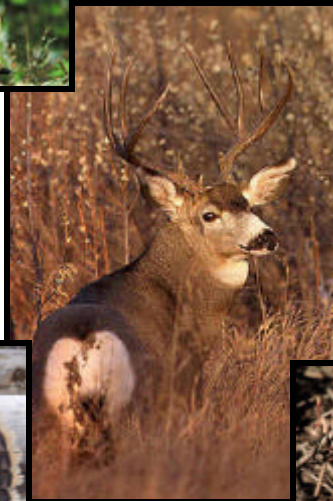


# Game Management Plan

July 2003 - June 2009



Wildlife Program  
600 Capitol Way North  
Olympia, Washington 98501-1091

Phone: (360) 902-2515  
Email: [wildthing@dfw.wa.gov](mailto:wildthing@dfw.wa.gov)

# **Game Management Plan**

**2003-2009**

**January 1, 2003**

**Washington Department of Fish and Wildlife  
600 Capitol Way North  
Olympia, Washington 98501-1091**

# An Official Publication of the State of Washington

State of Washington  
Gary Locke, Governor

Washington Department of Fish and Wildlife  
Jeff P. Koenings, Ph.D., Director

Wildlife Program  
Dave Brittell, Assistant Director

Game Division  
Dave Ware, Game Division Manager

This Program Receives Federal Aid in Wildlife Restoration, Project W-96-R, Game Surveys.

This report should be cited as:

Washington Department of Fish and Wildlife. 2003. Game Management Plan. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

---

# TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS</b>	<b>i</b>
<b>EXECUTIVE SUMMARY</b>	<b>ii</b>
<b>CHAPTER 1</b>	<b>1</b>
Introduction	1
Background And Setting	4
Washington Hunters	9
<b>CHAPTER 2</b>	<b>15</b>
Scientific/Professional Management of Hunted Wildlife	15
Public Support for Hunting as a Management Tool	16
Hunter Ethics And Fair Chase	17
Hunter Behavior/Ethics	18
Private Land Programs and Hunter Access	19
Road Management	20
Tribal Hunting	21
Predator Management	22
Hunting Season Regulations	23
Game Species Damage and Nuisance	25
<b>CHAPTER 3</b>	<b>29</b>
Elk	29
Deer	47
Bighorn Sheep	59
Mountain Goat	66
Moose	71
Black Bear	75
Cougar	83
Waterfowl	93
Mourning Dove, Band-Tailed Pigeon, Coot, And Snipe	101
Wild Turkey	105
Mountain Quail	111
Forest Grouse	114
Upland Game Birds	118
Small Game, Furbearers, And Unclassified Species	127
<b>APPENDIX A</b>	<b>134</b>
<b>APPENDIX B</b>	<b>135</b>
<b>APPENDIX C</b>	<b>136</b>

---

# **ACKNOWLEDGEMENTS**

The primary authors of this 2003-09 Game Management Plan are: Dave Ware, Jerry Nelson, Donny Martorello, Don Kraege, Mick Cope, Dick Stone, and George Tsukamoto. However, a great number of individuals helped with reviewing, editing, and collecting public comment for this plan. Rena Henson completed the final production.

Peggy Crain, Rena Henson, and Dick Stone assisted with the public meetings and edited the plan, Craig Bartlett provided extensive edits and enhanced the readability of the plan, and Cynthia Pratt skillfully guided the plan through the Environmental Impact Statement process.

Special thanks are extended to Peggy Crain and Rena Henson for coordinating public comment, for keeping the entire plan development process organized, for their patience with a changing process, and for their tireless efforts including multiple late nights and weekends to meet demanding deadlines.

WDFW also sincerely appreciates the extensive review and comment provided by the public during preparation of the drafts and completion of the final plan.

# 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.

Washington's citizens played a strong role in developing this plan. A variety of public involvement opportunities were used to solicit ideas. In all, several thousand citizens provided comments, edits, and priority issues. The Game Management Advisory Council, a group of citizens representing conservation and hunting organizations, landowners, and biologists, was continually involved in identifying and refining issues. The Wildlife Diversity Advisory Council, representing environmental organizations and mostly non-consumptive viewpoints, also provided important counsel on key predator management issues. In addition, an extensive public opinion survey was

conducted for the Department by the private consulting firm, Responsive Management.

A panel of scientists, from several universities and specialists from across the west reviewed key issues associated with Washington's elk management and made recommendations to WDFW for management direction and strategies to incorporate into the plan. Consultations with cougar scientists were also conducted as peer review of the cougar management section.

The priority issues identified by the public include:

1. Scientific/professional management of hunted species
2. Public support for hunting as a management tool
3. Hunter ethics and fair chase
4. Private lands programs and hunter access
5. Tribal hunting
6. Predator management
7. Hunting season regulations
8. Game damage and nuisance
9. Species-specific management issues

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. Success and accountability will

be measured through the reporting of accomplishments in the annual Game Status and Trend Report.

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.

### **General Management Issues**

With science and the goal of sustaining game populations as the foundation, many of the preferred strategies in chapter two emphasize education, public involvement in decisions and participation in data collection, and subsequent monitoring of public satisfaction. Hunter ethics/fair chase issues such as the development of equipment restrictions are largely based on public opinion because any biological or environmental impacts from equipment technology can be mitigated in other ways. Techniques for mitigating equipment impacts on hunted species include adjustment of season length and timing, bag limits, and other harvest adjustments.

Tribal hunting strategies hinge on the development of cooperative harvest management plans and increased coordination in the management of our respective hunters. Strategies to review and improve private land programs and address game damage rely on working groups of stakeholders to develop recommendations for future actions.

Attention is given to those values identified in recent public opinion surveys for predator management and hunting season preferences. The intent is to provide intensive public education on key issues that maintain public support for hunting; address human/wildlife conflicts with focused hunting strategies; and provide a variety of hunting opportunities that satisfy different preferences while meeting game population objectives.

Road management issues are complicated with a precarious balance between protection of wildlife and hunter access. The development of road management plans is the key strategy to develop and maintain an appropriate balance.

As mentioned previously, the foundation for all objectives and strategies identified in this plan is science and the professional judgment of biologists. 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 three 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.

### **Elk Management**

The principal strategies are designed to maintain or increase the number of mature (five year old/six points or greater) bulls that survive after hunting seasons; to determine habitat limitations and estimate carrying capacity for several herds, and where populations are meeting or exceeding goals, to increase harvest of antlerless animals. These measures will be phased in and monitored over six years with expected improvements to recruitment and herd dynamics. Improvements are planned to better monitor population status and

determine herd composition. Distinct population management units will be reviewed and updated to form the geographic boundaries for achieving herd objectives.

From the recreational standpoint, current general season strategies will be maintained to the extent possible with a variety of hunting opportunities available and balanced for archers, muzzleloaders, and modern firearm hunters within each of WDFW's seventeen districts. Spike only management will continue to be emphasized in most of eastern Washington, using branch bull permit levels to achieve sex ratio objectives and three point or better regulations will be retained in western Washington, mainly relying on road management to achieve sex ratio objectives.

### **Deer Management**

Recommended changes to deer management are subtle, since many factors that determine population levels are beyond the control of state wildlife managers-such as weather, wild fires, disease, and timber harvest. Preferred strategies will emphasize improvements in population monitoring, mule deer research, and refinement of population model inputs such as mortality and recruitment rates. Actions will be increased for surveillance of chronic wasting disease and determination of population impacts from hair slip syndrome.

Hunting season changes will be similar to elk regarding maintenance of current general season strategies while ensuring that a variety of hunting opportunities are available and balanced within each of WDFW's seventeen districts. These guidelines will allow continued debate regarding hunter preferences for season regulations while maintaining the minimum population objective of 15 bucks per 100 does after the hunting season.

### **Special Species Management**

Management strategies for bighorn sheep, mountain goats, and moose will largely continue along current paths. The greatest issue for bighorns continues to be a slow recovery of Rocky Mountain bighorns along the Snake and Grande Ronde rivers. The main strategy for California bighorns is to continue reintroductions in suitable portions of their historic range. With populations of mountain goats in apparent decline and subsequent reductions in hunting opportunity, a new mountain goat research project is being initiated with federal funding. Moose populations continue to expand and management will focus on better documentation of suitable range and development of appropriate levels of harvest. Carefully regulated hunting will continue for all three species by issuing limited numbers of permits and managing for high success rates in these once-in-a-lifetime opportunities.

### **Black Bear Management**

Preferred strategies for black bear management will emphasize resolution of public concerns for public safety, pet and livestock depredation, and property damage. Hunting opportunities will focus on these concerns as well as providing recreational harvest. The potential development of a spring hunting season to help address timber and property damage will be considered through strategies identified in the plan.

### **Cougar Management**

Population objectives and female harvest guidelines for each cougar management unit (CMU) have been identified in the plan. Monitoring strategies will be increased in units designated for cougar population reductions to provide greater assurances that hunting will not have a significant negative impact on the perpetuation of cougar populations. The strategies identify



ways to improve monitoring protocols and data collection. WDFW will also identify areas where cougar survival is high and acting as a source for areas where survival is lower.

Similar to black bear management strategies, harvest will be focused in those areas with concerns for public safety and pet and livestock depredation. A recently initiated cougar research project will be continued to determine behavior and habitat use of cougars with an emphasis on the urban-wild lands interface.

### **Management of Migratory Birds**

The U.S. Fish and Wildlife Service and the Pacific Flyway states, including Washington, cooperatively manage migratory birds. Management efforts will continue to emphasize protection and enhancement of declining wetland habitats and to closely monitor harvest management. Refinement of harvest strategies will further emphasize regional differences and address crop damage concerns, while protecting populations of migratory birds of management concern. Studies will be developed to determine the impact, of snipe hunting on other wildlife (especially shorebirds) and investigate hunting impacts on mourning doves.

### **Management of Upland Game Birds**

Strategies for upland game birds (pheasant, quail, and partridge) and wild turkeys will continue to focus on enhancing populations in suitable habitats and providing appropriate harvest opportunities for these largely non-native species. Wild turkey

populations have expanded dramatically due to enhancement activities over the past twenty years. Several strategies were developed to re-evaluate current management direction, gauge the success of introductions, consider impacts to native wildlife, and determine future direction. Mountain quail are considered native to parts of south central and southeast Washington. Strategies are identified to re-establish mountain quail in their native range in eastern Washington and to better monitor harvest in western Washington.

Pheasants continue to be the focus of upland bird management efforts. Other upland bird populations such as California quail are either considered healthier or receive less attention from hunters. Dedicated and targeted funding for pheasant management is discussed with identified strategies for changes in funding emphasis. Access to private lands continues to be emphasized with strategies to focus on expanding opportunities in higher quality pheasant habitat and hunting areas. Forest grouse management strategies suggest emphasis on improving harvest management and population monitoring.

### **Management of Small Game Animals, Furbearers, and Unclassified Wildlife**

Small game animal management strategies are largely focused on refining distribution information and addressing nuisance problems. Harvest and education strategies will attempt to minimize negative human-wildlife interactions and potential accidental harvest of protected wildlife.

# 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 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 2003-05 and 2006-08. In addition, the plan will direct the development of WDFW Game Division work plans and budget proposals. Implementation will begin July 2003 and continue through June 2009.

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 next five to ten years. This was done using a series of questionnaires and by providing a place on the agency web site. 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 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 process (EIS) 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, 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. Over 60 groups and individuals provided comments during this review period.

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 take 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.

## **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 regulations under their authority through the adoption of Washington Administrative Code. In addition, various Commission and Department policies and procedures 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 for wildlife:

- 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 the plan. In particular the Washington Department of Fish and Wildlife Hunting Season Guideline (August 1999) provided further guidance for this plan:

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

1. *In general, hunting seasons and 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 based on resource or management need.*
3. *Hunting season establishment shall be consistent with the Hunting Co-Management Guidelines between WDFW and Tribes.*
4. *Hunting seasons should be consistent with species planning objectives and provide maximum recreation days while achieving population goals.*
5. *A three year season setting process should be maintained which will provide consistent general seasons from year to year with annual changes in permit levels to address emergent resource concerns; natural disasters;*

*and to meet requirements of federal guideline changes; etc.*

6. *Substantial public involvement and timely opportunity to comment must be provided for 3-year season recommendations and must be in compliance 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. *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 be easy to understand and enforce, maintain public safety, protect the resource, and allow wide latitude for individuals to make equipment choices.*
11. *Enhanced general season considerations, special access opportunities, and other special incentives should be developed for disabled, Advanced Hunter Education (AHE) graduates, youth, and hunters 65 and older rather than special permit hunts. AHE incentives should return to the program's original intent, which was to address private lands, and associated hunter ethics issues. Disabled hunter opportunities should emphasize equal access consistent with the Americans With Disabilities Act.*
12. *Private landowner hunting issues such as season length, damage control,*

- and trespass should be given consideration when developing hunting season recommendations.*
13. *Standardize furbearer regulations that provide trapping opportunity and address damage control.*
  14. *Establish migratory bird and small game regulations to provide maximum hunting opportunity considering federal guidelines, flyway management plan elements, and Department management objectives.*
  15. *Hunting season closures and firearm restrictions should be based on resource conservation and public safety.*
  16. *Maintain a high quality goat, sheep, and moose permit hunting opportunity consistent with resource availability."*

Implementing the Legislative mandate and 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 (maximizing) public hunting 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:

1. Determine the status of game populations and impacts of previous harvest strategies;
2. Preliminary discussion of ideas with the tribes, the public, state and federal agencies, and WDFW staff;

3. Development of season and regulation alternatives;
4. A formal drafting of regulations and establishment of a public comment period in compliance with the Administrative Procedures Act;
5. Development of final recommendations by WDFW staff;
6. Adoption of regulations by the Fish and Wildlife Commission.

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 coastal 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 new 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.

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: Provided, however, that they shall not take shellfish from any beds staked or cultivated by citizens, and that they shall alter all stallions not intended for breeding-horses, and shall keep up and confine the latter.

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 of traditional use, on open and unclaimed lands that have not been put to a use that is inconsistent with hunting. As part of this ability, tribes are responsible for the management of their own hunters and hunting activities, on and off-reservation.

Not all of the tribes signed treaties with the government. Several of these tribes have reservations designated by presidential proclamation. These include the tribes of the Colville, Spokane, and Kalispel reservations in eastern Washington, and the

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

<b>Treaty</b>	<b>Indian Tribes</b>	<b>Location and Date</b>
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 Ratified March 8, 1859 Proclaimed April 11, 1859
Treaty of Point No Point	Jamestown S’Klallam, Port Gamble S’Klallam, Lower Elwha S’Klallam, Skokomish	Point No Point, Suquamish Head Jan. 26, 1855 Ratified March 8, 1859 Proclaimed April 29, 1859
Treaty of Point Elliot	Lummi, Nooksack, Stillaguamish, Swinomish, Upper Skagit, Suquamish, Sauk Suiattle, Tulalip, and Muckleshoot	Point Elliott January 22, 1855 Ratified March 8, 1859 Proclaimed April 11, 1859
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 Ratified March 8, 1859 Proclaimed April 18, 1859
Treaty of Medicine Creek	Nisqually, Puyallup, Squaxin Island, Muckleshoot	Medicine Creek December 26, 1854 Ratified March 3, 1855 Proclaimed April 10, 1855

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 19<sup>th</sup> 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 issue 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.

Appendix 2 shows the cost of hunting licenses and deer and elk tag fee changes since 1901.

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. On the Olympic Peninsula there is 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 the Blue Mountains of southeastern Washington ponderosa pine, Douglas fir, Grand fir, Western hemlock, and sub alpine fir are the major 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 primarily made up of 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. At the end of 2001 the population was estimated at 5,974,900 making it the 15<sup>th</sup> most populous state in the union. The long-term outlook in human population for the state of Washington is continued growth, 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 Interstate Highway 5 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 and Bellevue are all over 100,000 in population.

### **Industry**

Prior to 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; 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 2000 Census of Agriculture showed that Washington farmland acreage totaled 15.7 million or about 35.6% 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, and waterfowl are attracted to private lands for their abundance of food and water.

Recent changes in natural resource policies and implementation of new ecosystem management strategies have affected the timber industry, the people of Washington, and the Northwest. The timber harvest changes in Washington between 1989 and 1994 have been substantial (Table 2), (Dodge 2001). The changes in forestry practices are necessary for the survival of many species that require older, larger trees. However there may be serious impacts to the future amount and quality of deer and elk forage and population numbers over the long term.

**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 Appendix C, (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.

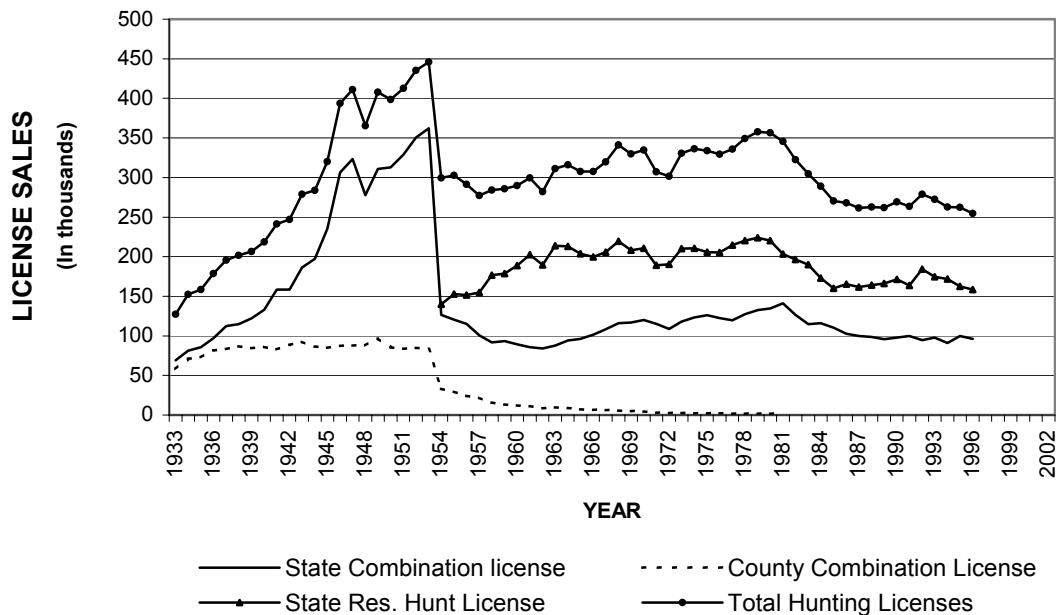
**Washington Hunters**

The number of licensed hunters in the state of Washington grew rapidly 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 show a significant increasing trend, peaking in 1953 at approximately 445,000 state and county hunting and fishing combination licenses sold (Figure 1). The incline in hunting license sales was particularly steep following World War II.

**Table 2. Timber harvest changes in Washington between 1989 and 1994**

<b>Ownership</b>	<b>1989 harvest <sup>a</sup></b>	<b>1994 harvest <sup>a</sup></b>	<b>Percent Decrease</b>
Private	4,027,278	2,965,848	-26.4
Public	1,929,039	592,045	-69.3
Total	5,956,317	3,557,893	-40.3

<sup>a</sup> in thousand board feet



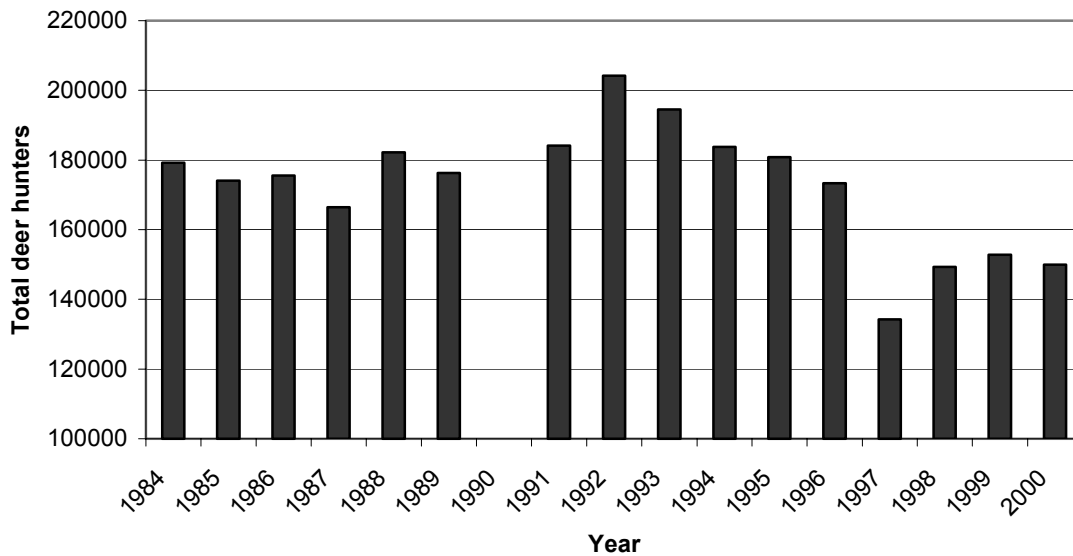
**Figure 1. Washington hunting license sales and numbers, 1933-1997.**

In 1954 a separate resident hunting license was introduced resulting in a significant drop in total licenses sold. This drop most likely reflects 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 showed a declining trend through 1989, when 269,000 licenses were sold. Since 1989 there has been no clear trend in hunter numbers, however the state's human population has increased significantly.

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 does not support the predicted decline. Since 1984, deer hunting participation rates are highly variable from one year to the next and no clear trends are evident (Figure 2).

Washington hunter characteristics in 2002 are very different from a century ago. They are mostly well educated, having graduated from high school or equivalent (37%), some having additional college or trade school training (18%), college graduates (16%), and some with post-graduate or professional degrees (12%), (Duda 2002b). Washington hunters are mostly older than 45 and male dominated (93%). Waterfowl and furbearer hunter groups were almost exclusively males (Duda 2002b). In comparing a demographic study of Washington hunters (Johnson 1973) to the recent survey, there has not been any change in male dominance (94% males and 6% females) in the intervening 31 years. Age distribution of hunters in 1972 and 2002 are not directly comparable between



**Figure 2. Washington deer hunting participation, 1984-2001.**

the two studies, however, it is apparent the majority of hunters in 1972 were less than 29 years of age compared to 2002 data where age of respondents were predominantly over 35 years of age.

### 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 develop 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 black powder 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 of active hunters. Archery deer hunter numbers increased for the first 5 years and then stabilized. The number of muzzleloader deer hunters has shown a more protracted incline but appear to have stabilized, representing about 5% of the deer hunters (Johnson 1999).

Elk hunter numbers, on the other hand, 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 1998 the modern firearm hunter represented just 68% of the total, archery hunter numbers doubled in percentage and muzzleloader hunters increased six-fold. 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 (Johnson 1999).

Separating hunters by hunting method has successfully distributed hunting pressure, relieved congestion and increased primitive weapon opportunity. 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:

1. Which group gets to hunt first?
2. How should timing of various hunting seasons between user groups be fairly established?
3. Should fairness be related to equal opportunity (days) or equal success?
4. How primitive should "primitive weapon" hunting seasons remain?

### **Hunter Education/Safety Training**

Hunter education programs are in place in all 50 states, reaching about 650,000 hunters annually (Duda et al. 1998). In Washington all individuals born after January 1, 1972, must show proof that they have completed a hunter education course prior to 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. In 1992 an Advanced Hunter Education Program was introduced as a

voluntary program. For the last five years (1997-2001) enrollment in hunter education classes has been increasing, with approximately 11,500 students taught by a shrinking corps of volunteer hunter education instructors. Currently, the demand for hunter education classes exceeds the schedule of classes offered each year (Mikitik personal communications 2002).

### **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 lingering 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. The WDFW Upland Wildlife Restoration Project provides 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. The Department provides free signs and assists the landowner in posting their lands as "feel free to hunt" or "hunt by written permission." There are over 4 million acres and over 1,300 landowners in Washington under cooperative agreement through 2001, (Johnson personal communications 2001).

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 PLWMA's were authorized in 1993, 201-Wilson Creek and 401-Champion's Kapowsin Tree Farm. A third PLWMA 600-Pysht was added in 1997.

Many changes have been made to improve the program for the private landowner, as well as the public. A common criticism of this program from hunters is that public access is not adequately addressed and wildlife habitat enhancements may be driven by incentives, rationale, or regulations outside of the PLWMA program.

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, 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-exploitation of the wildlife resource, and a potential for forced decline in hunter participation rates because of escalating costs (Duda et al. 1998).

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.

Hunters are feeling the "crunch" in available hunting areas. Private lands are recognized as important to the future of hunting, especially upland game bird and waterfowl hunting. Maintaining hunting opportunities on these lands is becoming increasingly difficult and competitive. The hunter's willingness to pay landowners for hunting opportunity is a significant change from attitudes of the past.

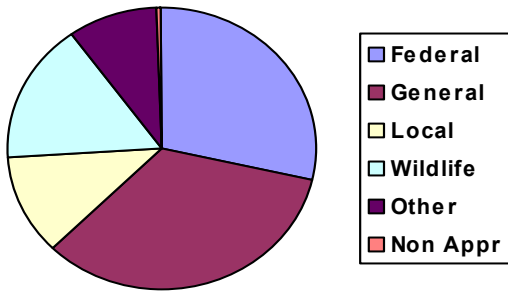
### **Economics**

Washington hunters spent \$327 million in 1996 for trip related expenses, equipment, and other expenditures primarily for hunting (U.S. Dept. of Interior et al. 1998). About 28% of their expenditures were for food, lodging, transportation; 66% for hunting equipment (guns, ammunition, camping); and 6% for purchase of magazines, membership dues, land leasing, and licenses and permits.

The national survey reported there were 271,000 resident and nonresident hunters 16 years of age or older who hunted in Washington. These hunters spent 4.7 million days hunting in the state. Expenditures per hunter per day were \$67.73 for all hunters.

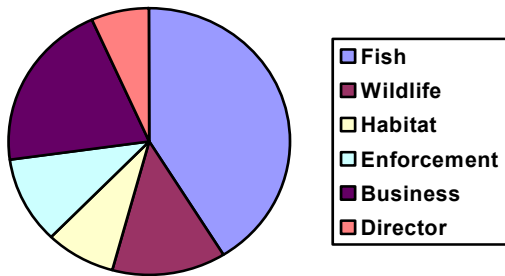
WDFW's 1999-2001 Biennial Report shows an average annual increase in hunting license revenue of \$1.9 million over the previous ten year average. Hunting license revenue was \$12.3 million in fiscal year 2000 and \$14.3 million in fiscal year 2001. This increase coincides with a restructuring of licenses in 1999 and with improving deer populations after a hard winter in 1996-97.

The budget for WDFW in the 1999-2001 biennium was made up from several sources of funds. The following chart shows the relative proportions of those funds:



Federal Funds	\$78,333,088
General Funds	\$92,695,990
Local Funds	\$32,284,266
Wildlife Funds	\$44,412,606
Other State Funds	\$25,726,584
Non Appropriated	\$1,394,473

There are six programs within WDFW and their proportion of the operating budget is shown in the following chart:



Fish	\$113,060,819
Wildlife	\$35,631,483
Habitat	\$22,606,582
Enforcement	\$28,806,191
Business Services	\$56,322,832
Director's Office	\$18,419,100

The Game Division is one of five divisions in the Wildlife Program. The biennial budget for the Game Division is about \$6 million. Of that total, \$1.3 million is dedicated to specific activities such as the migratory bird permit (\$386,000), auction and raffle funds (\$250,000), and the eastern Washington pheasant enhancement program (\$670,000). Another \$427,000 is from the general fund, dedicated for monitoring sea ducks as part of the Puget Sound Ambient Monitoring Program. The remaining funds come from the general fund (\$232,000), revenue from license sales or the wildlife fund (\$2.1 million), and federal funds (\$2 million), which is mostly from the Pittman-Robertson Act (excise tax on sporting equipment and ammunition).

This \$6.25 million is the base funding for most of the activities identified in this plan except for research, private lands access, hunter education, game damage, and law enforcement. These activities are funded from other divisions or programs within WDFW. Implementation of new activities in this plan will be dependant on additional funding, grants, and partnerships.

# CHAPTER 2

## **General Game Management Issues**

As stated in chapter one, 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 take comments and add, modify, or delete strategies. Essentially the number of alternative strategies was not limited and the following strategies were developed in concert with the public through a long scoping and development process and multiple comment periods.

During the extensive public involvement process, issues were identified in nine categories for WDFW to address in this plan. Eight of those categories will be addressed in this chapter. These include 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, species-specific management issues, is addressed in Chapter Three of this document. The issues, objectives, and strategies remaining in 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 or 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:

Develop agency hunting season recommendations and management actions that ensure long-term sustainability of endemic hunted and non-hunted wildlife.

#### Strategies:

- a. Agency staff will maintain regular contact with peer scientists and wildlife managers and consider the best available scientific information when developing strategies and recommendations for hunting seasons and management actions.
- b. Prior to implementation, WDFW will provide adequate opportunity for public review of recommendations for regulations and activities that may have significant impacts on non-hunted wildlife and their habitats.



- c. Significant impacts and the scientific basis for recommended actions may be “peer reviewed” by scientists outside WDFW when determined necessary by biologists and managers making the recommendations.

**Issue Statement:**

While science and professional opinion are important, social and economic issues often drive public opinion, and ultimately management strategies and regulations. A good public involvement process is necessary for people to make up their own minds and participate in making decisions. The key is to develop programs that achieve biological objectives and are supported by the public.

**Objective 2:**

Provide multiple opportunities for stakeholders 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 use them throughout the process of developing plans and regulation packages.
- b. Enhance the use of the WDFW Web page to encourage public comment and ideas for regulations and priorities.
- c. Conduct 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 five years to monitor support for agency programs, planned activities, and regulations.

- e. Publicize and maintain a mailing 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. Develop new opportunities for citizens to help with collection of data and interaction with biological staff.
- h. Increase public awareness regarding wildlife issues.

**Public Support for Hunting as a Management Tool**

With accelerating human population growth in Washington, a largely urban society, and two recent citizen initiatives that restricted hunting or trapping techniques, many are questioning general public support for hunting as a wildlife population management tool. This issue was identified by the public as one of the most significant issues for WDFW to address in this plan.

**Issue Statement:**

When the general public was asked a series of questions about support for hunting, it is apparent that overall support for legal, regulated hunting was very strong (82%).

However, there are some specific issues where opinions are very pronounced:

- While a majority of those surveyed supported hunting cougar (55%) and black bear (56%), they did not support hunting furbearing animals (42%). The level of support for cougar and black bear hunting was also lower than for most other game species. However, public support for predator reduction was high for purposes of addressing public safety, property damage, and domestic animal depredation.

- Hunting for the purpose of obtaining a trophy was clearly not supported by the general public (22%). Hunting contests were not supported by a majority of either the general public (20%) or hunters (37%).
  - The majority of respondents from the general public did not support introduction of non-native species and were split on the release of game birds to improve hunter success. A strong majority of hunters supported both of these activities.
  - Sixty-four percent of the general public did not think it is WDFW's role to encourage participation in hunting. A majority of hunters do think it is the Department's role, but a surprising 39% disagree.
  - The general public was split between those who supported and opposed providing special youth hunting opportunity, while a slight majority supported special opportunities for seniors. Hunters showed strong support for special opportunities for both youth and senior hunters.
- b. Conduct public outreach and determine the level of support for modifying regulations.
  - c. Carefully consider public support for regulations and management actions prior to developing recommendations and implementing actions.
  - d. Emphasize hunting opportunities for cougar, black bear, and furbearers in those instances that specifically address public safety, pet and livestock depredation, protection of threatened and endangered species, or property damage.
  - e. Develop a fact sheet by 2005 and develop several news articles each year describing the values of hunting.

In order to maintain public support for hunting, the Department should be sensitive to public opinion on these issues while still achieving game population objectives.

#### Objective 3:

By 2008, improve level of public support for hunting regulations and management actions with special emphasis on cougar, black bear, and furbearers; management of non-native species; and youth and senior hunting opportunity.

#### Strategies:

- a. Educate the public regarding current regulations and the rationale for them.

#### Objective 4:

By 2006, recommend changes to regulations associated with trophy hunting and hunting contests that are supported by the public.

#### Strategies:

- a. Measure the current level of public support for specific Department regulations regarding these issues.
- b. Provide education regarding current regulations and rationale and then conduct public outreach to determine regulation modifications that will receive support.
- c. Recommend regulation modifications to the Fish and Wildlife Commission.

### **Hunter Ethics And Fair Chase**

This issue is closely related to the previous one, since the public perception of hunters and hunting regulations may strongly influence support for hunting as a management tool. This is also a very significant issue to hunters, as identified during the initial 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 the public should not determine what is fair chase 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 particularly evident with equipment technology. During development of the 2000–2002 hunting season package, weapon technology was extensively debated and regulations were modified for archery, muzzleloader, and modern firearm equipment. The most recent debate was over the use of motorized waterfowl decoys, with Fish and Wildlife Commission action in 2001 that restricted the use of electronic waterfowl decoys

**Objective 5:**

Consider development and modification of regulations for use of electronic equipment and baiting of wildlife for purposes of hunting.

**Strategies:**

- a. Conduct public outreach and consider restricting electronic devices or baiting of wildlife.
- b. Regulate season length, timing, bag limits, and other restrictions as needed to address any increased harvest success from electronic devices that are not restricted.
- c. Develop effective regulations regarding fair chase that are understandable and enforceable.

- d. 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 a lot of hunters violate hunting laws. They feel that hunting without a license and poaching are the major violations, and that 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 has also indicated that hunter compliance with these laws should be 100% and that 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 6:**

Improve compliance for common violations and public opinion of hunters by 2008.

**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 the most common violations, and monitor subsequent improvements in compliance.
- c. Increase the frequency of field contacts and visible presence of officers and

other uniformed agency staff during hunting seasons.

- d. Publicize three news stories per year that emphasize the value and contributions of hunters or successful programs to improve regulation compliance.
- e. Publicize improvements in hunter compliance rather than just arrests.
- f. Review and simplify, clarify, or eliminate regulations that are dubious, ambiguous, or confusing.
- g. Re-invigorate and publicize the Advanced Hunter Education program to help address public support for additional hunter training and to improve public opinion of hunters.
- h. Provide incentives for hunters to complete additional training or refresher courses and consider mandatory refresher courses for wildlife law violations (at violator's expense).
- i. Support hunter education curriculum and program improvements and funding.
- j. Maintain or enhance the number of enforcement officers as funding and priorities allow.

### **Private Land Programs and Hunter Access**

Based on the opinion survey, hunters believe that private lands are important to wildlife and to outdoor recreation. They agree that maintaining the economic viability of farming and timber production, and controlling urban sprawl, are vital for conserving the agricultural and rural landscape so important to wildlife. Hunters also support private lands programs that provide incentives, including access fees, to landowners in exchange for improvements of wildlife habitat and access onto their lands for outdoor recreation (Duda 2002b). This was identified as a major issue to hunters during the public involvement

process leading to this plan. WDFW currently manages two such programs, the Upland Wildlife Restoration Program and the Private Lands Wildlife Management Area (PLWMA) Program that address wildlife habitat and hunter access to private land.

#### Issue Statement:

Even with these existing WDFW programs, hunters and landowners would like to see more. Hunters are especially concerned about recent closures of private industrial timberlands in southwest Washington; a lack of access for waterfowl hunting in western Washington; limited pheasant hunting access in eastern Washington; extensive road management systems in south central Washington; and a lack of general information about how to access public lands and WDFW lands.

#### Objective 7:

Determine hunter and landowner preferences for private land programs that address landowners' needs and increase lands available for hunter access by 25%.

#### Strategies:

- a. Publicize current programs better through the agency Web page, direct mail, the hunting pamphlet and other hunter publications.
- b. Identify the current level of hunter access to private land through a landowner survey and determine incentives that will be effective in encouraging landowners to provide greater levels of hunter access.
- c. Host a symposium in 2003 with experts from across the western states to gather ideas about what types of programs are effective in other states and to develop the key attributes necessary for a successful hunting access program.

- d. Form a task group of stakeholders to develop an implementation plan by November 2004, that includes recommendations for habitat and access requirements, addresses landowner needs, identifies a funding mechanism, includes draft legislation, and has strong public, hunter, and landowner support.

## Road Management

While there is a need for public access for hunting, especially on private lands, there is also a need to control access during critical times of the year to protect wildlife resources. Road management has been recognized as an important means of controlling human disturbance by limiting vehicular access seasonally or permanently. Studies have shown that limited vehicular access reduces human disturbance that results in reduced movements and poaching of elk, Cole et al. (1977), Smith et al. (1994), Phillips and Alldredge (2000).

Washington hunters consider road closures as important for controlling hunter numbers and impacts to wildlife. A majority of hunters surveyed (>70%) considered road closures important in reducing illegal activity and supported the Green Dot Cooperative Road Management System (Duda 2002b). A very high percentage also supported periodic or temporary hunting closure areas, road closures to protect game during critical periods of the year, and total access closure areas (refuges) to maintain numbers of game species in local areas.

### Issue Statement:

There is strong overall support for road management systems that are designed to help manage game populations as well as protect fish and wildlife habitat. WDFW recognizes the need to improve the balance between hunter access and wildlife and habitat protection. Some systems are more effective than others. Voluntary systems

such as the Green Dot System require high levels of enforcement to be effective. Comments from the public and from WDFW wildlife managers regarding road management were mostly directed at southwest, northeast, and central Washington. In addition, with expanding regulations on road access, hunters are increasing use of off-road vehicles (ORV) to gain motorized access. Indiscriminant ORV use can cause environmental damage and circumvents the intent of road access restrictions.

### Objective 8:

Develop road management plans in southwest and northeast Washington and in the central Cascades.

### Strategies:

- a. Because resources are limited, develop plans that focus on the Yakima, Colockum, Selkirk, Willapa Hills, and Mount Saint Helens areas that reduce active road densities to target levels, yet maintain well-distributed access for hunting. Other areas such as the Blue Mountains will also receive attention as staffing and funds are available.
- b. Place emphasis on the expansion of private lands incentive programs in these geographic areas.
- c. Emphasize gated and barrier type closures, rather than voluntary systems.
- d. Incorporate access exceptions for hunters with disabilities where possible and consider the needs of senior hunters.

### Issue Statement:

While Washington hunters supported most of the concepts and rationale for road management issues, significant concern continues to be expressed regarding the closure of specific roads and loss of hunting

access. Many road closures on private lands are for reasons other than game management and in some cases have resulted in extensive access restrictions over large areas. These concerns are especially evident in the Yakima area and in northeast and southwest Washington.

**Objective 9:**

Develop a plan that identifies the current level of hunter acceptance and understanding of road closures and resolves concerns, while addressing the resource needs in the Yakima area.

**Strategies:**

- a. Survey hunters that utilize the Yakima area in 2004 to determine the current level of understanding and acceptance of road closures. Determine key areas of concern for hunters and develop a plan that addresses those concerns.
- b. Develop at least three news articles by 2005 that explain the rationale and demonstrate the value of road closures in the Yakima area.
- c. Publish a comprehensive article for the 2003 Game Trails publication.
- d. Develop and provide fact sheets at the Oak Creek viewing area, Regional and District offices, and hunter check stations.
- e. Develop an electronic slide show presentation and use annually (2003-05) during presentations to hunting organizations.

**Objective 10:**

Manage hunter access opportunities on private industrial timberland in northeast and southwest Washington.

**Strategies:**

- a. Inventory current access levels and distribution including landowner surveys.
- b. Determine landowner concerns and ways to alleviate problems they experience.
- c. Educate hunters about landowner concerns and facilitate the development of partnerships to alleviate problems and open up access.
- d. Coordinate with other private lands and hunter access strategies and programs.
- e. Make southwest Washington the priority for expansion of WDFW access programs.

**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 rights issues, leading to anger and frustration.

**Objective 11:**

Improve 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. Use Wild About Washington to highlight tribal rights and tribal management activities.
- c. Develop cooperative management programs (see below) that can demonstrate state and tribal management programs.
- d. Use links from the WDFW website to highlight tribal research, regulation packages, and harvest reporting.
- e. Include a segment on tribal hunting rights and tribal management activities as part of the Hunter Education Program.
- f. Include a description about tribal hunting rights and wildlife management programs in the hunting pamphlet.

Issue Statement:

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

Objective 12:

By 2007, complete at least five additional coordinated tribal/state harvest management plans for deer, elk, and/or cougar populations subject to both tribal and non-tribal hunting.

Strategies:

- a. Use existing herd plans to develop coordinated harvest management plans for elk herds or other game species.
- b. Based on tribal interest and availability, pick a key population in each treaty area as a starting place to build working arrangements and processes for developing coordinated harvest management plans.

- c. Build upon existing working agreements to move the process forward as quickly as possible.
- d. The first plans to develop will be for key wildlife populations, where management and conservation issues are imminent.

**Predator Management**

Predator management is one of the most contentious issues WDFW will face in the next few years. As mentioned previously, there is less public support for hunting cougar and black bear than most other game species. In addition, a citizen initiative was passed in 1996 that restricted the use of hounds and baiting to hunt cougar and black bear. The passage of this initiative, and the subsequent debate centered on concerns for public safety and livestock depredation from cougar, has resulted in a polarization of public opinion regarding predator management. The Legislature modified the initiative in 2000 to allow the use of hounds to hunt cougar to address public safety in limited areas.

Washington has healthy populations of both cougar and black bear, which at times come into conflict with humans. This conflict appears to be increasing, at least partly in response to the growing human population. Managing this conflict and maintaining an appropriate balance between predator and prey populations will present a significant challenge over the next several years.

Issue Statement:

Both the general public and hunters showed strong support for managing predator populations to address human safety, protect endangered species, and to prevent the loss of livestock and pets. There was a significant divergence of opinion between the general public and hunters when asked about managing predators to increase game populations. Hunters showed strong support, though less than for all other

purposes, and the general public did not support reduction of predators to increase game populations.

**Objective 13:**

Maintain public support for managing predator populations, while sustaining predator populations in balance with prey species and considering public safety and social tolerance.

**Strategies:**

- a. Focus hunting and harvest efforts for predators on those areas and situations that address human safety, protection of pets and livestock, and recovery of listed species. Specific management proposals are included in the species sections of this plan.
- b. Incorporate focused predator harvest activities using licensed hunters while ensuring sustainable predator populations.
- c. Make any changes to current predator hunting on a gradual basis in order to monitor success prior to expanding hunting opportunities and to increase public support.

**Issue Statement:**

Black bear damage to commercial timber in the spring is a significant expense to timber managers. Forest owners have the legal authority to protect their forests from documented damage by killing black bears with a permit from WDFW. The general practice is for forest managers to contract with hound hunters and kill bears in areas sustaining damage (this was exempt from Initiative 655). Contractors (using hounds) kill over 100 black bears each spring to control damage. Adding to the management complexity, the public does not support reducing the number of black bears to prevent timber damage, opposes

the use of hounds, and also opposes spring hunting seasons to control damage. Yet, when asked about the manner in which predator populations might be reduced if determined necessary by the Department, the general public supports using licensed hunters, although not to the same extent as trap-and-relocate strategies.

**Objective 14:**

Determine the level of support and understanding from the public for spring black bear hunting in those commercial timber areas or other private properties that receive damage and the feasibility of a spring damage hunt.

**Strategies:**

- a. Conduct public involvement and education prior to recommending spring black bear hunting designed to reduce commercial timber damage.
- b. Develop a fact sheet describing the feasibility of trap and relocation efforts prior to implementing spring seasons.
- c. Implement localized spring hunts on a limited basis to determine effectiveness prior to recommending expansion.
- d. Retain current black bear timber damage management program using contractors.

**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 the hunter opinion survey conducted in preparation for this plan, most hunters expressed general satisfaction with their hunting experience. Eastern Washington pheasant, waterfowl, furbearer, black bear



and cougar hunters were least satisfied and deer and elk hunters expressed that satisfaction could be higher. Harvesting an animal (hunter success) and seeing plenty of game were the main factors driving hunter satisfaction. Not enough game and dislike of the regulations or general management strategies were the main reasons given for dissatisfaction (Duda 2002b). It is fairly clear that harvest success plays a significant role in hunter satisfaction. Yet when asked, hunters often rank ability to harvest much lower than things like hunting with friends and family, seeing game, and low hunter densities.

**Issue Statement:**

While some predict continued declines in hunter numbers over time, hunter demand for opportunity and game harvest still exceeds the supply of game animals in most situations in Washington. Hunters also feel that seasons are crowded and regulations too confining. In addition, they say that seasons are too short, success rates are too low, antler restrictions on deer and elk are too onerous, and there is not enough game.

**Objective 15:**

Maintain sustainable game species populations while reducing hunter dissatisfaction as measured by a "poor" rating to less than 10% for all game species hunting by 2008.

**Strategies:**

- a. Consistent with population goals, 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 by 2008.

- 2. Develop at least two hunting opportunities that emphasize low hunter densities and higher success rates (than current general seasons) through permit only restrictions.
- 3. 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.
  - (a) Provide general antlerless opportunity to users in the following order of priority:
    - (1) Hunters with disabilities
    - (2) Youth hunters
    - (3) Senior hunters
  - (b) 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 nearly equal.
- 4. Support the intent of the Advanced Hunter Education program by providing Master Hunter graduates primary consideration in hunting efforts designed to resolve private land and sensitive damage issues.
  - b. Within population goals, provide consistent general-season opportunity rather than permit restrictions whenever possible. Use other techniques to manage success rates 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 success rates, such as timing, antler points, etc.

- d. Identify high priority (top 10%) waterfowl and pheasant hunting areas, increase hunter access, and provide a variety of hunting opportunities in these areas using access easements, cooperative programs, or acquisition.
  1. Develop limited entry areas, marked sites, walk-in sites, or other restrictions to reduce crowding.
  2. Focus habitat programs and population enhancement activities in these high priority areas.
- e. Implement multiple public involvement strategies leading to Fish and Wildlife Commission adoption of three-year regulation packages.
- f. Following implementation of strategies and allowing time for results, monitor level of dissatisfaction through opinion survey in 2007.

### **Game Species Damage and Nuisance**

The Legislature, through RCW 77.36.005, has clearly articulated the state's policy that the responsibility to minimize and resolve conflicts between wildlife and humans is shared by all citizens of the state. However, in RCW 77.36.040, the Legislature allows farmers and ranchers to receive payment for damages caused by deer and elk to crops and rangeland.

In a recent public opinion survey (Duda 2002a), a substantial percentage of respondents indicated they had experienced problems with wildlife (26%). Raccoons (47%), deer and opossums (14% each) were the major culprits in Washington. Damage to garbage, pets, gardens, yards and livestock were the most common problems identified.

The public identified nuisance wildlife as a major issue frequently citing recent restrictions on the use of certain traps for furbearing species. Public appreciation of wildlife is critical to maintaining wildlife protection over the long-term. If the public's experiences with wildlife are increasingly negative over time, they may not be as supportive for maintaining abundant populations. The public's ability to resolve problems they encounter with wildlife is important to help maintain support for wildlife.

#### **Issue Statement:**

Twenty-six percent of the public experienced problems associated with wildlife. The survey found that the public is divided on whether funding for resolving problems should be the responsibility of impacted landowners or of local, state, or federal government. However, the survey did not include questions regarding two important issues: 1) Is the public satisfied with WDFW's response and 2) Are property owner's satisfied with their ability to resolve their wildlife problems?

#### **Objective 16:**

Determine public support and desires for WDFW assistance in dealing with wildlife nuisance and damage by 2005.

#### **Strategies:**

- a. Conduct a public opinion survey to determine satisfaction levels and desires for addressing nuisance and damage.
- b. Develop regional focus groups to help resolve local damage and nuisance problems.
- c. Provide information to the public on how they can resolve nuisance problems themselves or by hiring contractors.
- d. Develop alternate strategies to mitigate or prevent damage from taking place.

- e. Form a task group of stakeholders to develop an implementation plan by November 2005, that includes recommendations for deer and elk damage resolution, dangerous wildlife concerns, nuisance wildlife problems, identifies funding mechanisms as needed, develops draft legislation, and has strong public, hunter, and landowner support.

**Issue Statement:**

The level of concern for deer and elk damage to croplands generally depends on landowner tolerance and landowner tolerance often depends on how quickly the problem is resolved. Historically, crop damage by deer and elk has been addressed with hunting as the primary tool. Washington residents continue to show strong support of hunting to control animal damage to private property. However some landowners and some situations do not favor resolution by hunting.

**Objective 17:**

Foster greater landowner understanding of available options and develop new strategies for resolving crop damage. Respond to crop damage complaints quickly and initiate action to resolve damage.

**Strategies:**

- a. Develop a brochure explaining available tools and priorities for resolving crop damage.
- b. Provide list of options to landowner for handling damage and allow flexibility to the landowner.
- c. Use harassment and other non-lethal methods to address damage in deer and elk populations that are below management goals.
- d. Continue to prioritize hunting as the most efficient means of resolving damage problems in those deer and elk

populations that are above management goals and focus efforts on the animals causing the problem rather than general herd reductions. The alternatives for addressing damage problems:

1. Provide landowner's name to hunters or landowner selects hunters during general season hunt.
  2. Provide landowner's name to hunters or landowner selects hunters during permit only hunt.
  3. Agency selects hunters for "hot spot" hunts.
  4. Allow the landowner (or immediate family member) to kill and retain one or more deer or elk through issuance of a "landowner preference" permit.
  5. Allow the landowner to select one or more hunters to kill and retain one deer or elk through issuance of a "landowner damage access" permit.
  6. Issue the landowner a "kill" permit to take one or more deer or elk, with the state retaining the carcass. Provide the meat to charitable organizations or tribes to meet ceremonial and subsistence needs.
  7. Pay the landowner for the crop damage.
- e. Conduct annual survey of landowners filing complaints to determine satisfaction with WDFW actions for resolving their problem.

**Plan Monitoring**

In order to clearly identify accomplishment of the objectives identified throughout this plan, an annual reporting or "report card" will be prepared as part of the annual status report developed by the Game Division. The "report card" may be published separately in other publications as well. 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/awgen  
eral.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.
- 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.
- 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.

# CHAPTER 3

## ELK

### 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 fully understood at this time, 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 introduced in the early 1900s. 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 Fish and Wildlife 1996).

Elk were hunted regularly, but not always extensively, by Indian tribes in both eastern and western Washington (McCabe 1981). As European settlement expanded into this

region, elk exploitation 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 1996).

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 Fish and Wildlife 1996). 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 has reduced the overall carrying capacity for elk in Washington compared to decades past. The Washington Department of Fish and Wildlife (WDFW) currently recognizes 10 major elk



herds totaling approximately 56,000 animals.

## **RECREATIONAL OPPORTUNITY**

In Washington, elk are hunted from September through December with some special permit hunts to address agricultural damage taking place as late as February. Hunting seasons for archery, muzzleloader, and modern firearms are currently available to both resident and non-resident hunters. There are currently no quotas on 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. Antler point restrictions are spike-only with branch-antlered bulls by limited permit-only in eastern Washington. West side elk restrictions are usually 3-point minimum or greater. Some "any elk" hunting opportunities exist in parts of northeast, 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).

## **DATA COLLECTION**

Elk populations are assessed for a variety of characteristics, often including herd composition and population size. 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. These data are collected using a variety of techniques, depending on data 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.
- Mark-resight population estimates from air or ground surveys where a known number of animals are marked using neckbands or paintballs and then subsequent surveys are conducted and the number of marked and unmarked animals observed are entered in statistical formulas (models) to estimate the total population.
- Population modeling using aerial survey and/or harvest data and population reconstruction (Bender and Spencer 1999).

## **Assessment Of Current Management Of Elk**

The Department is currently developing 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. Existing herd plans are an important resource used in development of this GMP and are designed to be revised and updated every three to five years.

In April 2001, WDFW contracted with an external, independent panel of scientists to evaluate the current elk management program. That evaluation addressed 1) the effectiveness of using post-hunt bull:cow ratios as management objectives; 2) the effects of hunting elk during the rut; 3) the effects of late season elk hunting, especially from a disturbance and caloric expenditure standpoint; and 4) the genetic consequences of using post-hunt bull:cow ratios as management objectives. This evaluation culminated in an assessment

report on elk management in Washington (Peek et al. 2002).

## ELK MANAGEMENT GOALS

The statewide management goals for elk are:

1. Preserve, protect, perpetuate, and manage elk and their habitat to ensure healthy, productive 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.

## ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

### Population Management

Background:

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 rely on round numbers and pinpoint accuracy. Therefore, the preferred target population objectives for each elk herd are presented as an acceptable range of plus or minus 5% of the population objective (Table 1). 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 doesn't impinge on the population objectives for total population numbers and population composition and a viable,

**Table 1. Population estimates and population objectives with (+/- 5 %) acceptable range for 10 elk herds in Washington.**

Elk Herd	Current Population Estimate	Population Range Objective
Yakima	10,460 <sup>a</sup>	9,025 to 9,975 <sup>a</sup>
Olympic	8,620 <sup>b, c</sup>	10,782 to 11,918 <sup>c</sup>
Colockum	4,500	4,275 to 4,725
North Rainier	1,845 <sup>b</sup>	2,660 to 2,940
South Rainier	2,100	2,850 to 3,150
North Cascades	425 <sup>b</sup>	1,852 to 2,048
Selkirk	1,450	1,377 to 1,523
Willapa Hills	7,600	7,600 to 8,400
Mount St. Helens	13,350 <sup>d</sup>	14,250 to 15,750
Blue Mountains	4,400	5,320 to 5,880

a: Does not include GMUs 372 and 382

b: Estimate made in 2000.

c: Does not include Olympic National Park.

d: Mean estimate from 1996 to 1999.



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 prior to 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. Mature bulls are defined as being older than four years, which is usually equated to having antlers with at least six tines on one side. Antler points are used as an index of age because it is a characteristic that is readily visible when conducting aerial surveys. WDFW will explore the possibility of using a different number of antler points

to define mature bulls if average age correlations or other circumstances warrant.

The parameters collected in Table 2 function as guidelines for biologists to make management decisions. The challenge presented to managers is to interpret parameters and guidelines that are not in complete agreement. 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 while 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 a rigid prescription. Oftentimes extenuating circumstances will dictate whether management changes will be made and what direction those changes might take. Unhunted 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).

**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.**

<b>Criteria</b>	<b>Class of Elk Targeted by Season Change</b>	<b>Consider Liberalizing Season</b>	<b>Acceptable Range</b>	<b>Consider Restricting Season</b>
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
Total Bull Mortality <sup>a</sup>	Antlered	Less than 40%	Less than or equal to 50%	Greater than 50%
Percent Mature <sup>b</sup> 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

a: Total mortality from all sources including state hunting, tribal hunting, predation, winter kill, disease, etc.

b: Mature bulls are defined as having antlers with at least six tines on one side.

Issue Statement:

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

Objective 18:

Maintain elk populations that are consistent with Tables 1 and 2.

Strategies:

- a. Conduct aerial surveys to estimate populations, estimate indices, or to estimate composition ratios of bulls, cows, and calves.
- b. Manage for cow elk sub-populations that are consistent with the desired rate of increase or rate of decline 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 1985, Houston 1982, Prothero et al. 1979, Flook 1970).
- d. Manage for 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, manage for a total bull mortality rate of less than or equal to 50% averaged over three years.
- f. Manage for a post-hunt mature bull (at least six antler points on one side) percentage of 2% to 10% of the bull sub-population (Table 2).

- g. Manage for herd composition and population goals at the Population Management Unit (PMU) level.
- h. Manage for minimal disturbance and selective harvest of mature bulls during the peak breeding period of September 15-30.

Issue Statement:

Low recruitment in the Colockum elk herd may be the result of the elk herd exceeding the habitat's carrying capacity.

Objective 19:

Explore the possibility that the Colockum elk herd may be above carrying capacity, which may be contributing to lower recruitment.

Strategies:

- a. Monitor annual recruitment.
- b. Assess the strength of correlations between antlerless elk harvest and juvenile survival for years 2003 and 2004.
- c. Monitor body condition of elk using ultrasonography or carcass fat indices to detect any correlations between elk population density and changes in individual elk body condition for years 2002 through 2004.
- d. Monitor forage quantity and quality annually to detect any habitat changes in response to changes in elk population density.
- e. If necessary, starting in the fall of 2005 incrementally increase the antlerless portion of the harvest each year for three years or until a new population objective is met and then maintain the new population objective.

Issue Statement:

Elk are currently managed at the Population Management Unit (PMU) level. To be an

effective tool in elk management and season setting, PMUs must have some biological relevance in terms of populations, sub-populations, and how elk physically use the landscape through all seasons of the year.

Objective 20:

Develop a report that assesses if the current PMU structure system is the most relevant grouping for elk populations and sub-populations by 2005.

Strategies:

- a. Determine the status of the current PMU system through a review of the current PMU data and a mapping and GIS inventory of the current PMU structure.
- b. If necessary, radio-collar elk within a PMU and determine annual movements, migrations, and seasonal use of available habitat types.
- c. Determine annual and seasonal use within and outside the designated PMU. Compare area use between hunting season, winter, the calving period, summer, and transitional periods. As data becomes available, consider the possible genetic influences on PMU delineation.
- d. Redefine PMUs where necessary.

Issue Statement:

Data on elk population size and composition often are collected using helicopter surveys. Age ratios or sex ratios by themselves are inadequate in detecting population growth or decline (Caughley 1974, 1977). The use of sightability models has improved population estimates derived from helicopter surveys by accounting for sighting biases (Samuel et al. 1987). Segregation between males and females can potentially bias aerial surveys during certain times of the year. However, the

assumption that mixing of the sexes in the fall significantly reduces or eliminates gender-based sighting biases remains untested as well. The assumption that sightability models eliminate visibility differences (statistical biases) associated with different age classes and sex classes (i.e., juveniles, adults, males, females, breeders, non-breeders) should be tested. The benefits of surveying elk at times when they are freely intermixing could be outweighed by lower overall sightability during summer-fall. These effects on the accuracy and precision of parameter estimates should be explored further (Lancia et al. 1996, 2000).

Objective 21:

Evaluate summer and fall aerial surveys and evaluate and refine the use of winter helicopter surveys to estimate population size, population indices and population composition of Washington elk by 2005. Continue efforts to standardize and improve survey protocols to provide reliable data on the size and structure of Washington elk herds.

Strategies:

- a. Assess current protocols for winter helicopter surveys of elk and refine where necessary. Identify populations that are most effectively monitored with winter helicopter surveys. Develop herd-specific models where appropriate.
- b. Refine current data collection protocols and explore the development of new approaches to monitor elk populations and the effects of management strategies on elk populations (Bender and Spencer 1999).
- c. Expand efforts to monitor elk populations with summer and fall surveys where appropriate.
- d. If necessary, conduct sightability experiments to assess bias and precision

associated with summer/fall helicopter surveys for elk.

- e. If necessary, construct new sightability bias models for elk on summer and fall range in Washington.
- f. Validate sightability models used in Washington.

**Issue Statement:**

Sex-age-kill population models and other modeling techniques are currently used to assess some elk populations in Washington (Bender and Spencer 1999). Input data for these models have generally been obtained from check stations, harvest reporting, and aerial survey composition counts. Although the approach is sound if input data are statistically unbiased and precise, the relative impact of statistically biased input parameter estimates on sex-age-kill model output has not been rigorously addressed.

**Objective 22:**

Improve the reliability of population estimates derived from the sex-age-kill model.

**Strategies:**

- a. Assess the population modeling approaches currently being used by WDFW and evaluate the need for new models and/or applications of population modeling.
- b. Assess the input parameters used in sex-age-kill modeling. Compare model output using both statistically unbiased estimates of sex-age-kill model input parameters and those routinely used in sex-age-kill modeling. Conduct this work on two separate elk populations by 2008.

## **Recreation Management**

**Issue Statement:**

Eighty thousand Washington elk hunters harvest approximately 7,000 elk annually from an estimated population of approximately 56,000. Washington has more elk hunters per elk than any other western state and has no quotas or limits on the number of elk licenses sold. Subsequently, success rates for hunters are low and without 3-point minimum or spike only antler point restrictions, the male sub-population would be over-harvested. Under the guidelines adopted by the Fish and Wildlife Commission for the hunting season setting process (see page 6), guideline number four states, "*Hunting seasons should be consistent with species planning objectives and provide maximum recreation days while achieving population goals.*" Considering all of the guidelines as well as the Department's legislative mandate, it becomes clear that the primary goal of the Commission is to achieve the population objectives of managed game species. The secondary goal is to provide the most opportunity possible without compromising the primary game population objectives. Opportunities to hunt and spend time afield must be balanced against achieving or maintaining elk population objectives.

**Objective 23:**

Maintain a sustainable annual elk harvest that is consistent with 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 ratio objectives. Retain any bull and any elk seasons in

northeastern Washington as long as population objectives are being met or have a reasonable likelihood of being met.

- c. Retain 3-point restriction in western Washington as long as population objectives are being met or have a reasonable likelihood of being met over time.
- d. If necessary, develop cooperative road access restrictions or limited permit only units to achieve bull ratio objectives in western Washington.
- e. Design and implement harvest strategies based on the best available information collected for those specific elk populations and sub-populations.
- f. Unless extreme circumstances warrant, allow at least three years to determine effectiveness of regulation changes designed to achieve population objectives.

#### Objective 24:

Maintain overall stability of elk hunting season regulations as provided during the last three years if possible, while still targeting the objectives in Tables 1 and 2.

#### Strategies:

- a. When feasible under budget and staffing restrictions, document recruitment and mortality rates for elk populations under a wide variety of conditions such as weather, human access, range condition, supplemental feeding, and herd densities.
- b. Adjust hunting season regulations to achieve the desired population characteristics.
- c. Monitor elk population responses to various harvest strategies.
- d. Develop population models that simulate various harvest strategies before implementation.

- e. Validate results of population modeling efforts using abundance, composition, mortality, recruitment, and harvest data collected annually.
- f. Implement an adaptive harvest strategy based on the past season harvest, composition counts, and/or population estimates or population indices available for each population or sub-population.

#### Issue Statement:

Elk are an important watchable wildlife species. Elk provide a wide variety of viewing and photographic opportunities for the citizens of Washington.

#### Objective 25:

Increase opportunities for viewing and photographing elk when consistent with the health and viability of elk populations.

#### Strategies:

- a. Develop one new elk-viewing site by 2008.
- b. Improve one existing elk viewing site by 2008.
- c. Develop an internet site that promotes elk viewing by 2006.

#### Issue Statement:

Not all elk hunters have the same expectations (Duda et al. 2002a). Some hunters want a high probability of harvesting an elk every year. Other elk hunters will accept a lower probability of success if they have a chance to take a mature bull. Still others just want the opportunity to recreate outdoors with some chance of harvesting an elk. Meeting the needs of all hunters requires a variety of harvesting schemes across the landscape. Five of the six WDFW administrative regions provide some level of elk hunting. However, the types of elk hunting

opportunities vary by location. Depending upon the type of elk hunting opportunity one is interested in, a hunter may have to travel across the state to participate in a desired type of hunt.

**Objective 26:**

Provide more than one type of elk hunting opportunity within an administrative region, allowing elk hunters to select a GMU or group of GMUs that best fits their preferred style of hunting.

**Strategies:**

- a. Identify elk population management units that currently attract or could attract higher hunter numbers by 2005. Less focus on hunter success would be placed on these GMUs. Hunter *opportunity* (maximum days) would be the priority in these units.
- b. Identify elk population management units by 2005 that can be managed for, or are currently being managed for, higher levels of hunter success without focusing on mature bull harvest. Hunter success rates would be the priority in these units.
- c. Identify population management units by 2005 that can be managed for, or are currently being managed for, lower success rates but with a better chance to harvest older age class bulls. Opportunity for mature bull harvest would be the emphasis in these units.
- d. Determine by 2008 if a variety of elk hunting opportunities can be provided within each of the administrative regions that have elk hunting.

**Issue Statement:**

Annual harvest data are used as an index to elk population abundance and herd health and to monitor impacts of changing regulations.

**Objective 27:**

Improve the accuracy and precision of harvest data to monitor elk populations and the effects of various management strategies.

**Strategies:**

- a. Continue to implement and improve the mandatory harvest reporting system.
- b. Explore the possibility of expanding efforts to collect age-at-harvest data from elk teeth collected from successful hunters.
- c. Explore the possibility of collecting data on elk body condition from harvested elk at check stations or using other sampling strategies.

**Issue Statement:**

Historically hunters and managers have been conservative in harvesting antlerless elk. The philosophy is based on a desire for ever-increasing elk populations. With some populations at or exceeding population goals, antlerless harvest could be expanded to match recruitment.

**Objective 28:**

Increase antlerless harvest opportunities in elk populations that are at or above population goals.

**Strategies:**

- a. Monitor annual recruitment and population response to increased or decreased harvest.
- b. In stable populations meeting population objective, develop harvest strategies to approach but not exceed recruitment of new animals into the population minus estimated annual, non-harvest mortality.
- c. In populations above population goals, incrementally increase antlerless hunting

opportunity and antlerless harvest each year until the population stabilizes within the preferred population range.

## **Management of Crop Damage and Nuisance Problems**

### **Issue Statement:**

Elk provide a sustainable annual harvest, but they also contribute to agricultural damage in some cases. Some herds that are at or below population objective can still contribute to agricultural damage.

### **Objective 29:**

Identify areas of elk damage and minimize the number of damage incidents if possible.

### **Strategies:**

- a. Provide information and advice to landowners regarding techniques to prevent elk damage. Reduce elk damage using non-lethal means in elk herds below population objective.
- b. Increase antlerless harvest in specific damage areas that target elk causing damage. Use site-specific lethal means in elk herds at or above population objective. Identify and map areas that will not be managed for elk and provide liberal harvest opportunities in those areas.
- c. Increase any elk harvest in certain situations where localized bull herds are causing depredation problems.
- d. Address site-specific damage situations by utilizing "hot spot" hunts, landowner preference tags, or issuing kill permits.
- e. Consider damage-related elk harvest data in management and harvest recommendations.
- f. Investigate the impacts of vehicle collisions on elk populations and explore options to mitigate some of those impacts.

## **Habitat Management**

### **Issue Statement:**

Elk habitat in Washington State is declining due to human population expansion, changes in timber management practices, progression of 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 set aside with the management of elk habitat identified as the primary activity on those lands.

### **Objective 30:**

Maintain, enhance, and acquire habitat for Rocky Mountain and Roosevelt elk.

### **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. Identify lands that fit financial and biological criteria consistent with WDFW's elk management program.
- c. Identify and access funding sources to complete acquisitions and easements that will benefit elk.
- d. Where habitat condition or quantity limits herd productivity, identify and implement large-scale habitat conservation and enhancement projects.
- e. 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.
- f. Establish cooperative cost share projects with U. S. Forest Service (USFS), Washington Department of Natural Resources (DNR), U. S. Fish and Wildlife Service, Tribal Governments, Rocky

Mountain Elk Foundation, Safari Club International and other entities to improve elk habitat.

- g. Manage for elk herd distribution within tolerance limits of landowners.
- h. Take a more active role with county governments in Growth Management Planning to prevent human encroachment on important elk habitat.
- i. Take a more active role with USFS and DNR in timber stand management that provides better elk habitat. Provide advice to USFS, DNR, and the private timber industry on pre-commercial thinning and commercial thinning that would improve elk habitat. Provide advice to DNR and private timber industry regarding reduced herbicide treatments of understory plants that are important elk forage. Work with state, federal, and private land managers to explore the best size and spacing for clear-cuts that will benefit elk.
- j. Secure private lands with valuable winter range in GMU 368 (Yakima Herd).
- k. Secure in-holdings in the Wenas Wildlife Area in GMU 342 (Yakima Herd).
- l. Acquire important elk habitat in the Skookumchuck and Naneum Basins (Colockum Herd).
- m. Purchase, lease, acquire easements and use other incentives to protect and enhance critical elk habitat located along the North Fork of the Lewis River (Mount St. Helens Herd).
- n. Secure important elk habitat in the Lick Creek unit GMU 175 (Blue Mountains Herd).
- o. Secure important elk habitat in the Tualum Drainage of the Tucannon unit, GMU 166 (Blue Mountains Herd).
- p. Secure elk winter range in the Mountain View unit, GMU 172 (Blue Mountains Herd).

- q. Secure important elk habitat in the bottomlands along the Upper Cowlitz River (South Rainier Herd).
- r. Purchase, lease, acquire easements and use other incentives to protect and enhance critical elk winter ranges located along the Skagit River bottomlands (North Cascades Herd).
- s. Purchase, lease, acquire easements and use other incentives to protect and enhance other key areas identified in future elk herd plans.

#### Issue Statement

Elk in the Mount St. Helens herd suffer some winter mortality even during mild winters. It is possible that elk from this herd are going into winter in less than prime condition due to poor summer and fall forage quantity and quality.

#### Objective 31:

Determine by 2008 if available summer and fall forage is predisposing Mount St. Helens elk to higher than normal winter mortality.

#### Strategies

- a. Measure body condition of Mount St. Helens elk before and after winter.
- b. Correlate body condition with current vegetation information that's being collected or collect new vegetation information to assess available forage quantity and quality.
- c. If necessary, develop cooperative projects with USFS, DNR, and Rocky Mountain Elk Foundation to improve elk habitat for Mount St. Helens herd.

#### Information and Education

##### Issue Statement:

Washington citizen's want to know more about elk and their natural history (Duda et al. 2002b).



#### Objective 32:

Inform and educate all portions of the general public regarding elk biology and elk issues impacting the state of Washington. Provide the general public with additional information about elk.

#### Strategies:

- a. Expand educational opportunities pertaining to elk on the agency web site and develop brochures for direct mailing by 2008.
- b. Develop a brochure that informs the public how to best enjoy elk without adding undue stress during critical times of the year (e.g., winter, calving, breeding).
- c. Publish two news articles per year regarding viewing opportunities.
- d. Update and improve the Department's current brochure on "Identification and Age Determination of Washington Deer and Elk" by 2005.
- e. Investigate the possibility of writing and publishing a book about the deer and elk of Washington using outside cooperators and outside funding sources. Determine feasibility of the project by 2008.

#### **Winter Feeding**

It is the policy 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 be considered a substitute for lost habitat and feeding shall be done only in limited situations as prescribed by Department policy.

The Department maintains some supplemental feeding operations for wildlife where adequate winter habitat is not available. The Department also recognizes that extreme winter conditions sometimes

necessitate implementation of emergency feeding operations. Both supplemental and emergency feeding of wildlife introduce an artificial food source. Feeding also results in the concentration of animals, which can make them more susceptible to disease, predation, and poaching.

The Department will attempt to identify methods designed to balance the size of populations with available winter habitat. 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.

#### Issue Statement:

Supplemental feeding is defined by the Department as the 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.

A large percentage of what is considered to be historic elk winter range prior to European settlement has been removed due to agriculture and housing development. At current population levels, some elk in Washington must be fed every winter due to inadequate winter range. To prevent elk in the Yakima herd from causing agricultural damage, elk fencing and a winter feeding program was established. The average amount of hay fed annually from 1981 to 2001 was 1,302 tons (range 320 to 5,100 tons). 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. Elk that are fed in the winter also can have extreme impacts on shrubs, trees, and riparian zones near feeding sites. Winter-feeding programs may allow elk populations to exceed the carrying capacity

of the available winter range, which can often be one of the most important factors in determining the size of an elk population that the landscape can support.

**Objective 33:**

Evaluate the current elk-feeding program. Reduce the dependency on supplemental feeding if possible.

**Strategies:**

- a. Evaluate the current Yakima elk-feeding program by 2005.
- b. Using data generated from the Yakima elk herd study (see Research Section), report on the costs, benefits, and impacts on range condition of managing for different Yakima elk herd sizes by December 2007.
- c. Using the data generated from the Yakima elk herd study, determine if the Yakima elk herd population objective needs to be adjusted by December 2008. If the population objective is changed, determine what impact that will have on the surrounding environment, hunting opportunities, viewing opportunities, and the current feeding program.
- d. Identify which feeding sites are essential to meeting Yakima elk herd management objectives.
- e. Identify areas where elk feeding efforts might be reduced. Eliminate some elk feeding sites if possible.
- f. Evaluate alternatives to the current feeding program such as diversionary forage plots, additional winter range acquisition, mineral supplements, or any other approaches that help redistribute elk activity.

**Issue statement:**

Emergency feeding is defined as the occasional feeding of wildlife, which the

Department implements because of extreme winter conditions or a disaster such as fire or drought. Emergency feeding operations will be implemented when the Director or the Director's designee determines that an emergency exists in a specific location of the state, using the emergency factors below. The factors evaluated to determine if an emergency exists include weather conditions and forecast, concentration and distribution of wildlife, access to natural forage, the nature of the disaster and its impact on wildlife, the physical condition of the wildlife in question, and designation by the Governor.

**Objective 34:**

Assess whether current winter-feeding policy is appropriate and being implemented.

**Strategies**

- a. Identify all locations where emergency feeding and supplemental feeding of wildlife is taking place by 2004.
- b. Ascertain whether winter feeding policy is being followed in all locations of Departmental feeding by 2005.
- c. Make recommendations for those sites that are not adhering to policy to bring them into compliance.
- d. Look for alternatives to supplemental and emergency feeding whenever possible. Determine if salt or mineral supplements would be a useful tool in improving body condition, recruitment of young, reducing parasite loads, or disease management.

**Disease**

**Issue Statement:**

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 35:**

Monitor the health and disease status of wild elk in Washington.

**Strategies:**

- a. Take blood and tissue samples when elk are captured and tested for diseases common to elk.
- b. Sample hunter harvested elk for chronic wasting disease.
- c. Follow U. S. Department of Agriculture and Washington Department of Agriculture guidelines for reporting and action when a disease is detected.

**Research**

**Issue Statement**

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. Recruitment during recent years has typically been below the long-term average, similar to other regional elk populations. 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 36:**

Determine the appropriate population size for the Yakima elk herd given the number of environmental, social, recreational, and economic values assigned to this herd by various user-groups.

**Strategies:**

- a. Detailed analysis of habitat condition and trend is needed to better define a population goal that protects other values, including environmental, social, and economic values of this region.
- b. Conduct intensive remote sensing data collection and GIS analyses.
- c. Use radio-telemetry to define elk use of sensitive habitats.
- d. Use radio-telemetry to define movements of elk between specific summer and winter ranges.

**Issue Statement:**

The Blue Mountains elk herd has historically provided considerable recreational hunting opportunity and supported subsistence and ceremonial needs for Native Americans. Like many other regional elk herds, the Blue Mountains herd has exhibited declining recruitment in the past decade. The herd is below population objective. Although spike-only hunting has improved bull elk survival, limited, hunting opportunities for branch-antlered bulls continues in some areas. The lack of documentation of tribal harvest impacts has complicated management of this elk herd. In some units, high poaching losses have contributed to a reduction or elimination of mature bull hunting opportunity. Estimates of both adult and yearling bull survival as well as adult cow survival need to be improved for this elk herd. The overall impact of human-caused mortality is known only in very general terms.

#### Objective 37:

Identify research questions to be answered regarding elk ecology and management and design experiments and studies that address those questions. Estimate total mortality for adult elk in the Blue Mountains. This project would focus on estimating survival for male elk, but information on female elk survival would also be useful to managers. Partition the total mortality as accurately as possible among all sources of mortality. Complete the project by 2008.

#### Strategies:

- a. Quantify total mortality for adult elk for one or more PMUs in the Blue Mountains. To accomplish this, a large-scale telemetry project is needed to obtain defensible survival estimates.
- b. Quantify the impact of human-caused mortality on elk in the Blue Mountains, particularly the impacts of various sources of hunting mortality on adult and yearling bull elk.
- c. Quantify the impacts of unreported mortality, such as tribal harvest, wounding losses, damage hunt loss, and poaching losses.
- d. Address the management implications of those various sources of mortality.

#### Issue Statement:

The Colockum elk herd has long been plagued by low bull:cow ratios, and calf:cow ratios have also declined precipitously during the last decade. In 1994, spike-only hunting was adopted for general license holders. This regulatory change occurred throughout eastern Washington and was designed to increase bull survival, increase the ratios of adult bulls to adult cows, and to promote early, synchronized breeding. In the Yakima elk herd, the effect on bull:cow ratios was rapid and dramatic. A similar response has not occurred in the

Colockum herd. Bull survival apparently remains low. Bull:cow ratios have generally remained below objective. Branch-antlered bull hunting has essentially been eliminated. No positive effects have been seen in recruitment patterns in the Colockum herd as well. Habitat condition also appears to be generally poor in some concentrated use areas, such as the Coffin Game Reserve. There are a number of potential factors that may be impacting elk recruitment, including poor nutrition, predation, and low numbers of breeding adult bulls. Defensible estimates of yearling bull survival and calf survival are needed.

#### Objective 38:

Ascertain the population dynamics of the Colockum elk herd by 2008.

#### Strategies:

- a. Determine adult and juvenile elk survival for the Colockum elk herd.
- b. Determine the cause of poor recruitment, including an assessment of body condition dynamics of adult cow elk.
- c. Analyze habitat conditions and trends at the landscape scale using remote sensing and ground-truthing.

#### Issue Statement:

Forage enhancement areas were created to mitigate elk habitat loss associated with construction of the Wynoochee Reservoir. No assessment of the realized value of these areas to elk has been done. It is unclear if the costs of such mitigation efforts are warranted or if the enhancement areas actually benefit elk relative to the background habitat mosaic. The efficacy of this and similar mitigation projects compensating for elk habitat loss is unknown.

Objective 39:

Quantify the differences in body condition, productivity, and recruitment for two elk sub-populations, one having access to mitigation enhancement fields and one that does not.

Strategies:

- a. Using telemetry, evaluate elk use of the Wynoochee forage enhancement fields.
- b. Assess the effect of use of the fields on elk body condition and productivity.
- c. Monitor demographics in both elk sub-populations.
- d. Monitor body condition in both sub-populations and relate body condition scores to elk landscape use, including use of the forage enhancement fields.

Issue Statement:

Movements and population dynamics of elk and deer in the upper Kittitas valley are poorly understood. Elk-landowner conflicts have been increasing on private lands in the upper Kittitas valley. Specific movement patterns for this sub-population of elk are poorly understood and abundance is unknown. Development continues to change the landscape of the upper Kittitas valley and the planned community will increase elk-human interaction. Management of elk numbers and distribution can be anticipated to become increasingly complicated. This area is also the study area for Project CAT, a large-scale cougar ecology project. The goal of Project CAT is to better define the movements and behavior of cougars in human occupied landscapes such as the I-90 corridor. It will be difficult to fully understand how cougars use this landscape without better knowledge of the movements and landscape use of their primary prey, elk and deer.

Objective 40:

Gain a better understanding of the population dynamics and habitat use of elk in the upper Kittitas valley.

Strategies:

- a. Gather specific information on elk and deer movements, landscape use, and population dynamics in the upper Kittitas valley.
- b. Collect data on deer and elk in a dynamic landscape where managing human-wildlife interactions can be expected to become increasingly complex.
- c. Coordinate project with staff conducting the Project CAT effort.
- d. Explore possible elk management options despite the presence of a large private land refugium. Explore management options for small and large private landowners to improve habitat for elk.
- e. Enhance the specific project objectives of the on-going cougar project.

Issue Statement:

Other herds including the North Rainier, South Rainier, Selkirk, North Cascade, and Willapa Hills will require additional study as funding and staff time become available.

Objective 41:

Determine aspects of elk populations that require further scientific investigation.

Strategies

- a. Identify new questions to be answered for elk populations.
- b. Conduct a literature search and develop study plan proposals that address the identified issues.
- c. Explore internal and external funding opportunities for additional studies pertaining to the identified elk issues.

- d. Develop study proposals in preparation for subsequent planning processes.

### LITERATURE CITED

- Bender, L. C. and R. D. Spencer. 1999. Estimating elk population size by reconstruction from harvest data and herd ratios. *Wildlife Society Bulletin* 27:636-645.
- Biederbeck, H. H., M. C. Boulay, and D. H. Jackson. 2001. Effects of hunting regulations on bull elk survival and age structure. *Wildlife Society Bulletin* 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, Pennsylvania, USA.
- Caughley, G. 1974. Interpretation of age ratios. *Journal of Wildlife Management* 38:557-562.
- Caughley, G. 1977. *Analysis of vertebrate populations*. John Wiley and Sons, London, England.
- 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. Zurawski, and A. Lanier. 2002a. Washington hunters' opinions on and attitudes toward game species management. *Responsive Management*, Harrisonburg, Virginia, USA.
- \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 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, Virginia, USA.
- Flook, D. R. 1970. Causes and implications of an observed sex differential in the survival of wapiti. *Canadian Wildlife Service Report Series No. 11*.
- 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 Publishing Company, Inc., New York, New York, USA.
- 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, editor *Research and management techniques for wildlife and habitats*. Fifth ed., rev. The Wildlife Society, Bethesda, Maryland, USA.
- \_\_\_\_\_, C. S. Rosenberry, and M. C. Conner. 2000. Population parameters and their estimation. Pages 64-83 in S. Demarais and P. R. Krausman, editors *Ecology and management of large mammals in North America*. Prentice-Hall, Inc., Upper Saddle River, New Jersey, USA.
- McCabe, R. E. 1981. Elk and Indians: historical values and perspectives. Pages 61-123 in J. W. Thomas and D. E. Toweill editors *Elk of North America: ecology and management*. Stackpole Books, Harrisburg, Pennsylvania, USA.

- 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 Company, Harrisburg, Pennsylvania and Wildlife Management Institute, Washington, D.C., USA.
- 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. Journal of Wildlife Management. 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. Washington Department of Fish and Wildlife, Olympia, Washington, USA.
- 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, editors North American elk: ecology, behavior and management. University of Wyoming Press, Laramie, Wyoming, USA.
- Samuel, M. D., E. O. Garton, M. W. Schlegel, and R. G. Carson. 1987. Visibility bias during aerial surveys of elk in north-central Idaho. Journal of Wildlife Management 51:622-630.
- Spalding, D. J. 1992. The history of elk (*Cervus elaphus*) in British Columbia. Contributions to Natural Science, Royal British Columbia Museum, Victoria, British Columbia, Canada.
- Squibb, R. C. 1985. Mating success of yearling and older bull elk. Journal of Wildlife Management 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 editors Proceedings of the elk vulnerability symposium. Montana State University, Bozeman, Montana, USA.
- \_\_\_\_\_, J. F. Kimball, Jr., and D. R. Anderson. 1986. Bimodal distribution of estimated conception dates in Rocky Mountain elk. Journal of Wildlife Management 50:118-122.
- Washington Department of Fish and Wildlife. 1996. Final environmental impact statement for the Washington State management plan for elk. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

# DEER

## 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 (Washington Dept. of Fish and Wildlife 2001). White-tailed deer populations are stable or increasing. Mule deer populations in northeastern Washington are below historical levels. Other mule deer populations in central and eastern Washington are growing in response to recent mild winters. Black-tailed deer populations seem to be stable or declining across their range. 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.

## RECREATIONAL OPPORTUNITY

Deer are hunted in Washington from September to December. State regulations provide for archery, muzzleloader, and modern rifle seasons. Historically about 45% of Washington's deer harvest was

black-tailed deer, 35% mule deer, and 20% white-tailed deer. Due to expanding white-tailed deer populations, recently depressed mule deer populations and conservative hunting seasons for mule deer, white-tailed deer have outnumbered mule deer in the harvest for the past few years (Table 1). For the 2001 hunting season, initial estimates suggest that mule deer and white-tailed deer harvest each total approximately 10,500 animals or 31% of the harvest respectively.



White-tailed deer hunting seasons have remained consistent for the last few years, except in northeastern Washington where the white-tailed deer antlerless opportunity has gradually increased. Beginning in 1997, youth, senior, and disabled hunters were allowed to take antlerless white-tailed deer during general buck seasons in northeast Washington.

Eastern Washington mule deer seasons have been much more restrictive since 1997, although some mule deer opportunity

**Table 1. Estimated Washington deer harvest by deer type for 1995 through 2001.**

Year	Black-tailed Deer	White-tailed Deer	Mule Deer	Total
1995	17,048	9,800	10,971	37,819
1996	14,808	11,600	13,034	39,442
1997	15,875	9,700	6,566	32,141
1998	13,966	8,960	7,327	30,253
1999	15,268	11,007	9,232	35,507
2000	13,932	15,161	11,883	40,976
2001	13,226*	10,574*	10,519*	34,319

\* Initial estimates not finalized.



is being reestablished in areas where mule deer herds are recovering. 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. Antlerless hunting opportunities are offered mostly by special permit only. The 2001 hunting season provided some additional antlerless opportunity as well as some any-deer opportunity for youth and disabled hunters.

Throughout western Washington, black-tailed deer harvest has remained relatively stable in recent years in terms of total numbers harvested. However success per unit of effort has decreased in southwest Washington black-tailed deer regions. Black-tailed deer still provided most of Washington's 2001 deer harvest with initial estimates at 13,200 or approximately 38.5% of the total deer harvest. The average annual harvest of black-tailed deer over the past seven years was 14,875.

## **DATA COLLECTION**

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

In western Washington, black-tailed deer surveys are coupled with hunter check station information and harvest data to model populations. Sex ratios, age ratios, and survival rates are reconstructed using harvest information and those vital statistics

are then entered into a sex/age/kill (SAK) population model to estimate population size (Bender and Spencer 1999).

Pre-hunt and post-hunt surveys are conducted in eastern Washington for both white-tailed deer and mule deer. Deer populations in selected areas are 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 again in spring to determine recruitment – those fawns that have survived their first 10 or 11 months and will likely reach their first birth date alive. Hunter check stations and harvest report cards are used to monitor age distribution of whitetail bucks in the harvest.

## **DEER MANAGEMENT GOALS**

The statewide management goals for deer are:

1. Preserve, protect, perpetuate, and manage deer and their habitat to ensure healthy, productive 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.

## **ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES**

### **Population Management**

Deer population management goals are to maintain relatively stable growth for both white-tailed deer and black-tailed deer populations. The population goal for mule deer management is an increase in populations within the limitations of available mule deer habitat, landowner

tolerance, and 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, improve hunting quality, and be responsive to landowner conflicts (see below). The general, post-hunt goal for buck:doe ratios in Washington is greater than 15 bucks per 100 does for most populations, although this may vary depending on the location, species, or subspecies. Recruitment rates and mortality rates also vary substantially depending upon species, subspecies, and location.

## ALL DEER

### Issue Statement:

Deer in Washington are currently managed at the Population Management Unit (PMU) level by WDFW. Most PMUs are made up of more than one Game Management Unit (GMU). Hunting season dates and bag limits are set at the GMU level with the understanding that total harvest will affect the deer population at the PMU level.

### Objective 42:

Determine by 2008 if the current PMU designations for Washington deer populations are representative from a biological standpoint.

### Strategies:

- a. Review the current information available for Washington deer including the primary literature, WDFW reports, federal reports, tribal reports, university research, and contractual reports. Investigate the current information seasonal movements, migrations, critical areas, home range sizes, etc.

- b. Maintain those PMUs that adequately represent deer populations.
- c. Modify those PMUs that do not currently represent deer population movement, activity, and harvest.

## Black-Tailed Deer

### Issue Statement

Of the three types of deer hunted in Washington, black-tailed deer have historically provided the highest number of deer harvested. Black-tailed deer are difficult to survey due to the type of habitat they occupy, making it difficult to detect population changes. Age ratios or sex ratios by themselves are inadequate when trying to detect population growth or decline (Caughley 1977, 1974).

Nonetheless it is incumbent to the process of setting deer harvest objectives to have some estimate or index of the number of animals in the population available for harvest.

### Objective 43:

Determine how well existing survey protocols for black-tailed deer are working by 2005.

### Strategies:

- a. Conduct a literature search for existing population estimate and population index techniques that would be appropriate for black-tailed deer.
- b. Document and/or standardize existing survey protocols for black-tailed deer.
- c. When necessary, develop and standardize new survey protocols for black-tailed deer.
- d. Determine key parameters to monitor for black-tailed deer. Incorporate those parameters in population models. Validate the parameters.

### Issue Statement

Black-tailed deer habitat has been reduced in western Washington due to a reduction in timber harvest and the natural progression of aging timber stands (succession). Annual harvest reports indicate that black-tailed deer numbers are remaining fairly static, however, the number of days per harvested animal would suggest that black-tailed deer may have declined somewhat over the past two decades. To complicate matters further, hunting regulations have varied quite a bit over the years. Because of the terrain they inhabit and the difficulties involved with surveying them, there are still many unknowns about black-tailed deer population dynamics that have yet to be revealed.

### Objective 44:

- i. Maintain black-tailed deer population numbers within habitat limitations.
- ii. Maintain greater than 15 bucks:100 does after the hunting season.
- iii. Maintain both antlered and antlerless opportunity for black-tailed deer at appropriate levels.

### Strategies:

- a. Review the current information available for black-tailed deer including the primary literature, WDFW reports, federal reports, tribal reports, other state agency reports, university research, and contractual reports.
- b. When appropriate, conduct post-hunt population surveys to ascertain population size or index.
- c. When appropriate, conduct post-hunt population survey or conduct mortality studies to ascertain buck survival through the hunt period.
- d. When appropriate, conduct pre-hunt surveys in summer and early fall to measure productivity and to measure

the ratio of bucks per does and the ratio of legal bucks per does.

- e. When possible, influence federal, state, and private landowners to manage western Washington deer habitat to benefit black-tailed deer.

### Mule Deer

#### Issue Statement:

Mule deer population levels are closely tied to severe winter events and are susceptible to over-harvest. 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.

### Objective 45:

- i. Maintain greater than 15 bucks:100 does in post-hunt surveys.
- ii. Define which Population Management Units (PMUs) or Game Management Units (GMUs) will be managed for older age structure in the buck sub-population.
- iii. Increase both antlered and antlerless hunting opportunity for all user groups when appropriate.
- iv. Maintain mule deer populations within tolerance of landowners.

### Strategies:

- a. Conduct post-hunt population surveys to ascertain population size or index.
- b. Conduct post-hunt population survey to ascertain buck survival through the hunt period.
- c. Conduct spring "green-up" surveys to determine winter survival of adults and juveniles and use this information to set special permit quotas and antlerless seasons for the coming fall hunting season.

- d. Conduct pre-hunt surveys in summer and early fall to measure productivity and to measure the ratio of bucks per does and the ratio of legal bucks per does.

Issue Statement:

Another measurement that can be used for deer in North America is a body-condition score measure using ultrasonography. Body-condition scores provide a measure of the deer's energy stores reported as a percentage of body fat. Body-condition scores represent the quantity and quality of forage available to deer and directly relates to their ability to survive and produce young. As part of the cooperative mule deer research study (see research section), federal, state, tribal, utility, and university cooperators and WDFW are developing body-condition baseline scores that will allow this technique to be used for mule deer. This effort is time consuming and very expensive. However, if successful, this technique may also be developed and established for other deer in Washington.

Objective 46:

Develop a baseline set of measurements using body condition ultrasonography for mule deer.

Strategies:

- a. Complete cooperative mule deer research study.
- b. As part of the cooperative mule deer study, report on the development of a body condition score that can be used for Washington mule deer.
- c. If feasible, implement body condition scoring to assess overall health of mule deer and mule deer range.

Issue Statement:

Mule deer populations are more amenable to population surveys than the other two types of deer in Washington. Currently, not all mule deer populations in all parts of the state are being surveyed (Mayer et al. 2002).

Objective 47:

Improve and expand the survey protocols for mule deer by 2008.

Strategies:

- a. Conduct a literature search for existing population estimation techniques that would be appropriate for mule deer.
- b. Document and/or standardize best-case survey protocols for mule deer throughout the state.
- c. When necessary, develop and standardize new survey protocols for mule deer.
- d. Validate existing survey protocols for mule deer.

White-Tailed Deer

Issue Statement:

White-tailed deer population levels are closely tied to severe winter events. 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). Compared to mule deer, white-tailed deer are less susceptible to overharvest. The antlerless component of white-tailed deer populations are often under utilized. Age ratios or sex ratios by themselves are inadequate when trying to detect population growth or decline (Caughley 1977).

Objective 48:

- i. Maintain greater than 15 bucks:100 does in post-hunt surveys.
- ii. Maintain antlered and antlerless hunting opportunity for all user groups if possible.
- iii. Maintain white-tailed deer populations within the tolerance of landowners.

Strategies:

- a. Conduct post-hunt population surveys to ascertain population size or index.
- b. Conduct post-hunt population surveys to ascertain buck survival through the hunt period.
- c. Conduct spring "green-up" surveys to determine winter survival of adults and juveniles and use this information to set special permit quotas for the coming fall hunting season.
- d. Conduct pre-hunt surveys in summer and early fall to measure productivity and to measure the ratio of bucks per does and the ratio of legal bucks per does.
- e. Develop an issue paper that identifies the optimum range of mature bucks in the standing population and in the harvest. The paper will review the current scientific literature and incorporate population-modeling efforts designed specifically for white-tailed deer, and public involvement. The paper will be completed by 2005.

Issue Statement:

Like black-tailed deer, white-tailed deer populations are difficult to estimate in 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 when trying to detect population growth or decline (Caughley 1977).

Objective 49:

Improve and expand the existing survey protocols for white-tailed deer by 2008.

Strategies:

- a. Conduct a literature search of existing techniques.
- b. Consult with statisticians at various universities for latest developments in population estimation.
- c. Document and/or standardize best-case survey protocols for white-tailed deer throughout the state.
- d. Validate existing survey protocols for white-tailed deer.
- e. If necessary, develop a new survey protocol for a population estimate or a population index for white-tailed deer in eastern Washington.
- f. Determine key parameters to monitor white-tailed deer. Incorporate those parameters in population models. Validate the models.

Issue Statement:

Habitat quality and herd health can be expressed through a variety of proxy measurements. One measurement used for white-tailed deer in other parts of North America is the live weight or the dressed, carcass weight of 1.5 year-old males. In those GMUs that allow any buck hunting, carcass weights of field dressed 1.5 year-old males can be readily obtained through check station data collection. Live weight estimates can be made using known conversion factors or measuring chest girth of the animal. Lower than desired 1.5 year-old male weights can be an indicator of deer densities that are too high and may suggest a more aggressive harvest strategy.

#### Objective 50:

Explore the possibility of using 1.5 year-old male weights as a measurement of herd health or habitat condition in those GMUs that allow any buck hunting for white-tailed deer.

#### Strategies:

- a. If possible, develop a range of standardized weights that indicate whether a 1.5 year-old buck is in good, fair, or poor condition.
- b. If necessary, conduct hunting season check stations and collect data on yearling buck carcass weights.
- c. If feasible, correlate yearling buck carcass weights to deer population density and quality of available forage.

### **Recreation Management**

#### All Deer

#### Background:

The recreation goals for deer management are to maintain hunting opportunity, improve hunting quality when possible, provide recreational viewing opportunity when possible, and be responsive to landowner/deer conflicts.

#### Issue Statement:

Deer hunters do not all have similar expectations (Duda et al. 2002a). Some hunters want a high probability of harvesting a mature buck. Others want a high probability of harvesting a legal deer. Meeting the needs of all hunters requires a wide diversity of hunting opportunities spread across the landscape. In some areas of the state, where escape cover for deer is extensive, some any buck opportunities are still available. An example would be some black-tailed deer units west of the Cascades. Other units in western Washington have less escape cover and are

in close proximity to high-density human populations. Still other units have more open terrain and less escape cover. An example would be units with 3-point minimum antler restrictions for either mule deer or white-tailed deer in central and eastern Washington.

#### Objective 51:

Maintain a variety of deer hunting opportunities within each administrative region. Increase antlerless hunting whenever possible.

#### Strategies:

- a. Increase the number of days in the general hunting season when appropriate.
- b. Increase or decrease the number of antlerless special permits when appropriate.
- c. Increase or decrease the number of any deer opportunities when appropriate. Allocate opportunity according to general strategies identified in Chapter 3 under Hunter Regulations.

### **Research**

#### Mule Deer

#### Issue Statement:

In the 1990s mule deer exhibited declines 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 and also high winter mortality due to the severe winter of 1996-97. As a result of this decline, the Department invested in a multi-cooperator, long-term mule deer research project.

#### Objective 52:

Determine the relationship between habitat, predation, body condition and other factors as they relate to Washington mule deer survival and recruitment.

#### Strategies:

- a. Complete Mule Deer Cooperative Study.
- b. Provide information summaries and technical reports to the public.
- c. Present results for the study in a variety of public forums.
- d. Publish the results of the study in the primary, scientific literature.

#### Black-Tailed Deer

##### Issue Statement:

For several years, black-tailed deer in western Washington have been observed with a condition known as hair loss syndrome. Deer suffering from this condition have both internal and external parasites that affect their health. The internal parasite is a muscle worm. The external parasite is a common louse that often affects deer. Deer become hypersensitive to the lice and groom excessively, removing and breaking off hairs. Some deer are affected severely by this condition and die of hypothermia from the hair loss or from verminous pneumonia caused by the larvae of the internal parasite residing in the lungs. Other deer survive the condition and grow new hair the following summer after shedding what is left of their winter coat. Because black-tailed deer are so difficult to monitor, it is unclear whether the mortalities resulting from this condition are having a major impact on the black tailed deer population.

#### Objective 53:

Determine the population level impact to black-tailed deer of hair loss syndrome by 2008.

#### Strategies:

- a. Identify areas with black-tailed deer populations that have a high incidence of hair loss syndrome and populations with low or no levels of hair loss syndrome.
- b. Initiate comparative studies on black-tailed deer populations with high levels of hair loss syndrome and those at lower levels to determine differences in fawn and doe survival.

##### Issue Statement:

The total mortality rate on male black-tailed deer in hunted populations has been, for the most part, unknown. The Department initiated studies on buck mortality in both Region 4 and Region 6 from 1999 through 2001 (WDFW unpubl. data). Initial work suggests that buck mortality in black-tailed deer is quite variable, both between years and between sites. Further work on this topic would help the Department better understand black-tailed deer mortality rates at various locations and under various hunting season regulations.

#### Objective 54:

Develop a better understanding of mortality rates in adult, male black-tailed deer.

#### Strategies:

- a. Identify new locations to conduct black-tailed deer buck mortality studies.
- b. If funding is available, continue the black-tailed deer buck mortality studies initiated in 1999.

## White-Tailed Deer

### Issue Statement:

Due to changes in land use practices and habitat condition, white-tailed deer seem to be expanding in some parts of the state. A substantial amount of speculation is occurring about the impacts of an expanding population of white-tailed deer. There are some questions about the impact of white-tailed deer populations in areas that were formerly inhabited by mule deer. There are also questions about the impact of increasing white-tailed deer populations on large predator populations.

### Objective 55:

Explore the possibility of conducting white-tailed deer research in areas that have increasing white-tailed deer populations and declining mule deer populations.

### Strategies:

- a. Identify areas that have declining populations of mule deer and increasing populations of white-tailed deer.
- b. Explore the possibility of investigating the impact of expanding white-tailed deer populations on mule deer populations.
- c. Explore the possibility of investigating the impact of expanding white-tailed deer populations on large predator populations.

## Habitat Management

### Black-Tailed Deer

#### Issue Statement:

Foraging habitat for black-tailed deer is being lost due to changes in forest practices and the ecological succession of younger aged habitat.

### Objective 56:

Try to maintain or enhance black-tailed deer foraging habitat.

### Strategies:

- a. When funding permits, acquire critical black-tailed deer habitat or conservation easements on critical black-tailed deer habitat.
- b. Work with state, federal, and private land managers to conduct pre-commercial thinnings and commercial thinnings that will benefit black-tailed deer.
- c. Work with state, federal, and private land managers to explore the best size and spacing for clear-cuts that will benefit black-tailed deer.
- d. Work with county government growth management planners to prevent the loss of black-tailed deer habitat.

### Mule Deer

#### Issue Statement:

Mule deer habitat is being lost throughout the western United States due to urban/suburban sprawl, expansion of agriculture into mule deer habitat, fire suppression, and ecological succession of younger aged habitat.

### Objective 57:

Try to maintain or enhance mule deer habitat including forage and security cover. Direct the Department's focus toward mule deer habitat improvement and protection.

### Strategies:

- a. Acquire critical mule deer habitat or conservation easements on critical mule deer habitat.



- b. Work with state, federal, and private land managers to conduct prescribed burns that will benefit mule deer.
- c. Work with county government growth management planners to limit the expansion of human development on mule deer range.
- d. Work with the Mule Deer Foundation to conduct projects that improve winter range for mule deer.

### White-Tailed Deer

#### Issue Statement:

White-tailed deer habitat is expanding due to human development, agricultural expansion, and changes in forest practices.

#### Objective 58:

Try to maintain current status of white-tailed deer habitat.

#### Strategies:

- a. Work with state, federal, and private land managers to conduct prescribed burns that will benefit mule deer and not expand white-tailed deer habitat.
- b. Work with county government growth management planners to limit the expansion of white-tailed deer habitat due to human development.

## Information and Education

### All Deer

#### Issue Statement:

The general public has an interest in deer from more than a consumptive standpoint (Duda 2002b). Information for the general public pertaining to deer needs to be expanded.

#### Objective 59:

Provide more information regarding deer biology and deer issues to the general public.

#### Strategies:

- a. Interact with local outdoor groups to discuss deer management topics.
- b. Produce new informational handouts for black-tailed, white-tailed, and mule deer on deer biology and natural history. Provide this information to the general public and the regional offices and headquarters.
- c. Incorporate deer information in WDFW's Go Play Outside program.
- d. Update and continue to produce the chronic wasting disease (CWD) handout, fact sheet, and web site.
- e. Publish two news articles regarding watchable deer opportunities.
- f. Update and improve the Department's current brochure on "Identification and Age Determination of Washington Deer and Elk" by 2005.
- g. Investigate the possibility of writing and publishing a book about the deer and elk of Washington using outside cooperators and outside funding sources. Determine feasibility of the project by 2008.

## Damage and Depredation

### All Deer

#### Issue Statement:

Deer cause agricultural damage. Expansion of agricultural operations on deer range has increased in the last 20 years. Conflicts between deer and the agricultural community will continue to grow as human activity expands across traditional deer habitat.

Objective 60:

Reduce damage caused by deer.

Strategies:

- a. Identify priority areas for deer caused damage.
- b. Focus more attention on prevention of damage to reduce the number of lethal removals and the number of cash payments made by the Department.
- c. Increase antlerless harvest in damage areas using all three major weapon groups (archery, muzzleloader, and modern firearm) when appropriate.
- d. Offer early and late season hunts specific to damage areas for muzzleloader and modern rifle hunters.
- e. Increase harassment factor in chronic damage areas using archery hunters.
- f. Explore the possibility of using more hunters with disabilities to deal with damage problems.

**Disease**

All Deer

Issue Statement:

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

Objective 61:

Monitor deer for disease and reduce the risk of disease when possible.

Strategies:

- a. Continue to monitor for chronic wasting disease (CWD).
- b. Develop a prevention plan by December 2002 to reduce the risk of CWD entering Washington.

- c. Enforce the current regulations that prevent the captive farming of native deer and elk in Washington.
- d. Develop a contingency plan by December 2002, in the event that CWD is ever found in Washington.
- e. Continue to monitor for epizootic hemorrhagic disease (EHD).
- f. Continue to monitor for adenovirus hemorrhagic disease (AHD).
- g. Continue to monitor for tuberculosis.
- h. Continue to monitor the affects of hair loss syndrome on black tailed deer populations (see research section).

**LITERATURE CITED**

Bender, L. C. and R. D. Spencer. 1999. Estimating elk population size by reconstruction from harvest data and herd ratios. *Wildlife Society Bulletin* 27:636-645.

Caughley, G. 1974. Interpretation of age ratios. *Journal of Wildlife Management* 38:557-562.

Caughley, G. 1977. Analysis of vertebrate populations. John Wiley and Sons, London, England.

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

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 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, Virginia, USA.

- 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, editor Research and management techniques for wildlife and habitats. Fifth edition. The Wildlife Society, Bethesda, Maryland, USA.
- \_\_\_\_\_, C. S. Rosenberry, and M. C. Conner. 2000. Population parameters and their estimation. Pages 64-83 in S. Demarais and P. R. Krausman, editors Ecology and management of large mammals in North America. Prentice-Hall, Inc., Upper Saddle River, New Jersey, USA.
- M. S. Mayer, T. K. Fuller, R. D. Deblinger, and J. E. McDonald Jr. 2002. Can low-precision population and survival estimates of deer be accurate? *Wildlife Society Bulletin* 30:440-448.
- McCullough, D. R. 1987. The theory and management of *Odocoileus* populations. Pages 535-549 in C. M. Wemmer, editor Biology and management of the *Cervidae*. Smithsonian Institution, Front Royal, Virginia, USA.
- Roseberry, J. L., and A. Woolf. 1991. A comparative evaluation of techniques for analyzing white-tailed deer harvest data. *Wildlife Monograph* No. 17.
- Samuel, M. D., E. O. Garton, M. W. Schlegel, and R. G. Carson. 1987. Visibility bias during aerial surveys of elk in north-central Idaho. *Journal of Wildlife Management* 51:622-630.
- Washington Department of Fish and Wildlife. 2001. 2001 Game status and trend report. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

# BIGHORN SHEEP

## POPULATION STATUS AND TREND

Washington State has approximately 1,100 bighorn sheep (*Ovis canadensis*) distributed in 16 herds. Of those, 11 herds are California bighorn sheep and five are Rocky Mountain bighorn sheep (Figure 1). Average herd size is 69 sheep, and ranges from 24 to 173 sheep. Populations are stable to increasing in 11 herds and declining in five herds, where diseases and parasites are the primary causes for decline.

## RECREATIONAL OPPORTUNITY

Currently, only California bighorn sheep are hunted in Washington, as populations of Rocky Mountain bighorns are still recovering from the *pasteurella* die-off. In Washington, hunters typically pursue mature rams. Therefore, harvest thresholds are based on total population size, sex structure, and the number of mature rams in a herd. Hunting opportunity is allocated by permit drawing and is a once in a lifetime opportunity (except for raffle and auction permit holders). The number of controlled hunt applications received

annually ranges from 1,000-4,500, which averages approximately 151 applications per bighorn sheep hunting permit. Statewide, permit levels have ranged from 9-22 and hunter success is high (92%).



## DATA COLLECTION

The Department surveys each herd one or two times annually, using either aerial or ground surveys. Surveys typically are conducted during lambing or rutting periods and data are used to estimate lamb recruitment, sex ratio, adult survival, population size, 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.

## 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.



**Figure 1. Bighorn sheep herds in Washington, 2002.**

3. Manage statewide bighorn sheep populations for a sustained yield.

## **ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES**

### **Habitat Management**

#### Issue Statement:

Habitat quality influences bighorn sheep reproduction, survival, and abundance. Unfortunately, habitat conditions are deteriorating in many bighorn herds, primarily due to the spread of noxious weeds, poor forage growth, and forest encroachment. To improve habitat quality for bighorn sheep, there is a need to conduct various habitat improvement projects, as the need and opportunity arises, in several herds.

#### Objective 62:

Conduct habitat improvement projects on  $\geq 10\%$  of the habitat in bighorn ranges in Vulcan Mountain, Swakane, and the Blue Mountains.

#### Strategies:

- a. Inventory and map habitat conditions.
- b. Conduct controlled burns to improve habitat quality.
- c. If not detrimental to other habitat or wildlife objectives, consider distributing fertilizer and herbicides to improve forage quality.
- d. Distribute mineral blocks to supplement forage quality.
- e. Distribute water sources to improve habitat quality.
- f. Pursue other activities that enhance desirable native plant communities.

### **Population Management**

#### Issue Statement:

Washington's bighorn sheep populations are few in number, isolated, and relatively small. To address these concerns, relocation is used as a tool to increase sheep abundance and link populations. With this comes the need to prioritize potential relocation areas, while considering funding limitations, availability of sheep, social-economical concerns, and biological merit.

#### Objective 63:

Develop a prioritized list of potential bighorn sheep relocation areas by January 2003.

#### Strategies:

- a. Prioritize potential relocation areas using a geographical information system (GIS), coupled with various landscape variables (e.g., forage, cover, and anthropogenic activities), and a meta-population analysis.
- b. Prioritize potential relocation areas based on cooperative agreements, collaborations, and funding availability.
- c. Prioritize potential relocation areas using on-the-ground habitat evaluations.

#### Issue Statement:

Relocation is used as a tool to establish new populations and augment existing ones. 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).

#### Objective 64:

Establish two new bighorn sheep herds by 2008.

Strategies:

- a. Relocate sheep from existing herds in Washington or out-of-state herds.
- b. Allow the establishment of new herds through natural colonization of bighorn sheep.
- c. Re-establish the Tucannon herd as Rocky Mountain bighorns instead of California bighorns.

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 65:

Maintain bighorn sheep population size as indicated in Table 1.

**Table 1. Population size objectives for specific bighorn sheep herds.**

Herd	Population Size	
	Current	Desired <sup>b</sup>
Hall Mountain <sup>a</sup>	29	40-70
Asotin Creek <sup>a</sup>	38	50-60
Black Butte <sup>a</sup>	80	300
Wenaha <sup>a</sup>	65	140
Cottonwood Creek <sup>a</sup>	27	50-60
Tucannon	27	60-70
Vulcan	24	80-110
Mt. Hull	65	55-80
Sinlahekin	30	50
Swakane	53	50-60
Quilomene	165	250-300
Umtanum(+Selah Butte)	173	250-300
Cleman Mountain	156	140-160
Lincoln Cliffs	95	60-70
Lake Chelan	46	100-150
Tieton River	37	75-150
<b>Total</b>	<b>1,110</b>	<b>1,750-2,130</b>

<sup>a</sup> Rocky Mountain bighorn sheep

<sup>b</sup> Based on biologists estimates of habitat capacity, including forage, escape cover, and water sources

Strategies:

- a. For herds that are exceeding population goals trap and relocate sheep to an alternate area.
- b. For herds that are exceeding the desired population size, establish ewe harvest opportunities as indicated in *Objective 68, Strategy g*.
- c. For herds that are below the desired population size, consider restricting harvest (see *Objective 68, Strategy d*) and augmenting the population.

Issue Statement:

Bighorn sheep populations are sensitive to over-exploitation because of their low population growth rate and low population size (Berger 1990). As such, assessing the status of each bighorn population annually is necessary to ensure sustainability.

Objective 66:

Monitor bighorn sheep herds at a level where a 20% change in population size can be detected within 3-years or less.

Strategies:

- a. Estimate minimum number of sheep, ram:ewe ratio, and ewe:lamb ratio annually for each herd.
- b. Develop a sightability correction factor to estimate population size from annual surveys (Bodie et al. 1995).
- c. Use radio collared sheep to enhance sightability of sheep during surveys.
- d. Use population models to estimate changes in population size.

Issue Statement:

Certain types of *Pasteurella* spp. are pathogenic and produce acute bacterial pneumonia in bighorn sheep (Foreyt and Jessup 1982). The occurrences of lethal strains of *Pasteurella* in bighorns are most

commonly associated with overlapping ranges of bighorn and domestic sheep; as *Pasteurella* is commonly found in domestic sheep. There are many uncertainties about the mode of transmission, vulnerability, and other epidemiological factors of *Pasteurella* (Martin et. al 1996). However, given the present state of knowledge, the current management practice used throughout North America to prevent the disease in bighorn sheep is to eliminate interactions between domestic sheep and bighorn sheep (Schommer and Woolever 2001).

#### Objective 67:

Eliminate interactions between domestic sheep and bighorn sheep in the Swakane herd, Hells Canyon herds, Cleman Mountain, and areas identified for repatriation of bighorn sheep.

#### Strategies:

- a. Maintain at least a 9-mile buffer between domestic sheep and bighorn sheep (BLM 1998).
- b. Pursue the purchase of grazing leases and conservation easements.
- c. Develop physical or habitat barriers between domestic and bighorn sheep.
- d. Work with livestock producers to reduce transmission of disease and parasites from domestic sheep to bighorns.

## 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 healthy bighorn sheep populations.

#### Objective 68:

Provide recreational hunting season opportunities for individual bighorn sheep herds where harvest success averages  $\geq 85\%$  over a 3-year period, while at the same time bighorn population size remains stable or increasing.

#### Strategies:

- a. Conduct bighorn sheep hunts by permit only and allow harvest of any ram.
- b. Do not hunt transplanted animals for at least five years after initial release to ensure success of the transplant.
- c. Survey herds annually for at least two years prior to being hunted to determine size, composition, and trend.
- d. Set ram permit levels as indicated in Table 2.
- e. Adjust permit levels for herds bordering other states and provinces to account for management activities of these other areas.
- f. 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.
- g. Use trap and relocation as the primary method of reducing overpopulated herds. Consider ewe harvest as a secondary method, with the following conditions:
  - Ewe permits should not exceed 10-20% of the adult ewe population.

- A harvested ewe would not count toward the one sheep a hunter can harvest in a lifetime.

**Issue Statement:**

The number of bighorn sheep applications/permit makes the odds of drawing a permit low (151 applications/available permit). As such, there is a need for a fair and equitable approach for allocating permits while maintaining a quality hunt experience.

**Objective 69:**

Distribute recreational opportunity to as many individuals as possible, compatible with high quality sheep hunting experiences and the biological status of bighorn populations.

**Strategies:**

- Allow bighorn sheep hunting by permit only.\*
- Allow "once-during-a-lifetime" opportunity for bighorn sheep hunters.\*
- Consider developing a preference point system consistent with deer and elk systems.
- Consider other alternatives to reduce crowding.

\*Strategy is currently implemented.

**Issue Statement:**

Bighorn sheep claim a strong aesthetic value throughout most western states. However, because bighorns have a relatively small range in Washington, viewing opportunities are limited. Where viewing opportunities do exist, they have proven to be extremely popular with the public.

**Objective 70:**

Develop viewing opportunities for two bighorn sheep herds.

**Strategies:**

- Develop vehicle tour and education board for bighorn sheep viewing areas.
- Develop a web-cam viewing opportunity for bighorn sheep.

**Information and Education**

**Issue Statement:**

Bighorn sheep were extirpated from Washington by the early 1900s. However, by securing critical habitats and transplanting sheep, bighorns have slowly recovered. As bighorns continue to do well in Washington, it's important to inform the public about the biology and management of bighorn sheep, as well as their ecological role in the ecosystem.

**Table 2. Permit levels for all bighorn sheep herds (see example below).**

Permit level is...	...when the herd has...			
	Population Size a	Ram:ewe ratio	Number rams with > 1/2 curl b	> 3/4 curl c
20% of the mature rams <sup>d</sup>	≥30	>50:100	8	2
15% of the mature rams <sup>d</sup>	≥30	25-50:100	8	2
10% of the mature rams <sup>d</sup>	≥30	<25:100	8	2

<sup>a</sup> Total population size, excluding lambs. Population must be stable or increasing.

<sup>b</sup> Used as a measure of >3-year-old rams.

<sup>c</sup> Used as a measure of >6-year-old rams.

<sup>d</sup> Rams ≥ 1/2 curl.

For example, the permit level for herd X is 15% of the mature ram population because the total population size is >30 sheep, the ram:ewe ratio is between 25-50 rams per 100 ewes, and the number of rams with 1/2 curl is >8 and at least 2 of those 8 rams are >3/4 curl.



#### Objective 71:

Provide educational information on bighorn sheep to at least 50,000 people annually and emphasize contribution of hunters to bighorn sheep recovery.

#### Strategies:

- a. Develop a brochure describing bighorn sheep ecology and management, threats from disease, as well as their history in Washington.
- b. Develop educational viewing opportunities for bighorn sheep (see Objective 70).
- c. Discuss bighorn sheep management at public forums.
- d. Develop segment for Wild About Washington video.

#### Enforcement

##### Issue Statement:

There are only about 1,100 bighorn sheep in Washington. So any illegal harvest or harassment has the potential to impact populations. Unfortunately, the rarity and majestic nature of mature rams (i.e., their horns) makes them likely targets for illegal take.

#### Objective 72:

Account for all known bighorn sheep mortalities.

#### Strategies:

- a. Permanently mark the horns of all dead bighorn sheep rams that are recovered from the field.\*
- b. Require mandatory reporting for all bighorn sheep hunters.\*

\* Strategy currently is implemented.

#### Research

##### Issue Statement:

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

#### Objective 73:

Acquire biological information that aids in bighorn management.

#### Strategies:

- a. Investigate parasite outbreak in the Vulcan Mountain herd.
- b. Investigate the recovery of bighorn sheep from *pasteurella* in Hells Canyon.
- c. Investigate the impacts of predation on recently established herds or herds with fewer than 100 animals.
- d. Investigate the probability of interactions between bighorn sheep and domestic sheep in areas where the two overlap.
- e. Investigate inbreeding effects among bighorn sheep.

#### LITERATURE CITED

- Bailey, J. A. 1992. Managing bighorn habitat from a landscape perspective. Biennial symposium of northern wild sheep and goat council 8:49-57.
- Berger, J. 1990. Persistence of different-sized populations: an empirical assessment of rapid extinctions in bighorn sheep. Conservation biology 4:91-98.
- 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.

- Bureau of Land Management. 1998. Revised guidelines for management of domestic sheep and goats in native wild sheep habitats. Instruction Memorandum No. 98-140.
- Foreyt, W.J. 1989. Fatal Pasteurella hemolytica pneumonia in bighorn sheep after direct contact with clinically normal domestic sheep. American Journal of Veterinary Research 50:341-344.
- \_\_\_\_\_, and D. A. Jessup. 1982. Fatal pneumonia of bighorn sheep following association with domestic sheep. Journal of Wildlife Diseases 18:163-168.
- Martin, K. D., T. Schommer, and V. L. Coggins. 1996. Literature review regarding the compatibility between bighorn and domestic sheep. Biennial symposium of northern wild sheep and goat council 10:72-77.
- Schommer, T. and M. Woolever. 2001. A process for finding management solutions to the incompatibility between domestic and bighorn sheep. Forest Service. Washington D.C., USA.

# MOUNTAIN GOAT

## POPULATION STATUS AND TREND

Mountain goat (*Oreamnos americanus*) populations have been on the decline in Washington for many years. Historically, goat populations may have been as high as 10,000 animals. Today goats likely number fewer than 4,000. Hunting opportunity has decreased accordingly, and current permit levels are conservative and represent 4% of the known population in herds that are stable to increasing. Despite reductions in hunting opportunity many local goat populations continue to decline. However, a few populations are doing well. Goat populations along the southern Cascades, the north shore of Lake Chelan, and the Methow region appear to be stable to slightly increasing.

## 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 over hunting, seasons were restricted in 1917, and all hunting closed by 1925. Later, goat populations rebounded and hunting resumed in 1948. Since 1948 mountain goat hunting opportunity has been limited by permit.

Unfortunately, goat abundance has decreased dramatically over the last decade. As such, hunting opportunity has declined from 218 permits in 1991 to 26 permits in 2001 – about a 9% decline/year. The number of permit applications received annually tends to range from 2,000 to 4,200, which averages about 42-applications/mountain goat permit. The hunting season for mountain goat is

generally about 47 days (September 15 to October 31) and harvest success averages 63% ( $n = 9$  years).



Currently, mountain goat hunting is an once-in-a-lifetime opportunity. Hunters may harvest any adult goat with horns >4 inches, although hunters are urged not to harvest a nanny and it's unlawful to harvest a nanny accompanied by kids. During the 2001 season, only a fraction of the mountain goat range was open to hunting, with 24 permits in 11 goat units (Figure 1).



**Figure 1. Historic mountain goat distribution and current hunting units for goats.**

## DATA COLLECTION

For many years, funding limitations greatly reduced the Department's ability to conduct thorough and consistent surveys. However, during the last three years, funding from cooperative grant sources, and auction and

raffle revenue, allowed the Department to survey all goat units open to hunting. All surveys were conducted using a helicopter and generally occurred between July and September. Because the funding level hasn't been enough to survey all goat units, hunted units have been the priority. As such, no consistent survey effort has been accomplished during the last five years for goat units closed to hunting.

## **MOUNTAIN GOAT MANAGEMENT GOALS**

The statewide goals for mountain goats are:

1. Preserve, protect, perpetuate, and manage mountain goats and their habitats to ensure healthy, productive populations.
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.

## **ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES**

### **Habitat Management**

Issue Statement:

Mountain goat populations typically occur as meta-populations scattered across the landscape on "habitat islands" where structural and vegetative characteristics are suitable for goats. The sizes and distribution of these islands of suitable habitats are largely unknown in Washington. Understanding the juxtaposition and quality of these habitats and their potential carrying capacity is critical for sustainable management of mountain goats.

Objective 74:

Develop a document identifying the locations and quality of suitable mountain goat habitat in Washington.

Strategies:

- a. Map goat habitats from a review of historic distribution and local expertise of all mountain goat sub-herds.
- b. Conduct surveys to determine locations and quality of suitable goat habitats.
- c. Develop a GIS model predicting quality and locations of suitable mountain goat habitats.
- d. Develop cooperative partnerships for mapping suitable goat habitats.

### **Population Management**

Issue Statement:

Mountain goat populations are sensitive to over-exploitation because of their low population growth rate and relatively low densities (Cote et al. 2001, Gonzales-Voyer et al. 2001). As such, assessing the status of each mountain goat population annually is necessary to ensure sustainability.

Objective 75:

Monitor population demographics of mountain goats at a level where a 20% decline in population size can be detected within 3-years or less.

Strategies:

- a. Survey all goat populations annually to estimate minimum population size and recruitment.
- b. As a supplemental data source, estimate goat population trends annually through hunter reports.
- c. Develop a sightability model to estimate population size from annual surveys.

- d. Re-define goat unit boundaries if spatial use patterns of distinct populations are inconsistent with current unit boundaries.

### **Recreation Management**

#### Issue Statement:

In most native mountain goat populations, recovery from population reductions is relatively slow (Cote and Festa-Bianchet 2001). This is the result of the low reproductive potential, extended parental care, low juvenile survival, and older age of sexual maturity in mountain goats. Given these demographic characteristics, the population growth rate of goats is sensitive to exploitation. As a result, harvest levels for mountain goats should be restricted to levels that approximate recruitment and the status of goat populations should be evaluated annually (Cote et al. 2001).

#### Objective 76:

Provide recreational hunting opportunities in individual mountain goat herds where harvest success averages  $\geq 50\%$  over a 3-year period, while at the same time goat population size remains stable or increasing.

#### Strategies:

- a. Goat populations will be surveyed annually beginning at least three years prior to being hunted to determine population size, herd composition, and trend.
- b. For populations to be hunted, surveys must indicate:
- c. Population size of at least 50 goats (Oldenburg 1991).
- d. Average production ratio of at least 25 kids:100 non-kids over a 3-year period.
- e. For herds meeting the above criteria, permits shall be issued to limit the goat harvest to 4% of the estimated local population (excluding kids) (Hebert and

Turnbull 1977, Kuck 1977, Cote et al. 2001).

- f. For each hunted population, nanny harvest will be maintained at or below 30% of the total harvest. This will be accomplished by:
  - 1. Requiring all goat hunters to view an educational video on mountain goat sex identification.
  - 2. Restricting hunting opportunity for populations with excess nanny harvest for three years of a 5-year period.
- g. Populations declining due to disease or high parasite loads may still be hunted but harvest generally will be reduced or possibly terminated depending on population size and rate of decline.

#### Issue Statement:

The number of goat applications/permit has steadily increased from 11 in 1992 to 182 in 2001. There is a need for a fair and equitable approach for allocating goat permits while maintaining a quality hunt experience.

#### Objective 77:

Distribute recreational opportunity to as many individuals as possible, compatible with high quality goat hunting experiences and the biological status of goat populations.

#### Strategies:

- a. Allow mountain goat hunting by permit only.\*
- b. Allow "once-during-a-lifetime" opportunity for mountain goat hunters.\*
- c. Consider other alternatives to reduce crowding.

\*Strategy is currently implemented.

#### Issue Statement:

Mountain goats are intriguing to many people. However, goats are a species that occur in low densities and typically occur in areas far from human disturbances. Nonetheless, some mountain goat populations are visible from roads, but viewing opportunities are limited.

#### Objective 78:

Develop one viewing opportunity for mountain goats.

#### Strategies:

- a. Develop a web-cam viewing opportunity for mountain goats.
- b. Develop vehicle tour and education board for mountain goat viewing areas.

### **Information and Education**

#### Issue Statement:

The public is not engaged in the recovery of declining goat populations. The public either is not aware of the status of mountain goats or lacks the necessary information to make informed decisions.

#### Objective 79:

Provide educational information on mountain goats to at least 50,000 people annually.

#### Strategies:

- a. Develop a brochure describing mountain goat ecology and history of Washington's populations and their locations.
- b. Develop an educational viewing opportunity and information website.
- c. Discuss management of mountain goats at public forums.
- d. Develop segment for Wild About Washington video.

### **Enforcement**

#### Issue Statement:

Mountain goats naturally occur as bands of relatively low-density meta-populations. The scattered nature of these bands, plus the marginal status of some specific mountain goat populations make illegal harvest or harassment a potentially critical factor. To ensure the sustainability of specific sub-populations, and the long-term existence of the entire meta-population, it's important to document all mortalities, and minimize illegal harvest and harassment of mountain goats.

#### Objective 80:

Develop a procedure to account for all mountain goat harvest mortalities.

#### Strategies:

- a. Require reporting of all harvested mountain goats.\*
- b. Permanently mark all known mountain goat mortalities.

\* Strategy currently is implemented.

### **Research**

#### Issue Statement:

Mountain goat abundance has declined steadily over the last decade throughout much of their historic range. Little is known about the cause of the decline or the necessary steps to reverse the trend.

#### Objective 81:

Develop a peer-reviewed publication that describes at a minimum, why mountain goat populations are declining, how to reverse the decline, and how to monitor goat populations.

Strategies:

- a. Conduct a mountain goat research project investigating the cause of the goat decline.
- b. Solicit funding to sustain a five-year research project.
- c. Encourage partnerships with interested stakeholders to fund and participate in mountain goat research projects.

**LITERATURE CITED**

Cote, S. D. and M. Festa-Bianchet. 2001. Reproductive success in female mountain goats: the influence of age and social rank. *Animal Behavior* \_\_\_\_\_, 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.

Hebert, D. M., and W. G. Turnbull. 1977. A description of southern interior and coastal mountain goat ecotypes in British Columbia. *Proceedings of the International Mountain Goat Symposium* 1:126-146.

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.

Oldenburg, L. 1991. Species management plan 1991-1995: Moose, sheep, and goat. Idaho Department of Fish and Game. Boise, Idaho, USA.

# MOOSE

## POPULATION STATUS AND TREND

The number of moose (*Alces alces*) in Washington has increased from about 60 in 1972 to 850-1,000 in 2002, corresponding to about a 9.6% annual increase in population size (Poelker 1972, Zender, pers. Commun.). This increase is the result of both increased moose density in prime habitats and colonization of moose into new areas. Today, moose occur in the northeastern counties of Ferry, Pend Oreille, Stevens, and Spokane (Figure 1). Moose are occasionally spotted in Lincoln, Whitman, Okanogan, and Whatcom Counties, and a few dispersing animals have been documented in surrounding areas.



**Figure 1. Occupied moose range in Washington, 2002.**

## 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. Since 1977, moose hunting has been limited by permit and the demand for moose hunting is high. The number of applications for moose permits has ranged from 1,214–8,623, corresponding to about

63–152 applications/permit (1992–2001 seasons).



Currently, moose hunts are by permit only and, if drawn, it is an once-in-a-lifetime opportunity (except youth-only 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. Antlerless only hunts are typically associated with population control efforts near suburban areas. Hunters typically see seven moose/day and, as such, harvest success is high (mean = 91%; 1992–2002). All moose hunters are required to report their hunting activities, regardless of whether they harvest a moose or not.

## DATA COLLECTION

The Department conducts aerial surveys of all moose populations once every 1 to 3-years. Surveys typically are conducted during early winter and data are used to estimate calf recruitment, sex ratio, and 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.



## **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.

## **ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES**

### **Habitat Management**

Issue Statement:

Moose are expanding both in abundance and range in Washington. However, the quantity and quality of moose habitat has not been evaluated or mapped. Therefore, the potential density and range expansion of moose is unknown.

Objective 82:

Develop a document that identifies the distribution and quality of moose habitat in Washington State.

Strategies:

- a. Conduct literature review on moose habitat requirements.
- b. Conduct a survey to assess the quality of moose habitats.
- c. Develop a GIS model to predict moose range and the quality of moose habitats.
- d. Develop cooperative partnerships to assess the quality of moose habitats.

## **Population Management**

Issue Statement:

Currently, the status of moose populations is estimated through aerial surveys that are conducted on a three-year rotation (i.e., all units surveyed once every three years). The efficacy of the data collected to serve as an indicator of population sustainability is unknown and has not been quantified.

Objective 83:

Monitor population demographics of moose at a level where a 20% decline in population size can be detected within three years.

Strategies:

- a. Conduct helicopter surveys for all moose population annually to estimate minimum abundance, bull:cow ratios, and cow:calf ratios.
- b. Develop a sightability correction factor to estimate relative moose density from aerial surveys.
- c. Develop an index (e.g., snow track or pellet group) to estimate moose density.
- d. As a supplement data source, develop a mechanism to estimate moose population trends through hunter reports and public sightings.

## **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. In doing so, the Department manages moose harvest as a high quality hunting opportunity, with moderate densities of moose and ample numbers of mature bulls. The result is a relatively high harvest success (mean = 91%) and post-

season bull: cow ratios that are favorable for healthy moose populations.

**Objective 84:**

Provide recreational hunting opportunities in individual moose herds where harvest success averages  $\geq 85\%$  over a three year period, while at the same time moose population size remains stable or increasing.

**Strategies:**

- a. Moose populations will be surveyed annually beginning at least two years prior to being hunted to determine size, composition, and trend.
- b. Moose harvest will be prescribed as follows:
  - Maintain  $\geq 90\%$  adult bulls in total harvest (Boer and Keppie 1988).
  - Maintain 10-30% antlerless moose in total harvest in areas where moose present a threat to human safety or property damage (Boer and Keppie 1988).
- c. Consider liberalizing or restricting moose hunting opportunity as indicated in Table 1.

**Issue Statement:**

Since 1991, the average number of moose applications/permit was 104 (range = 63–152). Given the high demand for hunting moose, there is a need for a fair and equitable approach for allocating moose permits while maintaining a quality hunt experience.

**Table 1. Moose harvest guidelines.**

Parameter <sup>a</sup>	Harvest		
	Liberalize	Acceptable	Restrict
Average bull:100 cow ratio	>75 bulls	60-75 bulls	<60 bulls
Average calf:100 cow ratio <sup>b</sup>	>50 calves	30-50 calves	<30 calves
Median age of harvested bulls	>6.5 years	4.5-5.5 years	<4.5 years

<sup>a</sup> Averaged over a 3-year period

<sup>b</sup> Modified from Courtois and Lamontagne 1997

**Objective 85:**

Distribute recreational opportunity to as many individuals as possible, compatible with high quality moose hunting experiences and the biological status of moose populations.

**Strategies:**

- a. Allow moose hunting by permit only.\*
- b. Allow “once-during-a-lifetime” opportunity for moose hunters (except youth-only antlerless moose hunts, and auction and raffle hunts).\*
- c. Consider developing a preference point system consistent with deer and elk systems.
- d. Consider other alternatives to reduce crowding.

\*Strategy currently is implemented.

**Information and Education**

**Issue Statement:**

The Department has limited information available for the public on moose ecology, population status, and management. To encourage public involvement in moose, there is a need for additional educational materials.

**Objective 86:**

Develop educational document regarding moose in Washington.

**Strategies:**

- a. Develop a brochure describing moose

ecology and management in Washington.

- b. Expand WDFW's website regarding moose to include basic biology, population statistics, and management.

### **LITERATURE CITED**

Boer, A. H., and D. M. Keppie. 1988. Modelling a hunted moose population in New Brunswick. *Alces* 24:201-217.

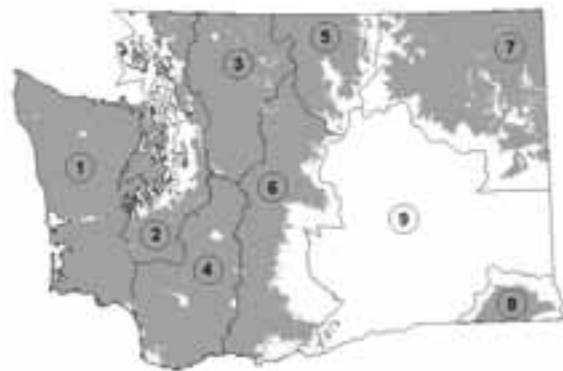
Courtois, R., and G. Lamontagne. 1997. Management systems and current status of moose in Quebec. *Alces* 33:97-114.

Poelker, R. J. 1972. The Shiras moose in Washington. Technical Report. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

# BLACK BEAR

## POPULATION STATUS AND TREND

Washington State has an abundant and healthy black (*Ursus americanus*) bear population. Statewide, there are an estimated 25,000-30,000 bears and regional populations are likely stable to slightly increasing (Washington Dept. of Fish and Wildlife 1997). For management purposes, the state is divided into nine black bear management units (BBMUs) (Figure 1). Harvest levels vary between BBMU depending on local population dynamics and conditions. To maintain stable bear populations, modifications to harvest levels are made on a three-year rotation. The percentage of females in the total harvest and median ages of males and females are used as indicators of exploitation (Beecham and Rohlman 1994) (Table 1).



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

## RECREATIONAL OPPORTUNITY

Black bear seasons have changed considerably over the last 10 years. Washington voters passed Initiative 655 (which banned the use of bait and dogs for hunting black bear) in the November 1996

general election. Therefore, the use of bait and hounds for the hunting of black bear became illegal for the 1997 season. In an effort to mitigate the anticipated decrease in bear harvest, as a result of I-655, 1997 bear seasons were lengthened and the bag limit was increased in some areas. Legislation also was passed that provided the authority to the Fish and Wildlife Commission to reduce costs for black bear transport tags; an effort to increase the number of bear hunters and, therefore, bear harvest. As a result of these efforts, the post I-655 black bear harvest has stabilized similar to previous levels.



## DATA COLLECTION

No formal surveys are conducted in Washington for black bears. In the recent past, Washington Department of Fish and Wildlife conducted bait station surveys as an index of relative bear abundance. However, an analysis of statistical power indicated that at the level of survey intensity (limited by funding), managers would not be able to detect a change in bear abundance using bait stations (Rice et al. 2001). As such, the survey technique was discontinued. Ideas for future survey efforts are being planned and will likely focus on monitoring

**Table 1. Statewide black bear harvest, hunter effort and median age information, 1991 - 2000.**

Year	Male	Female	Total	# hunters	Success	Hunter Days	Days per kill	Median Age		
								Males	Females	% females
1991	876	503	1,379	10,839	13%	84,771	61	3.5	4.5	36%
1992	921	521	1,442	13,642	11%	98,434	68	4.5	4.5	36%
1993	986	521	1,507	12,179	12%	102,558	68	3.5	5.5	35%
1994	654	419	1,073	11,530	9%	110,872	103	3.5	4.5	39%
1995	850	368	1,218	11,985	10%	102,859	84	3.5	4.5	30%
1996	951	359	1,310	12,868	10%	104,431	80	4.5	5.5	27%
1997	546	298	844	11,060	8%	97,426	115	4.5	5.5	35%
1998	1,157	645	1,802	20,891	9%	216,456	120	4.5	5.5	36%
1999	757	349	1,106	37,033	3%	481,319	435	4.5	5.5	32%
2000	777	371	1,148	37,401	3%	296,849	259	4.0	6.0	32%

adult female survival and capture-recapture via DNA or resight methods.

**HUMAN-BEAR CONFLICT**

Bears and humans are often in conflict given the distribution of bears in Washington and their adaptability to suburban environments. Approximately 300-600 human-bear interactions are documented annually (Washington Dept. of Fish and Wildlife 2001). There is a tendency to equate levels of human-bear interactions with bear abundance. However, bear nuisance and damage activity may not be a good indicator of population status, but more likely reflects the variability of environmental conditions. For example, in 1996 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.

**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. Washington also has one of the largest black bear populations in all of the lower 48 states. 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 bear is generally good.

**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 threats to public safety and property damage from black bears, 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.

## **ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES**

### **Population Management**

#### ***Population Status***

##### 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, while at the same time evaluating harvest data to assess long-term trends (Clark 1999).

##### Objective 87:

Monitor population demographics of black bears at a level where a 20% change in population size can be detected within three years or less.

##### Strategies:

- a. Develop a survey method to estimate female and cub survival of bears in BBMUs where declines are suspected (excluding BBMU 9).
- b. Estimate population growth using population reconstruction and modeling.
- c. Use sex and age ratio's of harvest bears as secondary indicator of population change.

#### ***Sources and Sinks***

##### Issue Statement:

Black bear population size is not constant throughout all areas of Washington State. Factors that influence bear populations, such as food availability and human-induced mortality, vary from region to region and certain areas of the state may act as bear "source" or "sink" areas. "Sources" are those areas where food availability is relatively high and bear mortality is low. As a result, the area acts as a source population for bears to migrate out of and into surrounding habitats. "Sinks" are those areas where food availability is relatively low and bear mortality is high. As a result, the area acts as a sink where bears that migrate into the area have a low chance of surviving (Clark 1999).

The distribution and effects of source and sink areas are important for managing black bears. The existence of source and sink areas, and the potential effects, has not been investigated in Washington State.

##### Objective 88:

Identify black bear habitats that act as a population source or sink.

##### Strategies:

- a. Evaluate and map food availability in each BBMU.

- b. Identify lands where food availability and bear survival are high.
- c. In BBMU where population declines are suspected, evaluate bear survival.
- d. Identify priority areas where management changes may be necessary.

- e. Conduct a public opinion survey of black bear management by 2007.
- f. Make any changes to current bear hunting on a gradual basis to promote public involvement.

## **Recreation Management**

### ***Public Opinions***

#### Issue Statement:

Public support for hunting black bears is lower than support for hunting several other big game animals (Duda et al. 2002). Recognizing public and hunter attitudes, WDFW faces challenging decisions about balancing hunter opportunities and public safety with public attitudes.

#### Objective 89:

Implement management strategies that are consistent with the biological status of black bear and public attitudes, respectively.

Note: Some of the following strategies correspond to specific objectives within the Plan.

#### Strategies:

- a. Maintain current black bear hunting programs to the extent possible.
- b. Provide strategies to mitigate problem bears that correspond to methods supported by the public (see objective 92).
- c. Focus bear hunting efforts on those areas and situations that address human safety, protection of pets, livestock and property, and recovery of listed species (see objectives 90, and 92-93).
- d. In the annual Status and Trend report, publish the results of strategies implemented under the population objectives and public safety objectives.

### ***Harvest Guidelines***

#### Issue Statement:

Hunting is the largest source of mortality for hunted bear populations (Bunnell and Tait 1985, Pelton 2000). Coupled with the 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). As ages of harvest bears decline, and percentage of females in the harvested population increases, the exploitation level of the bear population is increasing. A drawback of this method is that sex and age data alone are not necessarily accurate measures of population status (see *Issue Statement for Objective 87*). A supplemental measure of population status is needed to better manage bear populations in Washington.

#### Objective 90:

Provide recreational hunting opportunities to harvest black bears, while at the same time maintaining a sustainable bear population in each BBMU.

#### Strategies:

- a. Provide black bear hunting opportunities in each BBMU, with focused harvest in

areas where public safety, property damage, and pet and livestock depredation are evident.

- b. Develop harvest criteria that incorporate survey data from monitoring female and cub survivorship.
- c. Until more robust harvest criteria are developed, consider liberalizing or restricting bear hunting opportunity in each BBMU as indicated in Table 2:

Note: Thresholds outlined in strategy "c" above are currently implemented.

**Issue Statements:**

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.

The public has voiced concern about potential impacts of black bear hunting has on grizzly bears. With the prohibition on the use of dogs and bait for recreational hunting of bears, potential impacts to grizzly bears caused by dogs or bait was greatly reduced. However, there is a need to educate black bear hunters on how to identify and distinguish a black bear from a grizzly bear.

**Objective 91:**

Minimize impacts of black bear hunting on grizzly bears.

**Strategies:**

- a. Provide educational materials to black bear hunters that are hunting in areas with a known grizzly bear population.\*
  - b. Conduct agency-hunter contacts during black bear hunting season in areas with a known grizzly bear population.\*
- \* These strategies currently are being conducted.

**Public Safety**

**Issue Statement:**

A primary objective of WDFW is to protect people from dangerous wildlife, including black bears. While guaranteeing that black bears will never negatively impact people is impossible, the Department does implement activities to reduce human-bear interactions.

**Objective 92:**

Minimize negative human-bear interactions so that the "number of interactions per capita" is constant or declining.

**Strategies:**

- a. Conduct "Living with Wildlife" workshops annually.
- b. Distribute educational materials to key entities and locations.
- c. Evaluate the efficacy of capture-relocation of problem bears for mitigating conflict.
- d. Encourage recreational bear harvest in areas with demonstrated human-bear interactions.
- e. Utilize agency kill authority and depredation permits for problem bear

**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



incidents.

## Timber Damage

### Issue Statement:

Bear foods are scarce during spring, particularly those with a high nutritional value. Consequently, bears often forage on the sapwood of coniferous trees. During spring, sapwood is one of the few foods available to bears and it has a relatively high sugar content compared to other available foods. Trees with the highest sugar content, hence preferred by bears, are those with high growth rates, such as trees on private industrial timberlands. Bear selection for sapwood is so acute that industrial timberlands can experience damage that exceeds one-third of the trees in a given stand. These damage rates can result in economic losses for landowners. For that reason, private landowners of industrial timberlands seek ways to mitigate tree damage caused by bears.

### Objective 93:

Reduce annual bear damage to <30 trees/stand\* on private industrial timberlands.

### Strategies:

- a. Provide educational information on how to avoid timber damage by bears.
- b. Encourage the use of non-lethal methods, such as capture-relocation or aversive conditioning, for responding to timber damage by bears.
- c. Provide focused recreational bear hunting seasons in spring to mitigate timber damage by bears (see objective 94).
- d. Issue a bear depredation permit when one of the following criteria is met:
  - $\geq 30$  trees peeled in a spring and trees are in a clumping pattern within a stand.\*

- $\geq 30$  trees peeled over an ongoing 3-year period and trees in a clumping pattern within a stand\* of precommercially-thinned timber,  $\leq 30$  years of age.
- e. Collaborate mitigation efforts with state, federal, and private landowners, particularly efforts associated with Private Lands Wildlife Management Areas.
    - \*Efforts will be made to standardize the definition of a "stand" to account for the frequency of damage per unit area.

### Objective 94\*:

Determine the level of public support for spring black bear hunting in those commercial timber areas or private property that receive damage, and evaluate the feasibility of a spring damage hunt.

\* See objective 14 in Chapter 2 for issue statement.

### Strategies:

- a. Conduct extensive public involvement and education prior to recommending spring black bear hunting designed to reduce commercial timber damage.
- b. Develop a fact sheet describing the feasibility of trap and relocation efforts prior to implementing spring seasons.
- c. Implement localized spring hunts on a limited basis to determine effectiveness prior to recommending expansion.
- d. Retain current black bear timber damage management program using contractors.

## Enforcement

### Issue Statement:

In several Asian countries, gall bladders of native Asian bear species are used for food or medicinal purposes (Williamson 2001). The high demand for bear gall has resulted in severe over-exploitation, in both Asiatic

and brown bear. This situation has placed greater pressure on North American bears to supply the exorbitant demand for gall bladders. To protect Washington's black bears from this type of commercialization, laws were established to make it illegal to trade, barter, buy, or sell any bear parts. However, the demand for bear gall is so high, that several states have found commercialized poaching rings that specialize in black bears only. Given the economic incentives for poaching bears for galls and the history of offenses in numerous states, it's important to develop a long-term program to assess this form of illegal activity.

**Objective 95:**

Develop a long-term monitoring plan for assessing the level of illegal trading of bear gall bladders.

**Strategies:**

- a. Develop protocols to determine the prevalence of hunters that illegally sell the gall bladders from bears they harvest.
- b. Assess the level of poaching by monitoring radio marked bears.
- c. Use under cover enforcement operations to prevent over exploitation of black bears on public lands.
- d. As opportunities occur, consider incorporating other methods to assess illegal take of black bears.

**Habitat Management**

**Issue Statement:**

Black bear distribution and habitat use are influenced by a variety of environmental and human factors. It's important to understand and predict how these factors influence bears to better manage bear populations for sustainable harvest, as well

as minimizing negative human-bear interactions.

**Objective 96:**

Develop a document and map identifying core habitat areas for black bears.

**Strategies:**

- a. Delineate core habitat areas for black bears using regional staff expertise.
- b. Expand habitat preference results from 2001 black bear study final report to entire state.
- c. Work cooperatively with state, federal, tribal, and private entities to develop relative habitat use probability model for black bears.

**LITERATURE CITED**

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, editors. *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.
- Pelton, M. R. 2000. Black Bear. Pages 389-408 *in* Demarais, S. and P. R. Krausman, editors. Ecology and management of large mammals in North America. Prentice Hall, Upper Saddle River, New Jersey, USA.
- Washington Department of Fish and Wildlife. 1997. Washington State management plan for black bear. Washington Department of Fish and Wildlife, Olympia, Washington, USA.
- \_\_\_\_\_. 2001. 2001 Game status and trend report. 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.

# COUGAR

## POPULATION STATUS AND TREND

Cougar (*Puma concolor*) occur throughout most of the forested regions of Washington State, encompassing approximately 88,497 km<sup>2</sup> or 51% of the state (Figure 1).

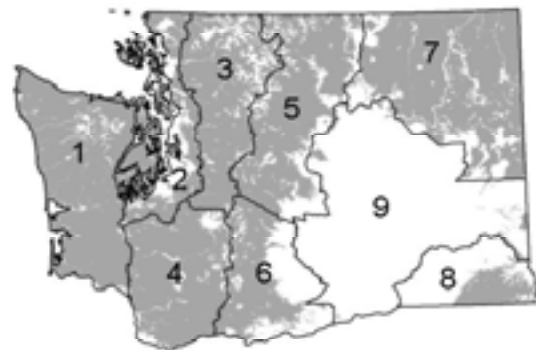
Estimates of cougar populations are difficult to formulate. Two techniques have been used to provide an approximate range of statewide cougar abundance. First, a rough estimate from population reconstruction indicates that the minimum number of cougars in Washington may be around 900 animals. However, this estimate is an under-estimate because it is based on harvested animals only and harvest methods have changed within the last 10 years. Second, a rough estimate based on extrapolation across the state with the highest cougar density reported in the literature indicates that the maximum number of cougars in Washington may be around 4,100 animals. Again, this estimate is probably an over-estimate because it is based on the unrealistic assumption that all of Washington supports a cougar density equal to the highest reported for North America. A more realistic estimate of statewide cougar abundance is about 2,600 animals. This level represents the average density for cougars in North America, and is consistent with quantitative estimates of cougar abundance in Washington that was generated in 1995. For management purposes, the state is divided into nine cougar management units (CMUs) (Figure 1).

Cougars generally are shy, secretive animals and occur throughout a variety of habitat types. Because of their reclusive nature, few people actually encounter a cougar in the wild or have an opportunity to harvest

one. As a result, cougar populations can be fairly resilient to moderate-heavy exploitation. This point was demonstrated during the bounty seasons of the early 1900s, when cougar populations persisted during years of widespread persecution.

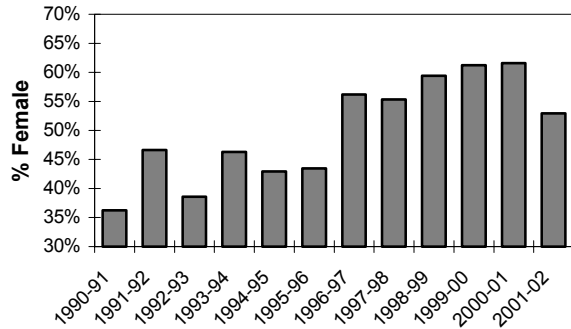


Cougar populations and management emphasis have visibly changed during the past 10 years in Washington State. From 1987 to 1996, cougar harvest was conservative and was controlled by permit only hunting. The majority of the cougars harvested were done so with the aid of dogs. As a result, hunters tended to be selective, harvesting mostly males (Fig. 2) and older aged animals (Fig. 3). In 1996, Voter Initiative 655 banned the use of dogs for recreational cougar hunting and cougar harvest changed dramatically. Since 1996, the majority of cougars were harvested either as opportunistic encounters by deer-

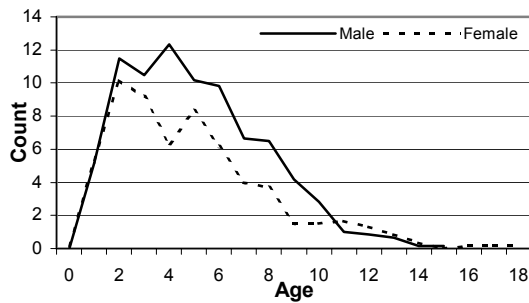


**Figure 1. Distribution of cougars (gray) and cougar management units (CMUs) (numbers) in Washington.**

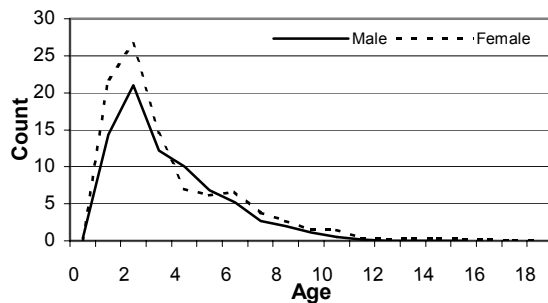
elk hunters and cougars, or using tracking and calling techniques. These harvest methods are not as selective as using dogs. Since 1996, hunters harvested more females (Figure 2) and younger cougars (Figures 3 and 4).



**Figure 2. Percent female in statewide cougar harvest, 1990-2002, Washington.**



**Figure 3. Age structure of harvested cougar using selective harvest methods, 1990-1995, Washington.**



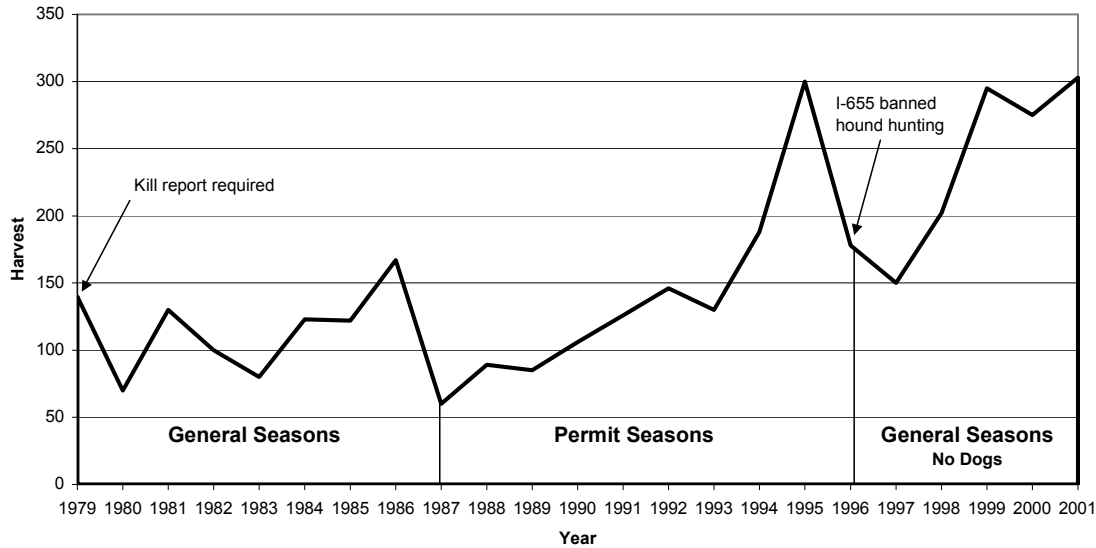
**Figure 4. Age structure of harvested cougar using non-selective harvest methods, 1996-2001, Washington.**

The changes in harvest vulnerability for specific sex and age classes of cougars have important implications for cougar populations. Since 1996, the shift to harvesting more females and younger animals (as well as more total animals) likely is causing the statewide cougar population to decline. This decline is supported by analyses of cougar harvest trends, sex and age ratio data from harvested cougar, and population modeling. However, depending on the population objectives for cougars in each CMU, a declining cougar population is not necessarily a reason for concern.

Since 1996, WDFW has recorded information on human-cougar interactions. Of particular concern is the increasing trend in human safety incidents, and pet and livestock depredations. Recognizing the widespread scope of the issue and its importance to cougars and people in the future, current cougar management goals include maintaining sustainable cougar populations and reducing human-cougar interactions. In some cases, reducing cougar populations to a lower, but sustainable level may help achieve both of these goals.

## RECREATIONAL OPPORTUNITY

Cougar were classified as a bounty animal in Washington State from 1935-1960. They were reclassified as a predator from 1961-1965, and again as a game animal from 1966-present (Figure 5). The number of hunters purchasing a cougar tag has increased in Washington, largely an artifact of changes in license cost, license structure, bag limits, and season length. As a result of the season structure changes, the number of recreational days open to cougar hunting has increased from a low of 30 days in 1996 to a high of 228 days in 1999. This has, in part, resulted in an increase in the number of cougars harvested annually.



**Figure 5. Trends in cougar season structure and harvest in Washington, 1979-2001.**

### DATA COLLECTION

The majority of data collected on cougar is from harvested animals, as no formal surveys are conducted. A mandatory carcass check is required for all harvested cougars, where data samples are collected including; kill date and location, sex, age (from tooth analysis), physical condition, weight, DNA (via tissue sample), and hunter information. From these data the Department monitors kill date and location, total kill, and sex and age composition of the total harvest. In addition, age and sex data are used to develop population size estimates using population reconstruction and modeling.

### 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 threats to public safety and private property from cougars.
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.

### ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES

#### Population Management

##### *Population Objectives*

Issue Statement:

A fundamental goal of WDFW is to preserve, protect, and perpetuate wildlife populations and their habitats to ensure healthy, productive populations. The starting point for achieving this goal is reliable information on the status of wildlife populations and the potential impacts of particular management actions, such as hunting. Given a variety of limitations, the accuracy and precision of the biological data to assess populations are often lower than biologists would prefer. In these situations, management decisions favor a conservative approach, to reduce the probability of causing significant negative impacts to the wildlife resource.

The only exception to this conservative management approach is for cougar populations in areas with concerns for human safety and protection of property. In these areas, cougar populations are managed to reduce threats to human safety and property damage.

**Objective 97:**

Manage cougar populations within each CMU as indicated in Table 1.

**Strategy:**

- a. For each CMU, implement a female harvest guideline that corresponds to a stable and sustainable cougar population, or a reduced and sustainable cougar population, depending on the objective.

**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 CMU.

Cougar impacts on prey. The cougar population objectives may impact some prey species. As a result of a lower harvest level of female cougar in some CMUs (Objective 102), cougar populations are expected to stabilize and may increase in

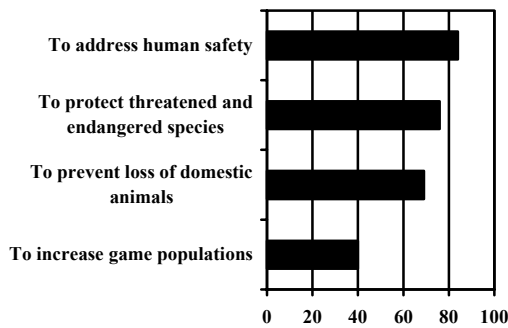
some local areas. Any local increases in cougars will result in more predation by cougar on ungulates (primarily deer and elk). However, if there is an increase in the predation rate, it's unknown whether the increase would be additive (additional prey killed by cougars causing total prey mortality to 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 voiced 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. Increased cougar harvest is a management action that can be used to increase deer or elk populations. When Washington citizens were asked about their attitudes about managing cougars to increase deer and elk populations, support was low (Figure 6). Recognizing the role of cougars in the ecosystem and public attitudes, WDFW does not put emphasis on increasing deer and elk herds as a management objective for cougar. However, cougar management objectives and strategies do include some

**Table 1. Cougar population objectives for each CMU.**

CMU	Objective
1 Coastal	Maintain a stable cougar population
2 Puget Sound	Reduce* cougar population to enhance public safety and protection of property
3 North Cascades	Maintain a stable cougar population
4 South Cascades	Maintain a stable cougar population
5 East Cascades North	Reduce* cougar population to enhance public safety and protection of property
6 East Cascades South	Maintain a stable cougar population
7 Northeastern	Reduce* cougar population to enhance public safety and protection of property
8 Blue Mountains	Maintain a stable cougar population
9 Columbia Basin	Unsustainable; not considered suitable cougar habitat

\* Implement cougar population reductions over a 3-year period and monitor annually.



**Figure 6. During a general public survey, the percent of respondents that supported reducing predator numbers for specific purposes (Duda et al. 2002).**

flexibility to address the recovery of low prey populations. In these situations, local cougar populations can be managed to enhance recovery efforts of prey species as long as the total cougar harvest within the respective CMU stays within the female harvest guidelines in Table 2.

### ***Population Status***

Issue Statement:

Historically, trends in sex ratios and ages of harvested cougar were used to evaluate the impact of cougar harvest on long-term sustainability. However, trend analyses are only useful when the parameters being

monitored are proven to be valid indicators of population status, and when the collection methods are constant overtime (Caughley 1977). Today, neither of these two requirements have been satisfied for cougars in Washington. The lack of a valid population indicator, coupled with limited biological data, results in many uncertainties about cougar populations in Washington, including:

- The number of cougars in each CMU.
- The trend in cougar population size.
- The rate of population increase or decrease.
- The age and sex structure of the living cougar population.
- Cougar population responses to harvest.
- Age and sex specific survival rates.
- The effects of hunter harvest and how that relates to natural mortality.

Given these uncertainties, there is a critical need for the collection of accurate and precise biological data on cougar populations, and the development of a robust population indicator.

Objective 98:

For each CMU, monitor population

**Table 2. Female cougar harvest guidelines a by Cougar Management Unit (CMU).**

<b>CMU</b>	<b>Objective</b>	<b>Female Harvest Guideline</b>	<b>Average Female Harvest 1999-2001</b>
1. Coastal	Stable	10	12
2. Puget Sound	Reduce	No limit	11
3. North Cascades	Stable	10	9
4. South Cascades	Stable	7	8
5. East Cascades North	Reduce	32	32
6. East Cascades South	Stable	4	6
7. Northeastern	Reduce	40	66
8. Blue Mountains	Stable	8	16
9. Columbia Basin	Unsustainable	No limit	1

<sup>a</sup> Guidelines are based on current biological information and harvest levels during the past 3-years; guidelines include recreational harvest, depredation kills, and public safety cougar removals. However, guidelines may be exceeded for depredation kills and public safety cougar removals.



demographics of cougar at a level where a significant change in population size can be detected within three years or less.

Strategies:

- a. To ensure population sustainability, mark and monitor cougars in CMUs where the objective is to reduce the cougar population.
- b. Estimate cougar population size using data from marked cougar, capture-recapture experiments, and population modeling.
- c. Develop inventory and monitoring protocols for cougar.
- d. Evaluate the utility of age structure and sex ratio as indicators of relative population size.
- e. Estimate the impacts of harvest on cougar populations through modeling.

***Predator-prey dynamics***

Issue Statement:

Cougar populations exist within a complex balance between prey availability, habitat quality and quantity, social behaviors, dispersal, natural mortality, and human-induced mortality and disturbance. Of these, the relationship between cougars and ungulates is central to cougar population dynamics. Cougars are effective and efficient predators and average about one deer kill (or deer equivalent) every 10 days (Ackerman et al. 1986). This has important implications when considering an ungulate population's ability to support cougars and the impacts of cougars on ungulate populations. The intricate details of the predator-prey relationship are critical for managing cougars and several questions remain, including: how carry capacity for cougars change as ungulate densities fluctuate, the impacts to ungulate populations when cougar abundance is high or low, the role of habitat quality,

fragmentation, and connective corridors on the cougar-ungulate relationship. By understanding these relationships wildlife managers will be able to manage cougars with greater scientific certainty.

Objective 99:

Develop a report that describes at least one component of the cougar-ungulate relationship.

Strategies:

- a. Investigate the impacts of changing white-tailed deer availability on cougar.
- b. Develop statewide models investigating the correlation between deer and elk abundance and cougar population dynamics.

***Sources and Sinks***

Issue Statement:

Cougar population size is not constant throughout all areas of Washington State. Factors that influence cougar populations, such as prey densities and human-induced mortality, vary from region to region and certain areas of the state may act as cougar "source" or "sink" areas. "Sources" are those areas where prey densities are relatively high and cougar mortality is low. As a result, the area acts as a source population for cougars to migrate out of and into surrounding habitats (Lindzey et al. 1988, Spreadbury et al. 1996, Spencer et al. 2001). "Sinks" are those areas where prey densities are relatively low and cougar mortality is high. As a result, the area acts as a sink where cougars that migrate into the area have a low chance of surviving (Clark 1999, Logan and Sweanor 2001).

The distribution and effects of source and sink areas are important for managing cougars, particularly if they are counter to the population objectives for the

surrounding area. The existence of source and sink areas, and the potential effects, have not been investigated in Washington State.

Objective 100:

Identify cougar habitats that act as a population source or sink.

Strategies:

- a. Evaluate and map relative prey densities for key CMUs.
- b. Identify key lands where prey numbers and female survival are high.
- c. Evaluate cougar survival rates in areas that appear to be problematic or where population objectives are not being met.
- d. Identify priority areas where management changes may be necessary.

## **Recreational Opportunity**

### ***Public Opinions***

Issue Statement:

Public support for hunting cougars is lower than support for hunting several other big game animals (Duda et al. 2002).

Recognizing public and hunter attitudes, WDFW faces challenging decisions about balancing hunter opportunities and public safety with public attitudes.

Objective 101:

Implement management strategies that are consistent with the biological status of cougars and public attitudes, respectively.

Note: Some of the following strategies correspond to other objectives within the Plan and are noted as such.

Strategies:

- a. Implement a public education program on cougar management and public safety (see objective 103).
- b. Provide strategies to mitigate problem cougars that correspond to methods supported by the public (see objective 103 and 105).
- c. Focus cougar hunting efforts to those areas and situations that address human safety, protection of pets and livestock, and recovery of listed species (see objective 102).
- d. In the annual Status and Trend Report, publish the results of strategies implemented under the population objectives and public safety objectives.
- e. Conduct a public opinion survey of cougar management by 2007.

### ***Harvest Guidelines***

Issue Statement:

In general, cougars are managed to protect human safety and property, and provide recreational hunting opportunities, while at the same time ensuring long-term sustainability. To accomplish this cougars are managed geographically in nine CMUs and the management needs vary based on the biological and public safety issues in each CMU.

To enhance this type of management system, harvest guidelines for female cougars were established for each CMU (Ross and Jalkotzy 1996). These harvest guidelines were developed using a combination of three quantitative methods: 1) by evaluating data on past harvest and age-sex structure of harvested cougar, 2) developing a population reconstruction model, and 3) developing a science based population growth model to evaluate the impacts of harvest on cougar populations. For CMUs where the objective is to reduce the cougar population, the guideline

corresponds to a female harvest necessary to gradually reduce the population over 3-years. For the remaining CMUs, the guidelines correspond to a female harvest necessary to achieve a stable and sustainable cougar population at current levels (Ross and Jalkotzy 1996, Logan and Sweanor 2000).

#### Objective 102:

Provide recreational opportunities to harvest cougars, while at the same time maintaining a sustainable cougar population in each cougar management unit (excluding CMU 2 and 9).

#### Strategies:

- a. Establish recreational hunting seasons that target the harvest guidelines identified in Table 2.
- b. Update harvest guidelines every three years, corresponding to the three year hunting season package.
- c. Provide educational materials to all public safety cougar removal participants to minimize interactions with lynx.

#### Impacts:

The public has voiced concern about impacts of cougar hunting on non-target species (i.e., lynx or grizzly bear). With the prohibition on the use of dogs for recreational hunting on all native cats and bears in 1996, potential impacts to non-target species caused by dogs was greatly reduced. The only exception to this is the potential impacts to lynx or grizzly bears during public safety cougar removals, when it's lawful to use dogs to pursue cougar. However, the potential for an encounter between dogs and these listed species is low given the narrow geographical focus of the removals, lynx, and grizzly bears, and the relatively low number of participants.

In addition, the timing of the cougar removals (Dec.–Mar.) corresponds to the winter dormancy period for bears, thereby greatly diminishing any potential impact to grizzly bears. Recognizing that there is some potential to encounter a lynx, specific educational materials that outline steps to minimize impacts to lynx will be provided to all cougar removal participants.

### **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 103:

Minimize cougar-human interactions to fewer than 11 confirmed complaints annually in each Game Management Unit (GMU).

#### Strategies:

- a. Conduct "Living with Wildlife" workshops annually.
- b. Distribute educational materials to key entities and locations.
- c. Consistent with Agency policy, consider capture-relocation as a tool for managing problem cougar (see Research strategies).
- d. Encourage recreational cougar harvest in areas with demonstrated human-cougar interactions.
- e. Utilize agency kill authority and depredation permits for problem cougar incidents.

- f. Conduct public safety cougar removals in GMUs with demonstrated history of human-cougar interactions.

#### Impacts:

The public safety objectives and strategies are designed to increase public safety in specific areas. Objectives 102 and 103 outline a flexible harvest strategy for areas with a demonstrated history of human-cougar interactions. In addition, objective 103 and 105 include an enhanced educational program and research activities aimed specifically at gaining information to better manage cougars in suburban versus rural environments.

#### Enforcement

##### Issue Statement:

To properly manage cougar populations for sustainability, prevent over harvest, and achieve public safety goals, 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 104:

Account for all human related cougar mortalities.

##### Strategies:

- a. Require mandatory carcass check of all harvested cougar.\*
- b. Mark all harvested cougar with a unique pelt identification tag.\*
- c. Collect biological information from all harvested cougar.\*

\* These strategies currently are implemented.

#### Research

##### Issue Statement:

Cougars and people live in close proximity to each other in several areas of the state, making the potential for conflict high. Unfortunately, little information is known about cougar populations, particularly in suburban environments. 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).

##### Objective 105:

Develop a report that describes the demographic and behavioral differences between cougar populations in suburban versus rural environments.

##### Strategies:

- a. Initiate a cougar research project investigating cougar behavior and populations in rural and suburban environments.
- b. Evaluate the efficacy of capture-relocation of problem cougars for mitigating conflict.
- c. Investigate the role of corridor design for facilitating or discouraging cougar movements.

#### Habitat Management

##### Issue Statement:

The density of cougars is not uniform across the landscape. Cougar densities likely vary based on prey abundance, vegetation conditions, human disturbances, and other factors that influence cougar habitat. To properly manage cougar populations (e.g., harvest, public safety), it's important to identify core and peripheral habitats so management decisions can be adjusted accordingly.

Objective 106:

Develop a map identifying core habitat areas for cougar.

Strategies:

- a. Conduct literature review on cougar habitat requirements.
- b. Identify distributions of important prey species.
- c. Develop a model identifying relative habitat suitability for cougar.
- d. Incorporate data from past and current studies.
- e. Identify habitats secured for prey species that also benefit cougar populations.

#### 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.

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.

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.

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, in Ecology and management of large mammals in North America*. Editors Demarais, S. and P. R. Krausman. Prentice Hall, New Jersey, USA.

\_\_\_\_\_, and \_\_\_\_\_. 2001. *Desert puma: evolutionary ecology and conservation of an enduring carnivore*. Island Press, Washington D. C., USA.

Ross, P. I., and M. G. Jalkotzy. 1996. The quota system of cougar harvest management in Alberta. *Wildlife Society Bulletin* 24:490-495.

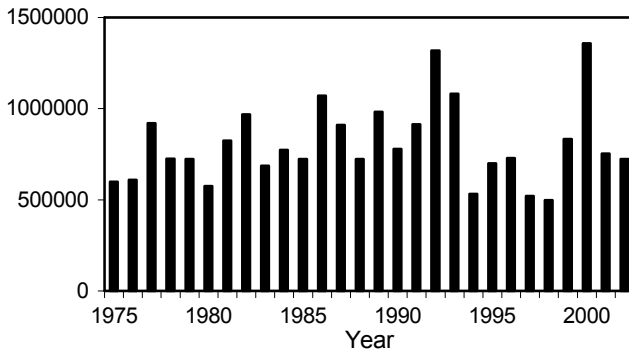
Spencer, R. D., D. J. Pierce, G. A. Schirato, K. R. Dixon, and C. B. Richards. 2001. *Mountain lion home range, dispersal, mortality, and survival in the Western Cascades Mountains of Washington*. Final Report. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

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.

# WATERFOWL

## POPULATION STATUS AND TREND

Washington provides wintering habitat for approximately 850,000 ducks, 125,000 geese, and 8,000 swans annually (Figure 1). In addition, the state provides habitat for approximately 160,000 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.



**Figure 1. Washington mid-winter waterfowl inventory.**

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. The trend for eastern Washington breeding ducks is shown in Figure 2.

Management of Washington's geese and swans is also complex. Geese and swans are classified in the subfamily *Anserinae*,

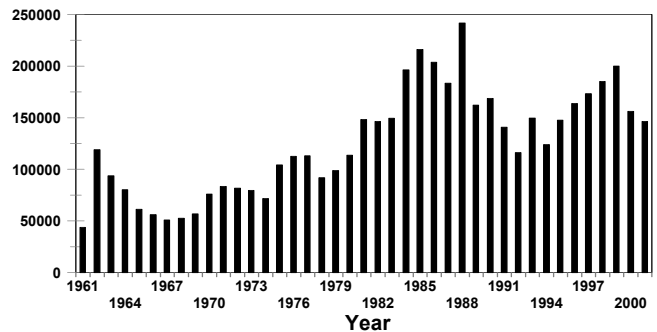
and Washington's 8 species belong to 2 tribes and 4 genera. Canada geese found in



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.

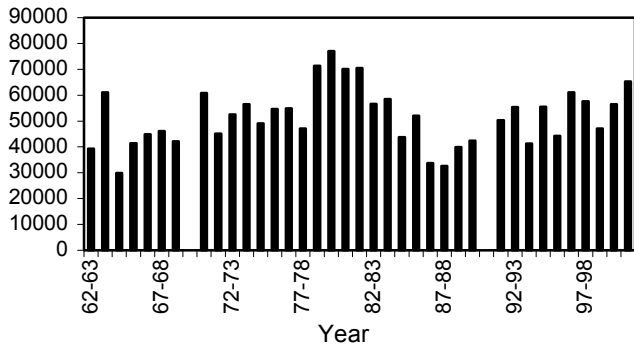
## RECREATIONAL OPPORTUNITY

Waterfowl are hunted from September's youth hunt 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). Over 40,000 hunters harvest 500,000 ducks and 70,000 geese each year in Washington, providing over 400,000 days of recreation annually. The trend in Washington Canada goose harvest is shown in Figure 3. Washington ranks second among the 11

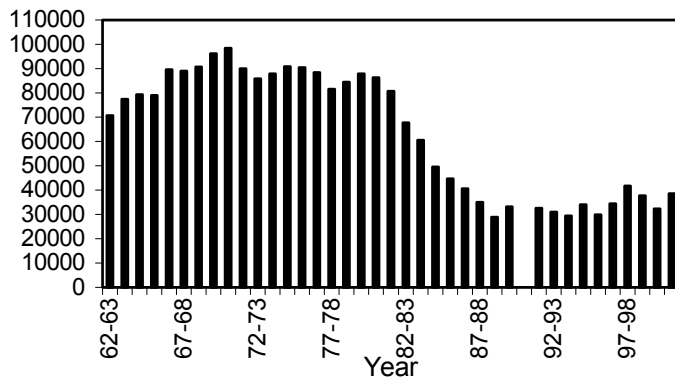


**Figure 2. Eastern Washington breeding ducks.**

Pacific Flyway states and in the top ten states in the U.S. based on waterfowl harvested and number of hunters. Hunter numbers have declined substantially since the 1970s (Figure 4).



**Figure 3. Washington Canada goose harvest.**



**Figure 4. Washington waterfowl hunters.**

### DATA COLLECTION

The Department conducts a variety of activities to estimate the size of the waterfowl population, production, movement, and harvest. Breeding surveys are completed in April and May to measure status of the breeding population; duck production surveys are conducted in July to measure recruitment; migration counts are completed in October-December; and winter index counts in January, completed cooperatively with USFWS. Duck and goose harvest is estimated using a mail

questionnaire and special card survey completed in May.

### MANAGEMENT

This section describes the management direction of the waterfowl program on a statewide basis. 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 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.

### 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.

## **ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES**

### **Habitat Management**

#### Issue Statement:

Wetlands and other waterfowl habitats are being lost throughout Washington due to development and conversion to other uses.

#### Objective 107:

Quantify and reduce habitat loss to achieve Joint Venture objectives.

#### Strategies:

- a. Update or develop habitat management guidelines and map recent habitat losses by 2008.
- b. Provide resource information to other agencies and organizations to influence land use decisions (ongoing).
- c. In cooperation with other agencies, track critical habitat status and trends (e.g., freshwater wetlands) (ongoing).

#### Objective 108:

Provide funding through state migratory bird stamp/print revenues and the Washington Wildlife and Recreation Program to protect/enhance 1000 acres of new habitat annually for all migratory birds. This acreage target was selected based on past annual accomplishments of the migratory bird stamp/print program.

#### Strategies:

- a. Determine habitat protection and enhancement needs considering Joint Venture plans, literature, and regional expertise.
- b. Solicit project proposals from regional staff and external organizations.
- c. Develop a stamp/print expenditure plan before the start of each new biennium, using an evaluation team from a

statewide cross-section of Department experts.

- d. Provide emphasis on projects to increase waterfowl recruitment in eastern Washington, wintering habitat and access in western Washington.
- e. 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%
  - Food plots on private lands 9%
- f. Monitor effectiveness of habitat projects through focused evaluation projects before and after implementation.

#### Objective 109:

Interact with other agencies and organizations to leverage migratory bird stamp funding by at least 100% annually. This percentage target was selected based on past annual accomplishments of the migratory bird stamp/print program.

#### Strategies:

- a. Participate in organizations designed to deliver habitat improvements via multi-organization partnerships (e.g., Pacific Coast Joint Venture, Intermountain West Joint Venture).
- b. Seek outside funding sources to leverage state revenues, through habitat improvement grants (e.g., National Coast Wetlands Grant, North American Wetlands Conservation Act).

### **Population Management**

#### Issue Statement:

Documentation of population size, movements, and mortality factors is difficult



due to the highly migratory nature of waterfowl species.

current literature and peer review, by 2004.

**Objective 110:**

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

**Strategies:**

- a. Monitor annual status and trends of waterfowl populations through coordinated surveys with other agencies, including USFWS, flyway states, and Puget Sound Action Team (PSAT).
- b. Work with other agencies to improve estimates of waterfowl in other areas of the flyway important to Washington, by 2004.
- c. Provide ongoing training for new observers in waterfowl population estimation techniques.
- d. Evaluate surveys to optimize accuracy and precision, including review of

**Objective 111:**

Maintain regional populations in accordance with Joint Venture population objectives.

**Strategies:**

- a. Evaluate needs for modifying waterfowl distribution in major concentration areas every five years.
- b. Evaluate needs for game reserves and closure areas near other habitat components every five years.
- c. Annually publish results in game status reports.

**Objective 112:**

Document distribution, movements, and survival in accordance with flyway management goals.

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

Species / subsp. / pop.	Area	Current Index (2002)	Population Objective	Measure
Mallard	N. America	7.5 million (annual)	8.7 million (annual)	breeding index
Pintail	N. America	1.8 million (annual)	6.3 million (annual)	breeding index
Western Canada goose	W. Wash.	1,705	1,500	nest index
Western Canada goose	E. Wash.	2,340	2,000	nest index
Cackling Canada goose	Flyway	166,986	250,000	breeding index
Dusky Canada goose	Flyway	16,665	16,000	winter index
Canada goose	L. Col. R. / W.V.	137,010 (annual)	reduce 133K-107K	winter index
Wrangel Island snow goose	Skagit/Fraser	54,354	35,000	winter index
Wrangel Island snow goose	Flyway	103,000	120,000	spring index
Black brant	Flyway	132,177	150,000	winter index
Black brant	Wash. Bays	5,256	13,000	winter index
Western High Arctic brant	Skagit/Fraser	7,255	12,000	winter index
White-fronted goose	Flyway	381,843	300,000	breeding index
Tundra swan	Flyway	78,541	60,000	winter index
Trumpeter swan	Flyway	17,551 (every 5 yr.)	13,000 (every 5 yr.)	breeding index

Strategies:

- a. Band a minimum of 500 mallards each year to provide survival estimates.
- b. Participate in annual dusky Canada goose banding and observation programs to estimate distribution, survival, abundance, and derivation of harvest.
- c. Conduct focused banding emphasis on select species (e.g., harlequins-2008, seaducks-2002, lesser Canada geese-2003, dark Canada geese-ongoing, and western Canada geese-annually).

Objective 113:

Minimize mortality due to disease and contaminants.

Strategies:

- a. Conduct surveillance monitoring to identify sources of disease and contaminants associated with mortality events (e.g., lead shot mortalities of swans in Whatcom County) (ongoing).
- 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 (ongoing).

**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 114:

Increase accuracy of surveys to measure harvest, number of hunters, and effort, accurate to ±10% at the 90% CI for each management unit.

Strategies:

- a. Participate in federal Harvest Information Program (HIP) for migratory birds.
- b. Provide supplemental estimates to determine regional differences in harvest (e.g., hunter questionnaire, daily card survey, snow goose harvest reports, brant color composition).

**Table 2. AHM regulation packages and Washington season timing.**

Regulation package	EASTERN WASHINGTON			WESTERN WASHINGTON		
	Days	Limit total/mall/hen mall	Season Timing*	Days	Limit total/mall/hen 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

**Objective 115:**

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

waterfowl species of management concern in Washington (e.g., harlequin ducks, scoters), depending on population status.

**Strategies:**

- a. Establish regulations to maximize effective season days and bag limits, locating most season days later in the framework period:
- b. Assist in refining USFWS duck harvest management programs to reflect regional population differences (e.g., western mallards) by 2003.
- c. Maintain state harvest restrictions, in addition to federal frameworks, on

**Objective 116:**

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

**Strategies:**

- a. Continue to establish regulations to follow flyway and state harvest thresholds (see Table 1 for current population indices).
- b. Utilize recreational harvest as the

**Table 3. Flyway and State harvest thresholds (3-yr. averages unless noted)**

Goose	Area	Flyway Harvest Thresholds	Additional WDFW Harvest Thresholds	Measure
Western Canada goose	W. Wash.	Restriction level: 800	<800: reduce days/limit	nest index
		Liberalization level: 1,500	<1,500: eliminate Sept. season	
Western Canada goose	E. Wash.	Restriction level: 1,300	<1,300: reduce days/limit	nest index
		Liberalization level: 2,000	<2,000: eliminate Sept. season	
Dusky Canada goose	Flyway	Closure level: 6,500 Restrict level 1: 6.5-8K = 70 quota Restrict level 2: 8-16K = 85 quota Liberalization level: 16,000	>85 quota: increase limit/days	winter index
Cackling Canada goose	Flyway	Closure level: 80,000 Reopening level: 110,000	None	nest index
Wrangel Island snow goose	Flyway	No closure level Liberalization level: 120,000	<120,000: Skagit end date ≤Jan.8	spring pop.
	Skagit	None	Closure level: 30,000 / 3 yr. <10% juv. Reopening level: 35,000	winter index + % juveniles
Brant	Flyway	Closure level: 90,000 Restrict level 1: 90-110K Restrict level 2: 110-135K Liberalization level: >135K	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	nest index

primary method to address depredated/nuisance goose populations above management objectives (e.g., implement Pacific Flyway SW Wash./NW Oregon Goose Depredation Control Plan).

**Objective 117:**

Distribute harvest evenly over public hunting areas.

**Strategies:**

- a. Evaluate needs for modifying waterfowl distribution in one of the six major harvest areas each year.
- b. Evaluate and establish game reserves and waterfowl closures every five years to maximize harvest opportunity.
- c. Develop map of reserves and closures and some measure of harvest or use in surrounding areas by 2005.

**Objective 118:**

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

**Strategies:**

- a. Periodically (e.g., every three years) 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, limited entry, established blind sites, limited open days), without reducing total use days.
- f. Utilize habitat funding in combined programs to provide hunter access to private lands with emphasis in western Washington.
- g. Work with local governments to maintain opportunity in traditional hunting areas, minimizing or finding alternatives to no shooting zones.
- h. Maintain diversity of recreational hunting and viewing opportunities.

**Research**

**Issue Statement:**

Additional information is needed to manage populations and harvest more effectively.

**Objective 119:**

Generate or support at least one publication every year regarding waterfowl research or management.

**Strategies:**

- a. Support and/or conduct research investigating limiting factors influencing duck recruitment.
- b. Support and/or conduct research-investigating factors related to waterfowl wintering distribution and carrying capacity.
- c. Support and/or conduct research investigating duck survival.
- d. Support and/or conduct research investigating genetic relationships of goose subspecies/populations.

- e. Support and/or conduct research investigating goose distribution and survival.
- f. Develop current list of research needs to guide additional research emphasis.

## **Information and Education**

### Issue Statement:

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

### Objective 120:

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

### Strategies:

- a. Increase public awareness through brochures, news releases, internet, and pamphlets (ongoing).
- b. Provide materials to assist waterfowl identification in the field by 2003.
- c. Provide information to improve hunter proficiency by 2003.
- d. Obtain outside review of hunting pamphlet annually to improve clarity (ongoing).
- e. Continue to discuss waterfowl population management at public meetings and select sports group forums (ongoing).
- f. Develop materials describing waterfowl hunting opportunities in Washington by 2004.

## **Enforcement**

### Issue Statement:

Compliance with regulations is low in areas where regulations are not enforced at

adequate levels, due to inadequate numbers of enforcement personnel.

### Objective 121:

Ensure a 90% compliance rate for waterfowl hunting regulations (i.e., 90% of hunters checked are in compliance with regulations).

### Strategies:

- a. Develop annual enforcement priorities to target regulations affecting population status (e.g., dusky Canada goose reporting requirements) and changes in select species bag limits (e.g., pintail).
- b. Provide adequate training of enforcement officers in waterfowl identification and regulations.
- c. Conduct emphasis patrols to determine nontoxic shot compliance in Skagit and Whatcom counties.

## **LITERATURE CITED**

North American Waterfowl Management Plan. 1998. U.S. Fish and Wildlife Service, Washington D.C., USA.

Pacific Coast and Intermountain West Joint Venture Management Plans, U.S. Fish and Wildlife Service, Portland, Oregon, USA.

For additional information please see 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 from U.S. Fish and Wildlife Service, Portland, Oregon, USA.

# MOURNING DOVE, BAND-TAILED PIGEON, COOT, AND SNIPE

## 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. Coots and snipe population trends are monitored by U.S. Fish and Wildlife Service (USFWS) standardized surveys on breeding areas.

## RECREATIONAL OPPORTUNITY

Mourning doves, hunted during a September season, provide the majority of recreational opportunity for this group of species. 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 9,000 hunters harvest 90,000 doves annually in Washington.

## DATA COLLECTION

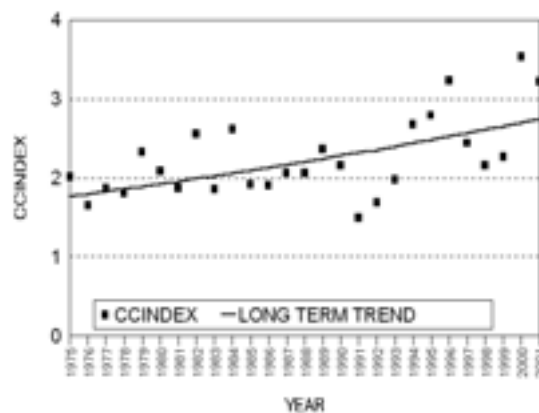
The Department maintains two surveys to estimate the size of dove and band-tailed pigeon populations. Dove call-count surveys are completed in May and band-tailed pigeon call-count surveys are conducted in June/July. Winter index counts for coots are completed with waterfowl surveys in January, in cooperation with USFWS. Harvest of these species is monitored by a variety of state and USFWS questionnaire surveys.

## 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

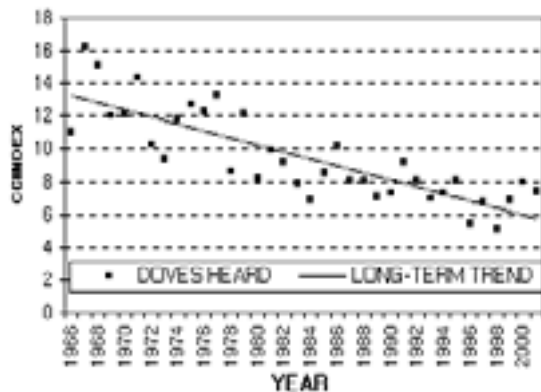


snipe. Management of these species in Washington is accomplished through the Waterfowl Section of WDFW. Although the U.S. Fish and Wildlife Service (USFWS) has nationwide management authority for migratory birds, effective management of these resources depends on established cooperative programs developed 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



**Figure 1. Band-tailed pigeon survey information, Washington, 1975-2001.**

must be accomplished to meet the goals and objectives.



**Figure 2. Mourning dove survey information, Washington, 1966-2001.**

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.

## **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 122:**

Quantify and reduce habitat loss by developing habitat maps and management guidelines.

#### **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-tails) (ongoing).
- b. In cooperation with other agencies, track critical habitat status and trends (e.g., mineral sites, freshwater wetlands) (ongoing).

#### **Objective 123:**

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

#### **Strategies:**

- a. Determine habitat protection and enhancement needs considering literature and regional expertise.
- b. Solicit project proposals from regional staff and external organizations.
- c. Develop expenditure plan before the start of each new biennium, using an evaluation team from a statewide cross-section of Department experts, to fulfill funding requirements for non-waterfowl migratory birds specified in legislation.
- d. Monitor effectiveness of habitat 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 124:

Meet Pacific Flyway Council goals for mourning doves (15 calls/route in flyway) and band-tailed pigeons (1980-84 call-count index in Washington).

### Strategies:

- a. Monitor annual status and trends of doves and band-tailed pigeons through coordinated breeding ground surveys with other agencies, including USFWS and flyway states.
- b. Monitor annual status and trends of coots through the midwinter inventory, coordinated with other agencies including USFWS and flyway states.
- c. Provide training aids for new observers in population estimation techniques, particularly for call-count surveys, by 2004.
- d. Participate in focused banding projects to answer specific management questions (e.g., dove reward band study in 2002-2003).

### Objective 125:

Minimize mortality due to disease and contaminants.

### Strategies:

- a. Conduct surveillance-monitoring studies to identify sources of disease and contaminants associated with mortality events (ongoing).
- b. In cooperation with other management agencies (e.g., National Wildlife Health

Research Center), take corrective action to minimize exposure to disease and contaminant sources (e.g., trichomoniasis in band-tailed pigeons) (ongoing).

## Recreation Management

### Issue Statement:

Management of limited populations requires refined harvest estimates.

### Objective 126:

Increase accuracy of surveys to measure 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., band-tailed pigeon harvest report).

### Objective 127:

Maximize recreational opportunities consistent with population status.

### Strategies:

- a. Establish state harvest regulations for mourning doves in consideration of federal frameworks and population status in Washington.
- b. Maintain restrictive dove season length until significant increase in 10-year call-count index trend is observed (no significant trend present for 1992-2001 index).
- c. Maintain opening/closure level for band-tailed pigeons based on 3-year average



call-count, in consideration of Pacific Flyway plan population objective.

**Issue Statement:**

Traditional hunting areas are being lost to development or no shooting ordinances.

**Objective 128:**

Maintain a minimum of 5,000 hunters and current recreational use days between 90,000-110,000, consistent with population status.

**Strategies:**

- a. Utilize habitat funding in combined programs to provide hunter access to five new private land holdings.
- b. Work with local governments to maintain opportunity in three traditional hunting areas, minimizing or finding alternatives to no shooting zones.

**Information and Education**

**Issue Statement:**

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

**Objective 129:**

Generate at least one information and education product each year to improve transfer of information to public.

**Strategies:**

- a. Increase public awareness about management issues through brochures, news releases, Internet, pamphlets (ongoing).
- b. Develop materials describing hunting opportunities for other migratory game birds in Washington (ongoing).

**Research**

**Issue Statement:**

Additional information is needed to manage populations and harvest more effectively.

**Objective 130:**

Generate or support at least one publication every five years regarding research or management of doves, band-tails, coots, or snipe.

**Strategies:**

- a. Investigate habitat use around mineral springs.
- b. Investigate optimal survey and timing for band-tailed pigeon trend analysis.
- c. Investigate band-tailed pigeon distribution and survival.
- d. Investigate limiting factors affecting mourning dove populations in Washington.
- e. Investigate maximum sustainable harvest for mourning doves.
- f. Investigate snipe habitat use, survival, effects of harvest, and incidental take of other species.
- g. Develop current list of research needs to guide additional research emphasis.

**LITERATURE CITED**

For more information please see Pacific Flyway Council Management Plans for Band-tailed Pigeons and Mourning Doves from U.S. Fish and Wildlife Service, Portland, Oregon, USA.

# WILD TURKEY

## POPULATION STATUS AND TREND

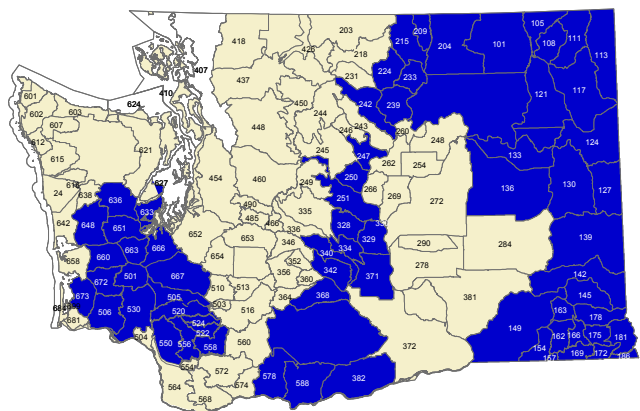
Efforts to introduce wild turkey (*Meleagris gallopavo*), which are not native to Washington, occurred as early as 1913. However, these early release efforts (1913–1959) did not result in established populations. In 1960, 12 wild-trapped Merriam’s turkeys from New Mexico were released in Klickitat County. 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 70s, 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 2001, 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 the 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. Currently, wild



turkeys occupy much of the forested habitat in Washington (Figure 1).

According to harvest trend information, most turkey populations in Washington are increasing with Stevens County having the highest population density. Other eastern Washington counties, such as Ferry, Lincoln, Pend Oreille, and Columbia, also have substantial turkey populations. Wild turkey populations in western Washington are not experiencing the same level of expansion as northeastern 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.



**Figure 1. 2003 Wild Turkey Distribution**

## RECREATIONAL OPPORTUNITY

Hunting seasons for wild turkeys have varied from a 2-day fall season in 1965 to the current 31-day spring season statewide and 5-day fall permit-only seasons. The statewide, April 15 to May 15, spring season was established in 1994 and a fall season has existed since 1965. At one time, the fall season was in late November, but in 2000, fall hunting was changed from a general season to a permit-only hunt by drawing and the hunt dates were moved from late November to early October to avoid overlapping other seasons.

Statewide harvest and hunter numbers have increased each year since 1991 (Figure 2). In 2000, 1,615 turkeys were taken and 19,209 tags were purchased. Prior to 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).

## DATA COLLECTION

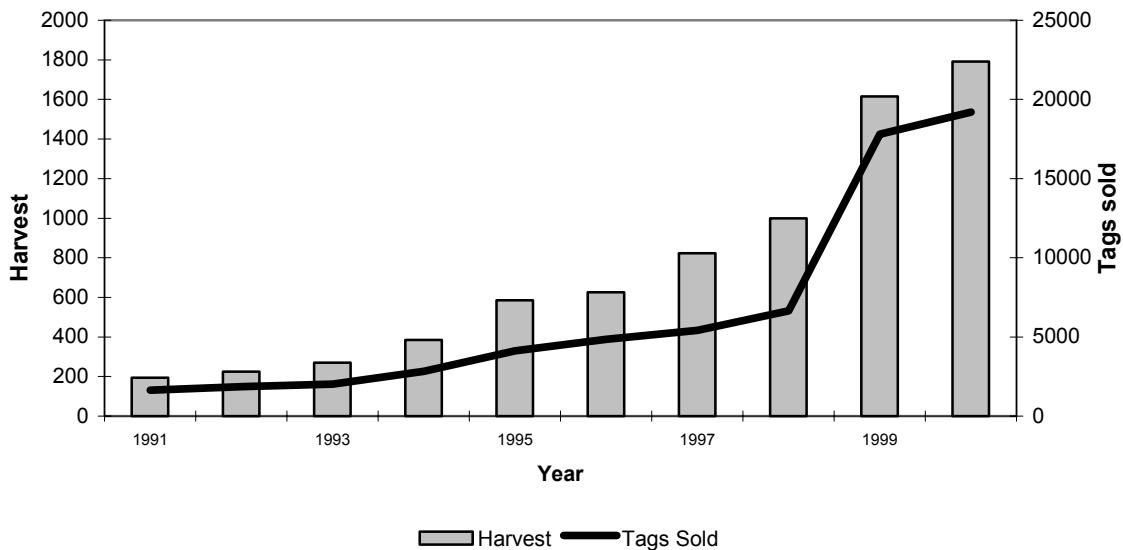
The largest amount of data collected on wild turkeys has been estimated harvest

and hunter effort. Some limited radio tracking has been done in Pend Oreille, Yakima, Chelan, and western Washington counties to help estimate survival and production of recently released birds. Future efforts to collect these types of data are described in the management section below.

## WILD TURKEY 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.



**Figure 2. Trend in turkey harvest and number of tags sold in Washington, 1991-2000.**

## **ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES**

### Population Management

#### Issue Statement:

Wild turkeys have been introduced in Washington State since 1960. Since the late 1980s, WDFW has been more aggressive in transplanting turkeys into suitable habitats in much of the state. An evaluation of past activities and a plan for future activities is needed.

#### Objective 131:

Develop a population management plan by December 2003.

#### Strategies:

- a. Develop criteria for evaluating past wild turkey releases.
- b. Evaluate past translocations within each WDFW region on a district-by-district basis.
- c. Evaluate reintroduction focus area criteria and make modifications to primary wild turkey population areas as necessary.
- d. Develop criteria that help identify areas where turkey populations are not desired (e.g., environmentally sensitive, urbanized, and depredation or nuisance areas).
- e. Conduct an assessment of potential release areas for habitat suitability, potential negative impacts, as well as public and agency support.
- f. Restrict release of turkeys into unoccupied areas until a population management plan is completed.
- g. Develop a population management plan.

#### Issue Statement:

Turkey populations in some areas of eastern Washington have expanded substantially

over the past five years. WDFW is receiving a considerable number of damage complaints from residents in some of these areas.

#### Objective 132

Develop a damage response plan by December 2003.

#### Strategies:

- a. Document locations of complaints.
- b. Evaluate WDFW responses to past complaints.
- c. Determine major factors relating to damage complaints.
- d. Develop a plan that addresses major factors and incorporates multiple methods of addressing the issues. Possible methods may include, but are not limited to, liberalized hunting seasons, deterrent activities, habitat enhancements, removal through trapping, and depredation permits.

#### Issue Statement:

Turkey populations need to be monitored to help determine appropriate hunting seasons and identify population management needs.

#### Objective 133:

Monitor turkey populations in primary management zones of the state on a yearly basis.

#### Strategies:

- a. Identify areas within the state that have population monitoring needs.
- b. Evaluate potential monitoring tools and develop a recommended monitoring protocol.
- c. Implement a recommended turkey population monitoring protocol.

## Recreation Management

### Issue Statement

Turkey populations in some portions of Washington have increased to the point that expanded hunting opportunities need to be evaluated.

### Objective 134:

By December 2003, develop a fall hunting opportunity recommendation for Fish and Wildlife Commission consideration.

### Strategies:

- a. Define population indexes for turkey populations.
- b. Evaluate the potential impacts of season options (including open season, increased season length, and increased permits).

### Issue Statement:

Members of the public have contacted WDFW and expressed a desire to eliminate inclusion of a turkey tag with the purchase of a small game license. In response, hunters were asked whether they would like to see the turkey tag separated in the hunter opinion survey conducted in January 2002. Survey results show that 57% of turkey hunters oppose separating the tag (48% strongly opposed) while 39% support separating the tag (24% strongly support).

### Objective 135:

By December 2002, determine if a turkey transport tag should be included with the purchase of a small game license.

### Strategies:

- a. Survey and/or discuss the subject with hunters and hunting groups to determine their position.

- b. Evaluate what impacts including or not including the tag may have on recreational opportunity.
- c. Develop a recommendation by 2003.

### 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 has also been identified as an important issue in hunter opinion surveys conducted by WDFW.

### Objective 136:

Over the next five years, increase the number of acres of private land available for public turkey hunting by 10% within priority turkey range.

### Strategies:

- a. Identify the priority turkey range.
- b. Increase public access to private lands through the efforts of WDFW's Upland Restoration Program.
- c. Investigate paying private entities for public hunting access to private property (e.g., block management, landowner incentives).

### Issue Statement:

A definitive method of determining when a hunting season change would be appropriate does not currently exist.

### Objective 137:

By April 2005, develop a set of criteria that, when met, would direct a change in season structure or hunting opportunity.

Strategies:

- a. Continue to collect harvest information via mandatory reporting.
- b. Define turkey population indexes for the different areas of the state.
- c. Develop and/or implement a method of monitoring turkey populations and harvest that includes triggers for adaptive management.

## 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 also has additional values to other wildlife species that utilize the same resources.

Objective 138:

Enhance wild turkey habitat within the primary turkey management zone.

Strategies:

- a. Utilize available enhancement grants (e.g., guzzlers for gobblers) to improve habitats utilized by wild turkeys.
- b. Facilitate habitat enhancement projects on private and public properties within the primary turkey management zone.
- c. Develop habitat enhancement projects to help address issues related to winter nuisance complaints.

## Public Education

Issue Statement:

The public is not well informed of turkey management history or practices in Washington and does not support introduction of non-native wildlife.

Objective 139:

Create educational pamphlets and news releases describing past management activities and future management objectives on a yearly basis.

Strategies:

- a. Produce a publication that provides information about non-native wildlife and inter-specific competition issues related to turkeys in Washington.
- b. Create a wild turkey pamphlet that describes past and future WDFW management activities and watchable wildlife opportunities.
- c. Produce timely news releases that cover substantial new management activities.
- d. Create an informational web page that addresses common concerns or interests surrounding wild turkeys.
- e. Develop a pamphlet or flyer that addresses the potential negative effects of feeding turkeys and guidelines describing how to avoid negative turkey interactions.

## 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 a better tool to use when managing the species.

Objective 140:

Initiate, participate in, or support research projects that increase our knowledge of wild turkeys in western habitats.

Strategies:

- a. Conduct a literature review of western U.S. wild turkey research.
- b. Identify and prioritize research needs.

- c. Cooperate with public and private entities (e.g., National Wild Turkey Federation) to develop research projects in Washington.
- d. Develop and/or participate in inter-specific competition research projects funded through the National Wild Turkey Federation and other public entities.
- e. Should research definitively show competition with native and or listed species, then plans to address the issues will be developed and implemented.

state, especially in parts of northeastern Washington where turkey hunter numbers are rising annually.

**Objective 141:**

Concentrate efforts on illegal harvest, public education, and landowner relations during appropriate times of the year.

**Strategies:**

- a. Increase enforcement patrols in areas where turkey hunters are concentrated.
- b. Work with landowners to address their concerns/needs.

**Enforcement**

**Issue Statement:**

Illegal activities such as trespass are becoming a problem in some areas of the

# MOUNTAIN QUAIL

## POPULATION STATUS AND TREND

Historically, mountain quail (*Oreortyx pictus*) are thought to have existed in western Washington and along the southern border in eastern Washington. However, mountain quail populations in Washington have been low for several years. 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 (Figure 1). The current status of this, and other eastern Washington populations is largely unknown but is assumed to be minimal at best.



**Figure 1. Historic Mountain quail distribution in Washington.**

## RECREATIONAL OPPORTUNITY

Mountain quail hunting season extends from October 6 through November 30 in western Washington; however, there have been no hunting seasons for mountain quail in eastern Washington since 1997. The 2000 mountain quail harvest was likely less than 200. Mountain quail do not represent a

major recreational opportunity in the state of Washington.

## DATA COLLECTION

To date, only incidental data on mountain quail populations in Washington have been collected.

These data suggests that mountain quail are limited in distribution and abundance. Future data collection may be focused on monitoring reintroduction efforts in eastern Washington.



## 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.



## **MANAGEMENT ISSUES, OBJECTIVES, AND STRATEGIES**

### **Habitat Management**

#### **Issue Statement:**

Little is known about mountain quail habitat in eastern Washington. Historic distribution has been estimated, but suitability and ability to sustain mountain quail populations is largely unknown.

#### **Objective 142:**

Determine distribution of potential mountain quail habitat in Washington and conduct an evaluation of key areas of native range by 2008.

#### **Strategies:**

- a. Develop a map showing potential mountain quail habitat.
- b. Evaluate potential habitat areas in southeastern Washington to determine the most appropriate areas for reintroduction efforts.
- c. Conduct an evaluation of eastern Washington mountain quail habitat conditions and suitability based on results from monitoring released quail. Identify potential habitat enhancement projects based on the evaluation.

### **Population Management**

#### **Issue Statement:**

Mountain quail occupy little of their historic range in eastern Washington.

#### **Objective 143:**

Re-establish mountain quail populations in historic range in eastern Washington by 2006.

#### **Strategies:**

- a. Secure funding for a reintroduction project.
- b. Enter into a cooperative project with Oregon and Idaho designed to address mountain quail reintroduction in southeastern Washington, northern Oregon and western Idaho.
- c. Support and/or conduct trapping of wild mountain quail in Oregon and release into identified areas of southeastern Washington.
- d. Implement a post-release monitoring program for quail as part of reintroduction efforts.
- e. Evaluate the need to close California quail hunting seasons in areas targeted for reintroduction.

### **Recreation Management**

#### **Issue Statement:**

Harvest of mountain quail in western Washington is not well understood. To date, mountain quail harvest has been reported as part of general quail harvest and cannot be reliably separated.

#### **Objective 144:**

By 2007, determine what proportion of the reported western Washington quail harvest is mountain quail.

#### **Strategies:**

- a. Develop a wing collection survey to estimate mountain quail harvest in western Washington.
- b. Develop a telephone survey to sub-sample quail hunters who report harvest in counties supporting mountain quail populations.
- c. Recommend requiring mountain quail hunters to possess an authorization permit and report harvest annually.

**Issue Statement:**

Recreational hunting opportunities in western Washington are still available, but are limited in distribution.

**Objective 145:**

Maintain a limited hunting season for mountain quail in western Washington

unless harvest declines by greater than 30% over 3 years.

**Strategy:**

- a. Recommend the use of a mandatory mountain quail harvest report and authorization card to maximize accuracy of harvest estimates.

# FOREST GROUSE

## POPULATION STATUS AND TREND

Forest grouse in Washington include blue (*Dendragapus obscurus*) and ruffed grouse (*Bonsa umbellus*), which occur throughout the forested lands in Washington, and spruce grouse (*Falci pennis 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). This trend shows an apparent decline in forest grouse populations, however, 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 private lands may be biasing results.

From 1984 to 2000, harvest estimates were conducted using a three wave mailed hunter survey (as opposed to a one-mailing survey in prior years). The harvest trend during that time shows a moderate decline ( $P = 0.0464$ ). In 1999, the small game survey was conducted differently than other years, which may explain the extremely low estimated harvest. If that data point is removed from the analysis, then the decreasing trend from 1984 to 2000 is not statistically significant ( $P = 0.1535$ ).

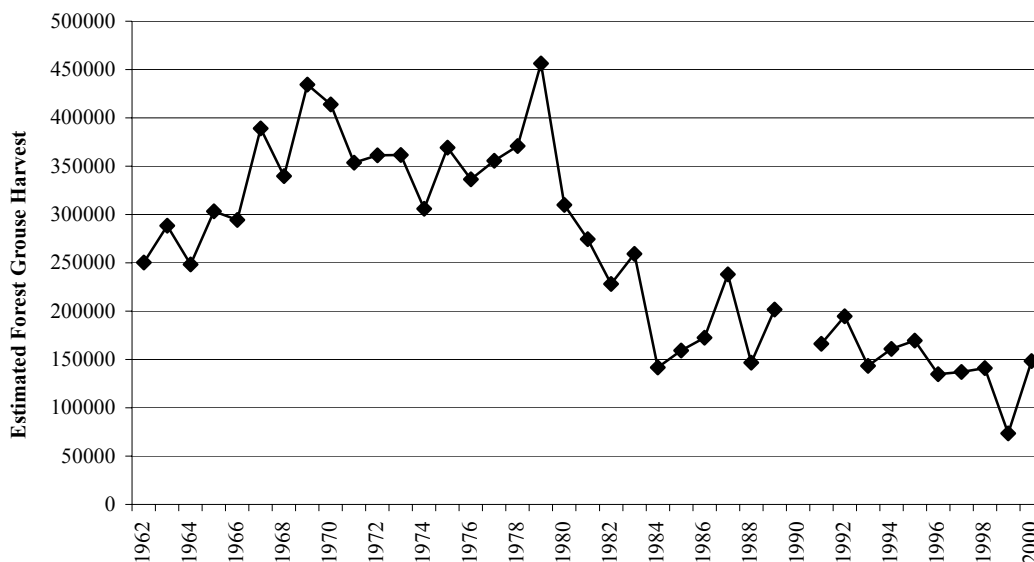


Figure 1. Estimated forest grouse harvest in Washington State from 1962 to 2000.

A wing collection study in 1997 revealed that hunters did not accurately report the species of grouse harvested. Since hunters have not been able to accurately report the species harvested, evaluating harvest, and thus population trends for individual species is very difficult. Currently grouse occupy much of the forested habitat in Washington (Figure 2) and populations are thought to be relatively healthy. However, loss of habitat to urban expansion and changes in forest management techniques may impact population status over time.



**Figure 2. Forest grouse distribution in Washington.**

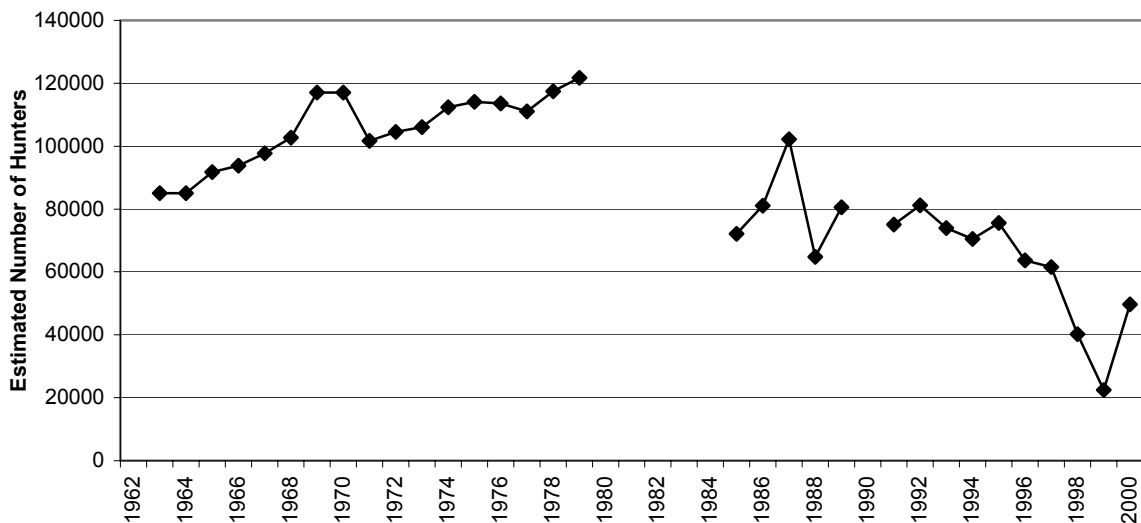
## RECREATIONAL OPPORTUNITY

The current Sept. 1 to Dec. 31 hunting season, which is similar to forest grouse seasons in Oregon (Sept. 1 – Jan. 6) and Idaho (Sept. 1 – Dec. 31), has been in place since 1987. The daily bag limit of three of any species (mixed or straight bag) has not changed since 1952. Estimated hunter numbers slowly declined from the late 1980s through 1997, but then fell sharply in 1998 and 1999 (Figure 3). 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, but are still below historic levels.

## DATA COLLECTION

Statewide population surveys for forest grouse have not been conducted. However, forest grouse wings were collected in 2000 by placing barrels in strategic locations in north-central Washington where hunters voluntarily deposited one wing from each grouse killed. Wings were classified as to species, sex, and age.

Statewide wing collections from 1993-95 provided several pieces of important



**Figure 3. Estimated number of forest grouse hunters in Washington from 1963 to 2000.**

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. Data was collected by surveying approximately 10% of hunting license buyers. These data are reported in the annual WDFW Game Harvest Report.

## **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.

## **ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES**

### **Habitat Management**

#### **Issue Statement:**

Forest grouse habitat quality is tied directly to forest management strategies implemented on public and private lands. As new information about forest grouse management becomes available, it is

important to make that information available to forest managers.

#### **Objective 146:**

Develop one additional habitat management publication by 2008.

#### **Strategies:**

- a. Review forest grouse literature concerning forest management techniques.
- b. Update existing or create additional forest grouse habitat management guidelines.
- c. Make guidelines available to forest landowners and encourage them to incorporate management practices that benefit forest grouse.

## **Population Management**

#### **Issue Statement:**

Current harvest estimation, which is used as an indicator of population trend, is not adequate to detect significant changes in forest grouse harvest at a local geographic level.

#### **Objective 147:**

Improve harvest estimation to detect a 50% decline over a 3-year period at the WDFW regional level.

#### **Strategies:**

- a. Analyze harvest report data to include estimation at the WDFW regional level.
- b. Develop a statistical model of harvest that includes the effects of weather and hunter effort.
- c. Investigate the potential to report grouse harvest on the WDFW website and implement if appropriate.

Objective 148:

When harvest estimates at the WDFW regional level show a decline of 50% over a 3-year period, focus management efforts on determining the causes for decline.

Strategies:

- a. Determine whether large-scale habitat changes have occurred in areas of concern.
- b. Determine if changes in forest grouse habitat and populations correlate with changes in timber management practices.

Issue Statement:

Having population trend data that is independent of harvest estimation available would help in monitoring population trends.

Objective 149:

Track forest grouse populations in key areas of Washington and report the results in the annual Game Status and Trend Report.

Strategies:

- a. Identify key areas for monitoring populations.
- b. Develop and/or implement a method to track population trends independent of harvest and compare the trends to trends in harvest estimation.

## **Recreation Management**

Issue Statement:

Some grouse hunters and other members of the public have questioned the ethics of hunting forest grouse with a center-fire cartridge firearm. The main issues are ethical fair chase, wastage, and respect for the species being hunted.

Objective 150:

Develop a recommendation for the Commission regarding regulating legal firearms and ammunition for forest grouse hunting by December 2003.

Strategies:

- a. Determine level of hunter support for greater firearm or ammunition restrictions and evaluate the rationale behind their opinion.
- b. Work with hunters to develop firearm and ammunition use alternatives.

Objective 151:

Develop a method to identify harvest of forest grouse species and report findings in the annual Game Status Report by 2008.

Strategies:

- a. Develop a species distribution map.
- b. Use wing collection data to create a correction factor to adjust hunter species composition reports.
- c. Develop and distribute educational materials that identify the differences between forest grouse species.

Objective 152:

Develop a report on hunting season impacts on grouse populations by 2008.

Strategy:

- a. Conduct a literature review targeting grouse hunting season impacts on forest grouse populations and assimilate results into a report with recommended management actions if appropriate.

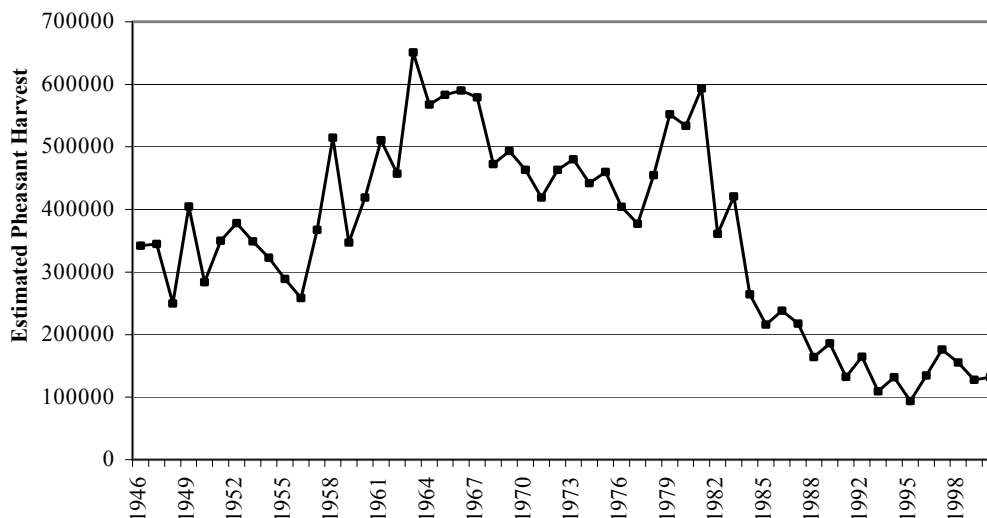
# UPLAND GAME BIRDS

## POPULATION STATUS AND TREND

Upland game birds in Washington include: Pheasant (*Phasianus colchicus*), California Quail, (*Callipepla californica*), Chukar (*Alectoris chukar*), and Hungarian or Gray Partridge (*Perdix perdix*). According to harvest estimates, (used as an index of population densities), pheasant populations in Washington have been declining since the early 1980s (Figure 1). Harvest estimation techniques did not change between 1984 and 2000, so estimates made during that time should be comparable. In addition, crowing count surveys and brood index surveys conducted between 1984 and 1998 also indicate a decrease in pheasant populations in many areas of eastern Washington (Cliff Rice, In Press). Interviews with hunters and biologists support the theory that pheasant populations have decreased over time. The cause of the decline is not definitively known, although several factors are thought

to have contributed, including loss and degradation of habitat.

The cause of the increase in pheasant harvest from 1995 to 1997 may be an artifact of the Eastern Washington Pheasant Enhancement Program. Since rooster pheasants were released in the fall between 1997 and 2000, harvest estimates may be artificially high when compared to harvest estimates between 1992 and 1996 when no pheasants were released in eastern Washington. Current populations do not appear to be significantly higher than periods prior to 1997.

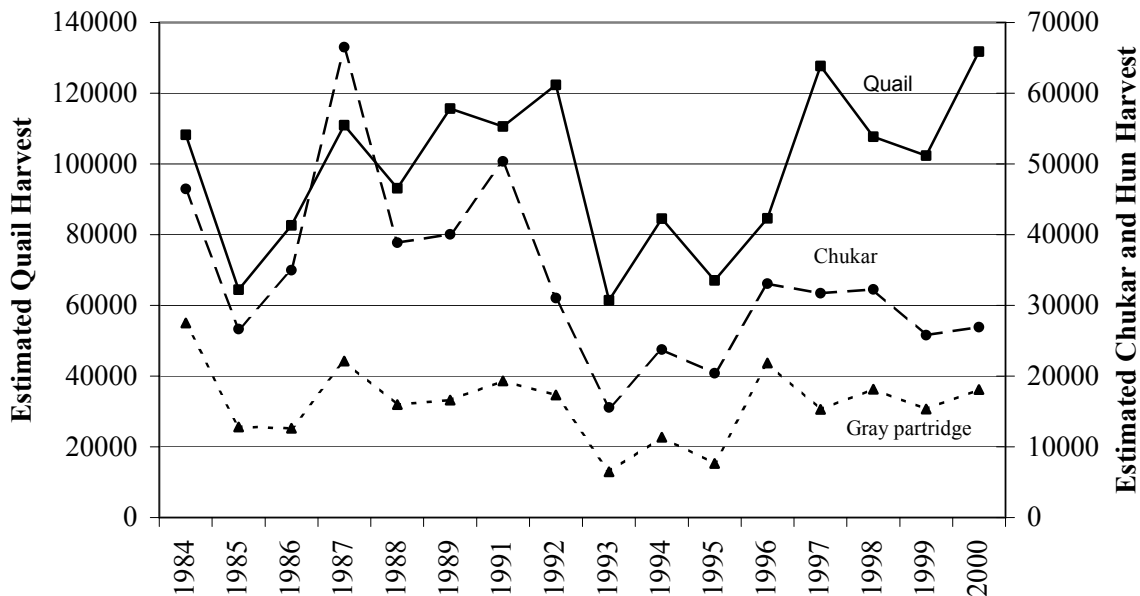


**Figure 1. Estimated pheasant harvest for Washington, 1946 - 2000.**

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 thermoregulating in cold, wet weather conditions. In addition, chicks need high protein diets in the spring and cold, wet springtime weather often decreases insect availability (Offerdahl and Fivizzani, 1987). Although variable from year to year, harvest estimates for quail, chukar and gray (Hungarian) partridge have not dropped below 1993 levels. Currently, harvest levels are at or near the 17 year high for quail and gray partridge, but chukar harvest is 60% lower than the 17 year high (Figure 2). In general, biologist opinions of upland game bird populations correlate with the harvest trends, seen in Figures 1 and 2.

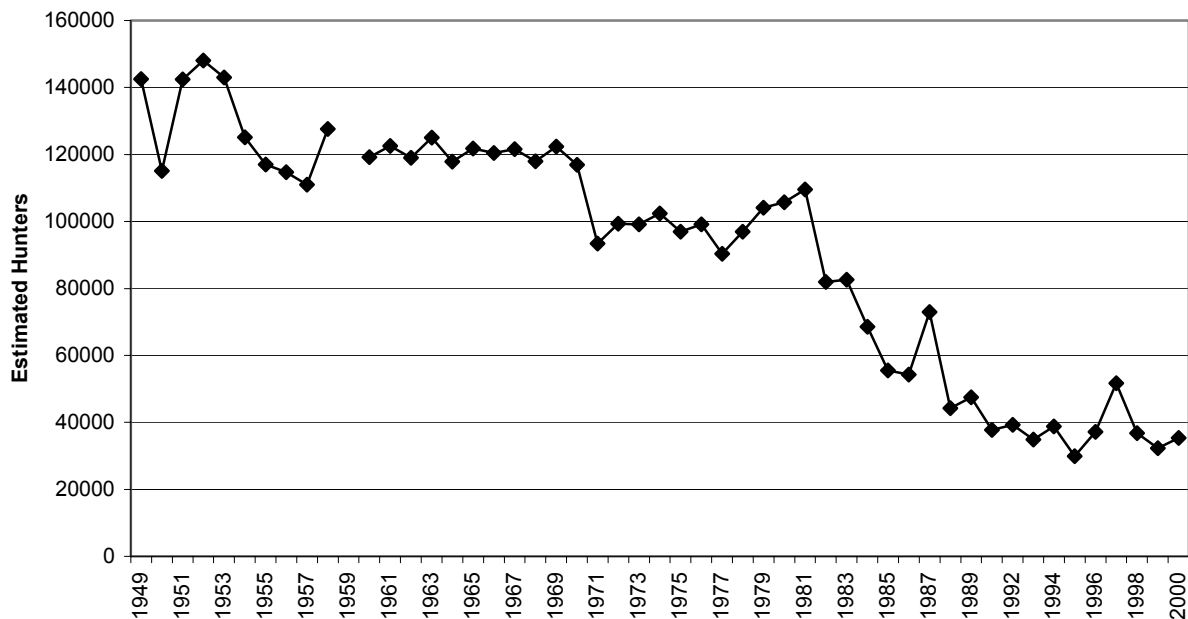
## RECREATIONAL OPPORTUNITY

Pheasant season timing in Washington State has varied only slightly over the past 10 years, usually starting in mid-October and lasting through December. For many years, pheasant hunters have been able to hunt for 11 or 12 weeks, depending on the year, with a daily bag limit of three roosters. In 2000, an estimated 35,789 people hunted pheasant in Washington. For nine out of the last 10 years, fewer than 40,000 people hunted pheasants, down from an estimated high of 142,000 in the early 1950s and a more recent high of 109,000 in 1979 (Figure 3). The spike in hunter participation in 1997 may have been due to the initiation of the Eastern Washington Pheasant Enhancement Program that year. In 2000, hunters spent over 233,000 days pursuing pheasant.



**Figure 2. Estimated quail, chukar and Gray partridge harvest for Washington, 1984-2000**





**Figure 3. Estimated pheasant hunter participation in Washington State, 1949 to 2000.**

Hunting seasons for other upland game birds have also varied in length over the years. During the 1960s and 70s, 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 2000, an estimated 17,317 people hunted quail, 7,713 hunted chukar, and 6,979 hunted gray partridge. Hunters spent over 159,000 days afield pursuing these upland birds.

### 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, population surveys for quail and chukar were completed through the late 1990s. All of these surveys were discontinued mainly due to the limited time and funding for district biologists considering all game species priorities.

Data are still collected annually in the irrigated farmland portions of Grant and Adams counties to provide indices of breeding population size and production of chicks. The population index is useful in determining long-term trends and major short-term population changes. The production index is a good predictor of hunting prospects and may provide information useful in determining reasons for annual changes in population size. In addition, a post-season mail survey of hunters is conducted to estimate harvest and hunter effort.

## **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.

## **ISSUE STATEMENTS, OBJECTIVES, AND STRATEGIES**

### Habitat Management

#### Issue Statement:

Pheasant habitat in eastern Washington has been lost, altered or degraded over the past 50 years. This is considered to be a major factor in the decline in pheasant populations (Flaherty 1979).

#### Objective 153:

By 2008, increase the quantity and quality of pheasant habitat in select WDFW districts within identified key pheasant management areas.

#### Strategies:

- a. Inventory current pheasant habitat and identify and prioritize key areas for improvement.
- b. Define quality pheasant habitat.
- c. Develop specific strategies for enhancing pheasant habitat.
- d. Purchase high priority pheasant habitat acreage using funds from the sale of

western Washington land holdings identified for that purpose.

- e. 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), and the Wildlife Habitat Incentives Program (WHIP).
- f. Improve pheasant habitat quality by funding habitat improvement projects through the Eastern Washington Pheasant Enhancement Program (EWPEP).
- g. Integrate pheasant habitat improvements and priorities with native species needs (e.g. sharp-tailed grouse and salmon).

#### Issue Statement:

The WDFW has been involved with improving upland wildlife habitat through the Upland Wildlife Restoration Program and various federal government sponsored programs such as CRP. Maximizing future involvement in federal and state programs is critical to increasing pheasant populations in eastern Washington in the future.

#### Objective 154:

By 2006, develop a report that evaluates past upland habitat program involvement and identifies those that are most effective.

#### Strategies:

- a. Evaluate the impacts of USDA programs and develop recommendations on how to best support these programs in Washington.
- b. Evaluate past acquisitions for their contribution to pheasant population densities.
- c. Support or conduct a thorough literature review and/or study to help determine

the value of guzzlers to upland game species.

## **Population Management**

### **Issue Statement:**

Harvest and survey trends indicate that pheasant populations have declined over the past 50 years.

### **Objective 155:**

Monitor population status and trend within the key areas identified for habitat improvement and document results in the annual Game Status Report by 2006.

### **Strategies:**

- a. Develop and/or adopt a standardized method to monitor pheasant population status.
- b. Consistently monitor pheasant populations to provide a gauge of how habitat improvements are affecting population trends.

## **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. Private land access has also been identified as an important issue in hunter opinion surveys conducted by WDFW.

### **Objective 156:**

By 2008, increase the number of acres of private land available for hunting by 10% and provide a variety of hunting opportunities within the areas identified as priorities.

### **Strategies:**

- a. Utilize the WDFW Upland Restoration Program to increase public access to private lands.
- b. Investigate paying private entities for public hunting access to private property (e.g., block management).
- c. Investigate alternatives to replace the loss of access to Snake River mitigation properties.
- d. Publicize where public hunting access is available.
- e. Develop limited entry areas, marked sites, walk-in sites, or other restrictions to reduce crowding and provide quality-hunting areas.

### **Issue Statement:**

Estimated harvest figures show that there has been a decline in pheasant and chukar harvest over the past 18 years and other upland game birds have experienced large fluctuations in harvest. Harvest estimation data 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 157:**

Monitor upland game bird harvest on a yearly basis.

### **Strategies:**

- a. Continue to collect harvest information on a yearly basis such that it is comparable to previous seasons.
- b. Evaluate harvest data to estimate trends in population status.
- c. Develop a method to collect eastern Washington pheasant release harvest data (e.g., an additional box on the hunter questionnaire) by 2004.

**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 158:**

Provide educational materials to hunters that describe the differences between upland game species and non-game upland birds.

**Strategies:**

- a. Include information describing the differences between pheasants and sharp-tailed grouse and sage grouse and include it in the annual upland bird-hunting pamphlet.
- b. Post signs notifying hunters of sage or sharp-tailed grouse being present in areas where upland game bird hunting occurs.

**Public Education**

**Issue Statement:**

Broad distribution of information regarding the biology and management of upland game birds will increase public understanding of management activities implemented by the WDFW.

**Objective 159:**

Provide information to the public on a yearly basis that increases the public's understanding of upland game bird management in Washington.

**Strategies:**

- a. Produce timely news releases when substantial developments in upland game bird management occur with an

emphasis on youth hunting opportunities.

- b. Produce pamphlets or other informational material that addresses upland game bird biology, emphasizing the impact of weather on annual population density.
- c. Enter into cooperative educational ventures with resource-oriented groups such as Pheasants Forever.
- d. Produce news releases and/or pamphlets that explain the potential impacts of lead shot on Washington's wildlife.

**Research**

**Issue Statement:**

Pheasant populations in Washington have declined over the past 50 years and the causes for the decline are not known with confidence.

**Objective 160:**

By 2008, develop a report that identifies the factors limiting pheasant populations in Washington and provides management recommendations.

**Strategies:**

- a. Conduct a literature review to identify potential factors and related research needs.
- b. Conduct studies that identify factors that are limiting pheasant populations in eastern Washington if needed.
- c. Compare brood count/crow count data with population decline and habitat change data.

**Issue Statement:**

Noxious weeds such as yellow star thistle and knapweed may be impacting habitat

quality for upland birds, especially Huns and chukar.

**Objective 161:**

Evaluate the effects of noxious weeds on chukar and Hun habitat and help develop and implement noxious weed control efforts in high priority areas.

**Strategies:**

- a. Support and/or conduct activities that document habitat distribution and current noxious weed distribution for high priority chukar and Hun areas.
- b. Complete a report that provides weed management recommendations for high priority upland bird areas.
- c. Participate in activities that identify and secure additional funding to aid in noxious weed control in high priority chukar and Hun areas.

**Eastern Washington Pheasant Enhancement Program (EWPEP)**

**Issue Statement:**

The EWPEP was developed "to improve the harvest of pheasants by releasing pen-reared rooster pheasants...and by providing grants for habitat enhancement...". It is not known if the program is achieving its objectives. Also, the program should be implemented to achieve the objectives in this plan.

**Objective 162:**

Evaluate the EWPEP and develop recommendations for any needed changes for legislative action in 2003.

**Strategies:**

- a. Review and analyze past EWPEP funded pheasant releases and develop a summary document that evaluates the

success of the program and provides recommendations for future action.

- b. Work with conservation organizations, such as Pheasants Forever, to develop recommendations.
- c. Focus habitat enhancements in identified key management areas.

**Western Washington Pheasant Program**

**Issue Statement:**

In 1997, the WDFW closed the Whidbey Island game farm to increase the efficiency of the program. Since that time, the program has gone from being 61% self-funded to 78% with the remainder being paid for by general hunting 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. In addition, being self-funded helps maximize the chances that the program can continue to operate.

**Objective 163:**

Evaluate the current funding mechanism for the western Washington pheasant program and identify new ways to create a self-funded budget by June 2003.

**Strategies:**

- a. Work with hunting public to determine the best way to increase revenue.
- b. Determine what percentage of small game license buyers hunts strictly western Washington pheasants.
- c. Identify cost saving efficiencies in pheasant production.

**Issue Statement:**

Hunter crowding and safety at several existing western Washington pheasant release sites are becoming more common.

**Objective 164:**

Develop and implement a plan to reduce hunter crowding by 2004.

**Strategies:**

- a. Identify and secure access to additional pheasant release sites.
- b. Evaluate need for even/odd regulation at additional release sites.
- c. Coordinate with western Washington pheasant program volunteers to develop crowd reduction recommendations.

**Issue Statement:**

Returned pheasant harvest permits have been used to help allocate pheasants to the different release sites. However, a very low number of these permits are returned every year making accurate allocation difficult.

**Objective 165:**

Develop a more effective method to appropriately allocate pheasants to pheasant release sites by September 2003.

**Strategies:**

- a. Visit release sites and document hunter use on high participation weekends.
- b. Integrate landowners supporting a release site into the decision making process.

**Issue Statement:**

Lead shot is known to be toxic to wildlife species that ingest pellets. In 2000, WDFW required non-toxic shot to be used at several western Washington release sites.

Members of the general public, and some hunters and wildlife professionals have suggested that all western Washington release sites should go to the non-toxic shot requirement due to the high level of use release sites receive.

**Objective 166:**

Determine if non-toxic shot should be required on all western Washington release sites by 2008.

**Strategies:**

- a. Test lead content and availability in the soils of select western Washington release sites.
- b. Survey hunters and other wildlife enthusiasts to help determine appropriate actions.
- c. Conduct a literature search and compile lead density, availability, and risk information found in other states.

**Enforcement**

**Issue Statement:**

Protecting the resource from illegal exploitation and working together with landowners is important.

**Objective 167:**

Concentrate efforts on illegal harvest, public education, and landowner relations.

**Strategies:**

- a. Maintain a field presence in areas of high hunter density.
- b. Work with landowners to address their concerns/needs.

## **LITERATURE CITED**

Flaherty, D.C. 1979. Phasianus c. and the Farmer. State of Washington Water Research Center Publication. Washington, USA.

Offerdahl, S.D. and A.J. Fivizzani. 1987. The Development of Thermoregulation in Gray Partridge Chicks. Proceedings of Perdix IV: Gray Partridge Workshop. 4:125-128.

Rice, C.G. In Press. The utility of pheasant call counts and brood counts for population monitoring and predicting harvest. Western North American Naturalist.

# SMALL GAME, FURBEARERS, AND UNCLASSIFIED SPECIES

## CLASSIFICATION

In Washington, there are approximately 31 mid-to-small sized mammals or mammal groups that can be hunted or trapped for recreational purposes (Table 1). Of these, 6 species are classified as game species (including 3 cross-classified as furbearers) and 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.

## 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. Nonetheless, because biological data on individual species populations are limited, harvest levels are generally managed at conservative levels.

## 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 late fall to early spring of the following year. Combining all species, an average of 7,038 hunters harvest 18,436

small game animals per year, which averages about 2.6 harvested animals per hunter (Table 2). The majority of the harvest is cottontail rabbits (64%), followed by raccoons (20%), snowshoe hares (13%), and bobcats (3%).

Trapping season for furbearers are generally through the winter months. Combining all species, an average of 475 trappers take 14,207 furbearers annually (Table 3). The majority of the take is muskrat (44%) and beaver (37%), followed by raccoon (6%), river otter (6%), mink (4%), and bobcat (2%); other species represent less than 1% of the total trapping harvest.

Unclassified wildlife can be hunted or trapped year-around 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 usually associated human-wildlife conflict and lethal take is a mitigating tool for nuisance or damage activities.

## DATA COLLECTION

There are no formal population surveys for small game mammals, furbearers, or unclassified wildlife. Rather, WDFW examines 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.



Data are also collected when any of these species are in conflict with humans. For bona fide human-wildlife conflicts, the species, location, number of animals, sex

animals are recorded. These data are used to help assess trends in wildlife populations and identify species distributions at the local scale.

**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	
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>	Furbearer	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</i>	Unclassified	X	X
Gophers	<i>Thomomys spp.</i>	Unclassified	X	X
Gray and fox squirrels <sup>a</sup>	<i>Sciurus spp.</i>	Unclassified	X	X
Ground squirrels <sup>b</sup>	<i>Sperophilus 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, Micotus, Phenacomys spp.</i>	Unclassified	X	X
Yellow-bellied marmot	<i>Marmota flaviventris</i>	Unclassified	X	X

<sup>a</sup> Except western gray squirrels (*S. griseus*) are protected and cannot be hunted or trapped.

<sup>b</sup> Except golden-mantled ground squirrels (*S. saturatus* and *S. lateralis*) and Washington ground squirrels (*S. washingtoni*) are protected and cannot be hunted or trapped.

**Table 2. Harvest trends for small game mammals, 1991-2000, Washington.**

Species	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Cottontail rabbit										
Harvest	15,528	17,706	12,574	14,944	13,619	12,704	7,304	8,203	7,065	7,203
Hunters	5,954	6,354	4,411	5,101	4,883	5,178	3,502	2,809	2,409	3,485
Snowshoe hare										
Harvest	2,017	4,488	3,793	3,110	2,826	2,533	1,042	1,463	483	2,398
Hunters	1,744	2,207	2,013	1,638	1,948	1,405	1,113	991	729	1,270
Raccoon										
Harvest	3,418	3,792	3,843	8,329	4,632	4,985	1,759	1,838	2,776	2,008
Hunters	1,255	1,261	1,076	1,787	1,551	1,408	484	794	504	1,117
Bobcat										
Harvest	675	1,026	661	565	1,074	1,227	152	140	253	206

**Table 3. Trapping trends for furbearers and unclassified wildlife, 1991-2000, Washington.**

<b>Species</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
Furbearers										
Bobcat	218	257	245	262	485	691	365	180	296	59
Raccoon	1,172	833	950	1,105	810	1,273	1,307	832	571	250
Red fox	9	0	0	0	0	0	0	0	0	0
Badger	30	20	17	40	6	11	14	2	13	7
Beaver	5,036	3,785	5,968	7,347	5,163	7,456	8,116	4,558	4,819	642
Mink	732	624	640	720	375	596	607	424	462	101
Marten	246	140	67	176	52	74	80	14	140	18
Muskrat	9,275	4,420	6,005	6,056	5,335	11,028	10,924	4,117	3,572	1,159
River otter	482	597	564	798	1,368	2,070	772	656	727	83
Weasels	66	78	2	78	49	49	49	47	87	44
Unclassified wildlife										
Coyote	1,875	1,610	2,341	2,288	1,770	1,864	1,606	922	838	503
Nutria	0	0	289	365	320	923	1,116	486	712	267
Skunks	0	0	146	204	79	225	127	164	175	16
Number of Trappers	492	445	435	537	451	562	601	488	473	261

**SMALL GAME, FURBEARERS, AND UNCLASSIFIED WILDLIFE MANAGEMENT GOALS**

The statewide goals for small game mammals, furbearers, and unclassified wildlife are:

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.

**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.

Objective 168:

Revise the distribution map for all small game and furbearer species by 2008.

Strategies:

- c. Revise the distribution maps using Priority Habitats and Species (PHS) protocols.
- d. Revise the distribution maps from harvest and trapping data, sightings, and regional biologist interpretations.
- e. Revise the distribution maps from survey and ground truthing activities.

Issue Statement:

Managers typically define and organize species populations by geographical units (e.g., Game Management Units). Management prescriptions are then applied according to the status of the population within each unit. This approach helps distribute sustainable populations evenly across the species range.

Currently, furbearers are managed at a relatively large geographical scale; that is, eastern and western Washington. Because

of this, the densities of individual furbearer species probably fluctuate widely, making local management of nuisance activity and sustainability problematic.

Objective 169:

Develop furbearer management units by 2008.

Strategies:

- a. Develop furbearer management units based on species biology and populations dynamics.
- b. Develop furbearer management units based on nuisance activity.

Issue Statement:

Accurate information on the status of furbearer populations is absent; as a result harvest levels are conservative. A more rigorous method of assessing animal populations is needed in order to ensure population health, maximize recreational opportunities, and suppress nuisance problems.

Objective 170:

Develop quantitative protocols for assessing the population status of small game and furbearing species by 2005.

Strategies:

- a. Develop quantitative methods for assessing population status from harvest data (e.g., catch-per-unit-effort, population modeling).
- b. Develop and implement survey methods to quantitatively assess population status.
- c. Improve the precision of current harvest estimates.
- d. Develop management criteria that address damage and nuisance problems on private property while ensuring long-

term sustainability of populations on public lands.

## Recreation Management

Issue Statement:

Information on the status of individual populations is necessary to accurately prescribe a harvest level that is compatible with maintaining sustainable and healthy populations. In the absence of such information, managers typically set conservative harvest levels, thereby minimizing the potential for over-exploitation.

Objective 171:

Until *Objective 170* is completed, use at least two methods to assess the impacts of harvest on populations, and then set harvest levels based on the more conservative method.

Strategies:

- a. Assess harvest impacts from three-year trends in total harvest, catch-per-unit-effort, or nuisance activity.
- b. Assess harvest impacts using population modeling (e.g., population viability analysis, sensitivity analysis).
- c. Assess harvest impacts using survey data, research findings, or other biological information.

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. Moreover, the trappers report of catch form is problematic in terms of ease of reporting and data utility.

Objective 172:

Develop a web based reporting system for furbearers and unclassified wildlife.

Strategies:

- a. Phase in a web-reporting system for the trapper's report of catch forms.
- b. Provide a mechanism for reporting capture of non-target species.
- c. Develop web-reporting system in collaboration with Washington Trappers Association.

Issue Statement:

One of the public's concerns about trapping is that trapping is non-discriminating to some extent. That is, non-target species can inadvertently be trapped and killed. With the prohibition on the use of body-gripping traps for recreational trapping in 2001 of all furbearers and unclassified wildlife, potential lethal impacts to non-target species caused by trapping was eliminated. Nonetheless, public support for trapping is still relatively low to date compared to other recreational hunting opportunities. Therefore, efforts should be made to shape trapping opportunities based on public attitudes, while at the same time fulfilling the Agency's mandate to maximize recreational hunting and trapping opportunities.

Objective 173:

Implement management strategies by 2008 that are consistent with the biological status of furbearers and public attitudes, respectively.

Strategies:

- a. Incorporate best management practices for trapping and trap types in Washington.

- b. Consider revising trap check times for lethal trap types.
- c. Require all new trappers to take a trapper education course prior to being issued a trapping license.\*
- d. Consider restricting hunting or trapping opportunities that greatly impact the viability or distribution of other native species.
- e. Publish management and trapping information in WDFW's annual Game Status and Trend Report.

\*Strategy currently is implemented.

Issue Statement:

Coyotes are categorized as "unclassified" wildlife, and can be hunted or trapped year-round. In the event that wolves become established in Washington State, the public has voiced concern about the chance for misidentification between coyotes and wolves.

Objective 174:

If wolves colonize or become established in Washington, minimize possible negative impacts of coyote hunting/trapping on wolves.

Strategies:

- a. Consider restricting coyote harvest opportunities if appropriate in areas occupied by wolves.\*
- b. Distribute educational information to hunters in areas occupied by wolves.\*

\*Strategy currently is implemented.

### **Problem Wildlife Management**

Issue Statement:

In the last two years, approximately 26% of Washingtonians have experienced problems with wild animals or birds. Of these, over half the problems were associated with small game mammals, furbearers, and

unclassified wildlife (Duda et al. 2002). This accounts for nearly 425,000 negative human-wildlife interactions annually.

**Objective 175:**

Minimize negative human-wildlife interactions so that the “number of interactions per capita” is constant or declining.

**Strategies:**

- a. Consider developing limited hunting seasons for appropriate furbearer species.
- b. Simplify special trapping permits via Enforcement Program to resolve damage caused by furbearers.
- c. Increase recreational harvest in areas prone to problem wildlife complaints.
- d. Develop educational package with tips on how to avoid furbearer damage and nuisance activity.
- e. Develop educational partnerships for informing the public on how to avoid furbearer damage and nuisance activity.
- f. Develop contracts with private wildlife control specialists for managing individual furbearer species involved in damage and nuisance activities.

**Issue Statement:**

Washington’s fauna includes wildlife species that are not native to the state. Some of these include nutria, Virginia opossum, and eastern gray squirrel. Non-native species can potentially impact native wildlife through competition, predation, habitat manipulations, and other ecological processes. However, major impacts have not been observed, so no management actions have been conducted that specifically target non-native species. Nonetheless, an indicator mechanism is needed to detect major negative impacts to native wildlife caused by non-native species.

**Objective 176:**

Develop a mechanism to assess the impacts of non-native species on native wildlife and habitat communities.

**Strategies:**

- a. Provide a reporting process for hunters and trappers to report lethal take of non-native species.
- b. Assess the impacts of non-native species by annually evaluating the problem wildlife complaint database.
- c. Coordinate monitoring efforts of non-native species with federal, state, tribal, county, and private organizations.

**Public Education**

**Issue Statement:**

Hunters may misidentify game species of rabbit or unclassified wildlife with a protected, non-game species or furbearer.

**Objective 177:**

Develop at least 2 publications or products that describe the differences between game, non-game, or furbearer species that may be easily mistaken.

**Strategies:**

- a. Develop publications, in conjunction with WDFW diversity division staff, describing the differences between similar game and non-game species, including ground squirrels and western gray squirrels.
- b. Develop simple identification materials for use in hunting pamphlets.
- c. Develop pygmy rabbit/cottontail rabbit informational signs and post areas where pygmy rabbits exist.

**Issue Statement:**

Washington State is home to approximately five million people and one-half million furbearers. Both people and furbearers exert pressures on one another (such as encroachment and habitat modification) and these pressures will likely increase in future years. Therefore, it's important the public understands the role of habitat for both conserving furbearer species and minimizing human-furbearer conflicts.

**Objective 178:**

Provide educational information on furbearer habitat that reaches 100,000 people annually.

**Strategies:**

- a. Develop a website describing proper habitat management for maintaining furbearer populations while at the same

time minimizing human-furbearer conflicts.

- b. Develop a viewing opportunity demonstrating proper habitat management for maintaining furbearer populations while at the same time minimizing human-furbearer conflicts.
- c. Develop a brochure describing proper habitat management for maintaining furbearer populations while at the same time minimizing human-furbearer conflicts.

**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.

---

# APPENDIX A

## RCW 77.04.012

### **Mandate of department and commission.**

Wildlife, fish, and shellfish are the property of the state. The commission, director, and the department shall preserve, protect, perpetuate, and manage the wildlife and food fish, game fish, and shellfish in state waters and offshore waters.

The department shall conserve the wildlife and food fish, game fish, and shellfish resources in a manner that does not impair the resource. In a manner consistent with this goal, the department shall seek to maintain the economic well-being and stability of the fishing industry in the state. The department shall promote orderly fisheries and shall enhance and improve recreational and commercial fishing in this state.

The commission may authorize the taking of wildlife, food fish, game fish, and shellfish 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 game fishing and hunting opportunities of all citizens, including juvenile, disabled, and senior citizens.

Recognizing that the management of our state wildlife, food fish, game fish, and shellfish resources depends heavily on the assistance of volunteers, the department shall work cooperatively with volunteer groups and individuals to achieve the goals of this title to the greatest extent possible.

Nothing in this title shall be construed to infringe on the right of a private property owner to control the owner's private property.

[2000 c 107 § 2; 1983 1st ex.s. c 46 § 5; 1975 1st ex.s. c 183 § 1; 1949 c 112 § 3, part; Rem. Supp. 1949 § 5780-201, part. Formerly RCW [75.08.012](#), [43.25.020](#).]

## APPENDIX B

### Resident Hunting License, Deer and Elk Tag Fee Changes Since 1901

Year	State Hunt & Fish	State Hunt	County Hunt & Fish	Deer Tag	Elk Tag
1901	NA*	NA	\$1.00		\$20 additional for killing a male elk
1905	NA	<b>\$5.00</b>	\$1.00	NA	<b>NA</b>
1913	<b>\$5.00</b>	<b>NA</b>	\$1.00	NA	NA
1921	<b>\$7.50</b>	NA	<b>\$1.50</b>	NA	NA
1929	\$7.50	NA	\$1.50	NA	<b>\$5.00</b>
1933	<b>\$3.00</b>	NA	\$1.50	NA	\$5.00
1948	<b>\$5.00</b>	NA	<b>\$2.50</b>	NA	\$5.00
1953	\$5.00	NA	\$2.50	<b>\$1.00</b>	<b>\$5.50</b>
1954	<b>\$7.00</b>	<b>\$4.00</b>	<b>\$3.00</b>	\$1.00	\$5.50
1956	\$7.00	\$4.00	<b>\$3.50</b>	\$1.00	\$5.50
1957	\$7.00	\$4.00	\$3.50	\$1.00	<b>\$7.50</b>
1958	<b>\$8.00</b>	<b>\$4.50</b>	<b>\$4.25</b>	<b>\$2.00</b>	\$7.50
1966	<b>\$9.00</b>	<b>\$5.50</b>	<b>\$5.25</b>	\$2.00	\$7.50
1971	<b>\$12.00</b>	<b>\$6.50</b>	<b>\$8.00</b>	<b>\$3.00</b>	<b>\$10.00</b>
1975	\$12.00	\$6.50	\$8.00	<b>\$5.00</b>	<b>\$11.00</b>
1976	<b>\$14.00</b>	<b>\$7.50</b>	<b>\$9.00</b>	\$5.00	\$11.00
1981	\$14.00	\$7.50	\$9.00	<b>\$10.00</b>	<b>\$15.00</b>
1982	<b>\$20.00</b>	<b>\$10.50</b>	<b>NA</b>	\$10.00	\$15.00
1985	<b>\$24.00</b>	<b>\$12.00</b>	NA	<b>\$15.00</b>	<b>\$20.00</b>
1992	<b>\$29.00</b>	<b>\$15.00</b>	NA	\$15.00	\$20.00
1999	<b>NA</b>	<b>NA</b>	NA	<b>\$36 deer only \$28 with elk</b>	<b>\$36 elk only \$28 with deer</b>

\* Not Applicable

\*\* Bold Indicates change from previous year.



# APPENDIX C

## Summary of 1999 Public land ownership and use (acres) in Washington State

Landowner/ Agency	Outdoor Recreation, Habitat, Environmental Protection.	Resource Production and Extraction	Transportation and Utilities Infrastructure	Other Government Services and Facilities	Unknown Upland Uses	Total Upland Acres	Total Aquatic Acres	Grand Total
Federal								
US Forest Service	6,887,490	2,115,089	82,703	531	18,560	9,104,373	85,045	9,189,418
National Park Ser.	1,831,274		9			1,831,283	0	1,831,283
B. of Reclamation			468,808			468,808	11,341	480,149
US Army				404,313		404,313	0	404,313
Bureau of Land Mgt.	74,154	318,429				392,583	3,346	395,929
US Dept. Energy	162,879		1,094	198,723		362,696	916	363,612
Corp of Engineers	1,098		84,916	4		86,018	5,764	91,782
All Other Federal	186,567	2,032	9,798	36,787	162	235,345	1,905	237,250
Federal Total	9,143,462	2,435,550	647,328	640,358	18,722	12,885,421	108,317	12,993,738
State								
Natural Resources	82,474	2,830,167	18,211	3,523	40,762	2,975,136	2,407,000	5,382,136
Fish and Wildlife	456,289	4,677	8	62		461,036	540	461,576
Transportation			150,561	1,903		152,464	0	152,464
Parks	107,608			11		107,619	0	107,619
All Other State	2,127	1,850	70	29,307	5	33,359	11,689	45,048
State Total	648,498	2,836,694	168,850	34,806	40,767	3,729,614	2,419,229	6,148,843
Local								
Counties	46,930	45,596	90,683	14,278	15,581	213,068	4,054	217,122
Cities/towns	167,044	14,981	119,897	12,049	2,691	316,661	3,189	319,850
Port Districts	4,032	2,836	18,170	16,779	176	41,993	3,849	45,841
All Other Local	19,033	2,491	14,185	24,153	781	60,643	15,489	76,132
Local Total	237,038	65,903	242,935	67,259	19,229	632,365	26,580	658,945
Total Public	10,028,998	5,338,147	1,059,113	742,424	78,718	17,247,400	2,554,126	19,801,526
Tribal	47,358	205,980	1,502	10,415	2,412,026	2,677,281		2,677,281
Total Public/Tribal	10,076,356	5,544,127	1,060,615	752,839	2,490,744	19,924,681	2,554,126	22,478,807
Total Private Lands								20,821,193