3

POLICY - 5302

Cancels: WDFW M6002

See Also: PRO 5302

Approval By: /s/ Joe Stohr

POL - 5302 FEEDING WILDLIFE DURING THE WINTER

This policy applies to all WDFW employees except if policies and procedures are in conflict with or are modified by a bargaining unit agreement, the agreement language shall prevail.

Definitions:

Artificial feeding: The distribution of harvested feed for wildlife through either supplemental feeding or emergency feeding.

Emergency feeding: The occasional feeding of wildlife, which the Department implements due to extreme winter conditions or a disaster such as fire or drought.

Supplemental feeding: The Department's regular winter-feeding operations to provide feed to wildlife where adequate winter habitat is not available and feeding is necessary to support the population level as identified in a management plan, or for specific control of deer or elk damage.

1. WDFW May Provide Supplemental or Emergency Feeding for Wildlife Under the Following Conditions

- A. To prevent and/or reduce deer or elk damage to private property (agricultural or horticultural crops).
- B. To support a Department management plan.
- C. To respond to an emergency as determined by the Director or the Director's designee.
- D. To allow for the regeneration of winter habitat that has been severely damaged or destroyed by disaster, such as fire or drought.
- E. For Department approved wildlife research or wildlife capture.
- F. In areas or times where hunting seasons have closed.

2. **The Director or Director’s Designee Declares an Emergency**

Implementation of emergency feeding operations will begin after an emergency has been declared in a specific location of the state. The Director's Emergency Feeding Advisory Team will include the Assistant Directors of the Enforcement Program, Wildlife Program, and affected Regional Director(s).

3. **WDFW Will Use the Following Factors to Determine Whether an Emergency Exists in a Specific Location of the State**

- A. Weather conditions and forecast:
Includes conditions such as abnormally cold temperatures, extreme wind chill, snow depth, icing, or crusting over a prolonged period of time. Evaluation may also include the forecasted weather to reflect early arrival and projected duration of severe winter weather.
- B. Concentration and distribution of wildlife:
Includes assessment of wildlife patterns such as animals concentrated in unusually high numbers in a specific area or located in areas where they are generally not found.
- C. Access to natural forage:
Assessment of availability of natural forage, including factors that may limit access (such as snow depth, icing, or crusting)
- D. Disaster:
Includes description of disaster (such as fire or drought) and its impact on wildlife, such as winter range that has been severely damaged or destroyed. Feeding may be an option to provide adequate time for recovery of wildlife habitat and subsequently reduce wildlife mortality.
- E. Physical condition of wildlife:
Evaluation to determine the physiological condition of animals, including experienced judgment by Department personnel based on knowledge of local wildlife. Evaluation may include bone marrow and kidney fat analysis to evaluate body fat reserves necessary for winter survival.

4. **WDFW May Discourage Private Feeding of Wildlife**

The Department discourages private feeding of wildlife where animals may become a problem or a nuisance, cause damage to property, or

present a health risk.

WDFW will provide the public with information on the appropriate way for winter-feeding of wildlife (i.e., deer, elk, upland birds, songbirds).

WDFW may provide feed in those situations where private actions will complement agency staff supplemental or emergency feeding.

5. **WDFW Will Accept Donations to Help Pay for Emergency Winter Feeding**