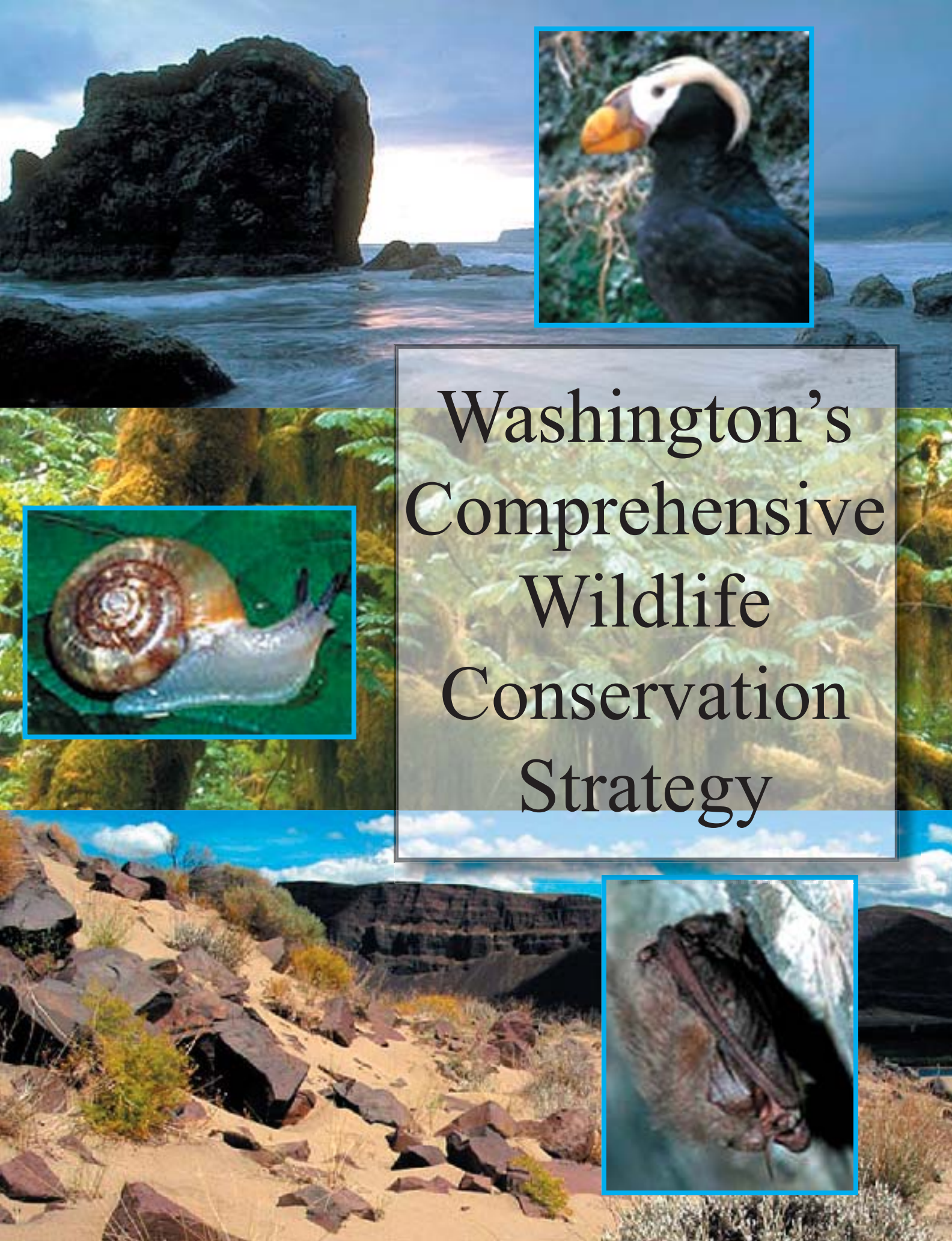

Washington's Comprehensive Wildlife Conservation Strategy

WASHINGTON'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY

FINAL DRAFT

Submitted
September 15, 2005

Washington Department of FISH AND WILDLIFE

WASHINGTON CWCS

TABLE OF CONTENTS Page No.

Foreword/Letter of Transmittal
Table of Contents
Roadmap to the Eight Essential Elements
Acknowledgments
VOLUME 1 – WASHINGTON'S CWCS
Chapter I: Introduction and Background 1
A. Comprehensive Wildlife Conservation Strategy 1
B. Washington Department of Fish and Wildlife 5
C. Major Conservation Partners and Programs 6
Chapter II: Biodiversity Conservation 7
A. The Challenge 7
B. What Should Be Conserved? 8
C. How Much and Where Should Biodiversity Be Conserved? 9
D. How Can Biodiversity Be Conserved? 9
E. How Can Biodiversity Be Measured and Monitored? 11
Chapter III: State Overview 12
A. Physiography and Climate 12
B. Land Ownership and Human Population 14
C. Washington's Biodiversity 16
D. Washington's Ecoregions 16
E. Wildlife Species Distribution, Status and WDFW Management Priorities 17
F. CWCS Habitats of Conservation Concern 19
G. Major Statewide Conservation Problems and Issues 21
H. Major Conservation Strategies 35
I. Major Statewide Conservation Planning and Assessment Initiatives 45
J. Major Fish and Wildlife Species and Habitat Databases 50
Chapter IV: Species of Greatest Conservation Need 55
Mammals 56
Birds 91
Reptiles 156
Amphibians 164
Fish 174
Invertebrates 209

TABLE OF CONTENTS Page No.

Chapter V: Implementation 249

A. A First Step in Wildlife Conservation Planning 249

B. Narrowing the Scope of Implementation 249

C. Beginning the Implementation Process 250

D. Implementation Partners 251

Chapter VI: Washington's Ecoregional Conservation Strategy 257

A. Why Ecoregions? 257

B. Ecoregional Assessments 258

C. Local Conservation Planning 259

D. Ecoregional Conservation Strategies 260

Northwest Coast Ecoregion 261

Puget Trough Ecoregion 303

North Cascades Ecoregion 348

West Cascades Ecoregion 373

East Cascades Ecoregion 404

Okanogan Ecoregion 435

Canadian Rocky Mountains Ecoregion 468

Blue Mountains Ecoregion 496

Columbia Plateau Ecoregion 522

Chapter VII: Monitoring and Adaptive Management 556

A. Status and Trends 557

B. Research Monitoring 559

C. Effectiveness Monitoring 561

D. Implementation (Compliance) Monitoring 562

E. Monitoring Tools 562

F. WDFW's Monitoring Partners 564

G. Next Steps 565

H. Adaptive Management and CWCS Review and Revision 568

I. Conclusion 569

VOLUME 2: APPROACH AND METHODS

A. Identify Species of Greatest Conservation Need 570

B. Identify Habitats of Conservation Concern 579

C. Identify Major Problems and Conservation Strategies for Species and Habitats 582

TABLE OF CONTENTS Page No.

D. Provide for Periodic Monitoring of Species, Habitats and Conservation Actions 583

E. Provide for the Periodic Review and Revision of the CWCS 583

F. Coordinate Development of the CWCS with Federal, State, Local and Tribal Partners 584

G. Incorporate Opportunities for Public Involvement into Development of the CWCS 585

List of Acronyms 588

Glossary 590

Supporting References 611

APPENDICES

Appendix 1: CWCS Species of Greatest Conservation Need 620

Appendix 2: CWCS Salmonids of Greatest Conservation Need 631

Appendix 3: Criteria for Ranking Species of Greatest Conservation Need 634

Appendix 4: CWCS Outreach Plan 636

Appendix 5: Major Conservation Programs and Partners 638

Appendix 6: SGCN Wildlife Species Plans 654

Appendix 7: SGCN Salmon Plans and Strategies 659

Appendix 8: Associated Habitats of Conservation Concern 661

Appendix 9: SGCN Status and Trend Checklist 724

Appendix 10: SGCN Problems and Actions Checklist 731

Appendix 11: CWCS Committees 738

Appendix 12: Ecoregional Assessments 742

Appendix 13: WHROW book (included separately) 757

Appendix 14: Habitat Classification Crosswalk 758

Appendix 15: CWCS Outreach Record 762

Appendix 16: CWCS Press Release 777

Appendix 17: CWCS Brochure 779

Appendix 18: SWG Brochure 780

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Development of the Washington Comprehensive Wildlife Conservation Strategy (CWCS) was a collaborative effort involving many policy advisors and technical experts from within the Department of Fish and Wildlife, as well as other public agencies and private conservation and business organizations. We want to acknowledge and thank the following organizations and individuals for their assistance in completing this large project:

Washington Department of Fish and Wildlife (WDFW) Personnel

Development of the CWCS was a high priority for WDFW, and many technical experts from the agency were enlisted to help with its development. Wildlife taxa experts from both Olympia headquarters staff and WDFW's six administrative regions participated in agency workshops to rank fish and wildlife species for the Species of Greatest Conservation Need list, as well as various other parts of the CWCS. Other technical staff, as well as fish, habitat and wildlife managers from around the state, were consulted in reviewing the discussions of species and habitats, problems and conservation actions, especially at the ecoregional scale. WDFW regional directors and regional wildlife staff also assisted in setting up and conducting public meetings around the state in June, 2005. Many of the WDFW staff who helped with developing the Species of Greatest Conservation Need list are included in Appendix 11; many of the regional meetings with WDFW staff are included in Appendix 15.

Natural Heritage Program, Washington Department of Natural Resources

Technical advice and hands-on assistance provided by managers and staff of the Washington Natural Heritage Program staff was invaluable in developing the CWCS. We consulted with WNHP staff throughout the CWCS process and they helped us in many ways, from participating in ranking wildlife species for the Species of Greatest Conservation Need list to helping us compare and crosswalk various habitat classification systems for the CWCS. We also want to acknowledge the importance of DNR documents as major sources of information for the CWCS, including the *Washington Natural Heritage Plan*, *Our Changing Nature* and *Changing Our Water Ways*. These documents were consulted early and continually throughout the development of the CWCS. Because the Washington Natural Heritage was Plan updated in 2003 and again in 2005, the plan provides an excellent summary of current problems affecting wildlife habitat, native plants, and other elements of biodiversity, at both statewide and ecoregional scales. Because it is beautifully designed and illustrated, the Natural Heritage Plan was also an inspiration to WDFW staff to try produce a CWCS document that is attractive and readable for the public.

CWCS Advisory Committee

This advisory committee was made up of representatives from other state and federal agencies, as well as business and stakeholder groups with an interest in helping WDFW develop the Washington CWCS. The committee met on an ad hoc basis in 2004 and 2005 and advised WDFW staff on various issues related to the CWCS. We especially want to thank The Nature Conservancy of Washington and Defenders of Wildlife for their intense level of involvement and their interest in helping us develop the best possible comprehensive wildlife strategy. We also appreciate the time spent by members of WDFW's standing Game, Wildlife Diversity, and Lands Management citizen advisory committees in meeting with WDFW staff and reviewing the draft CWCS. A list of these advisory committees is included as Appendix 11; a running account of our various meetings and planning workshops is included in Appendix 15.

I. INTRODUCTION AND BACKGROUND

A. Comprehensive Wildlife Conservation Strategy

Background

Since the 1970s, the Washington Department of Fish and Wildlife (WDFW) has gone through a significant evolution. Its overall mission has expanded from primarily managing the harvest of game and commercial fish and shellfish species, to the protection and management of all fish and wildlife species and their habitats. The regulation of hunting and fishing remains an important role of WDFW and the Fish and Wildlife Commission. Growing public interest in the protection and enjoyment of all wildlife species, plus the advent of laws such as the federal Endangered Species Act, has caused WDFW to become broader in its management scope and much more concerned with the protection and management of essential habitat and biodiversity than it was 30 years ago. Across the nation as well as in Washington, state wildlife agencies have shifted program emphasis and available funding to meet these new demands.

In 1980, WDFW published its first Nongame Wildlife (now Diversity) Plan and hired its first nongame wildlife biologists. In 1980, Congress also recognized this shift in public awareness and interest in broader wildlife programs by passing the Fish and Wildlife Conservation Act, also known as the "Nongame Act". This act authorized financial and technical assistance to the states for the development, revision and implementation of conservation plans and programs for nongame fish and wildlife. However, federal funding to assist with conservation of non-hunted wildlife lagged far behind resource needs and public demand, and it was not until 1994 that the states collectively approached Congress with a serious proposal to provide matching funds to conserve all those species and their habitats not covered by previous funding programs for game and commercial species.

In 1998, the International Association of Fish and Wildlife Agencies (IAFWA), in partnership with WDFW and other state wildlife agencies, initiated Teaming With Wildlife, a national campaign to document the need for additional wildlife funding and secure a reliable source of federal matching funds for species and habitat conservation. The original source of revenue investigated for the campaign was a new federal excise tax on outdoor equipment, similar to taxes imposed on fishing tackle and firearms and administered by the U.S. Fish and Wildlife Service. However, in 1999 the Teaming with Wildlife campaign became part of a much larger effort to restore and expand funding from offshore oil and gas revenues for a range of conservation, outdoor recreation and historic preservation programs. Although this expanded effort, the Conservation and Reinvestment Act of 1999 (CARA) was not passed by Congress as proposed, it did result in significant additional funds from the federal budget for certain programs such as a new State Wildlife Grant (SWG) program to assist state wildlife agencies with the conservation of species and habitats of greatest conservation need.

The first Congressional SWG appropriations were made in 2001, and both planning and implementation grants have been made to state wildlife agencies since that first appropriation. Funds are allocated according to a formula based on the size and population of each state.

All State Wildlife Grants funded by Congress are predicated on the completion and acceptance of state Comprehensive Wildlife Conservation Strategies (CWCS) by October 2005. Acceptance of the Washington CWCS by the U.S. Fish and Wildlife Service will satisfy the funding requirements of the current planning grants and establish eligibility for further funding of Washington wildlife conservation programs under the SWG program.

Eight Essential Elements

To meet the requirements for future State Wildlife Grants, state Comprehensive Wildlife Conservation Strategies must adequately address eight essential elements established by Congress. This Washington Comprehensive Wildlife Conservation Strategy meets or exceeds the requirements of these eight essential elements:

Element 1. Include information on the distribution and abundance of priority wildlife species that reflect the diversity and health of state wildlife.

Element 2. Identify the extent and condition of wildlife habitats and community types essential to the conservation of priority species.

Element 3. Identify problems that may adversely affect priority species or their habitats.

Element 4. Determine actions to be taken to conserve priority species and their habitats.

Element 5. Provide for periodic monitoring of priority species and habitats, as well as the effectiveness of conservation actions.

Element 6. Coordinate all stages of the CWCS with federal, state tribal and local agencies.

Element 7. Incorporate opportunities for public involvement into the development, revision and implementation of the CWCS.

Element 8. Provide for review of the CWCS and appropriate revision at intervals of not more than 10 years.

Guiding Principles

The State Wildlife Grants program and the Comprehensive Wildlife Conservation Strategy present the Washington Department of Fish and Wildlife with an opportunity to expand beyond traditional fish and wildlife management and consider other concepts such as biodiversity. Consequently, the following six Guiding Principles were adopted to direct the development of our Comprehensive Wildlife Conservation Strategy:

Guiding Principle 1: *"Leave no species behind." Address the conservation of wildlife species and associated habitats with identified greatest conservation need, while recognizing the importance of keeping common species common.*

The intent of Washington's CWCS is to build on current efforts to protect fish and wildlife species included on state and federal endangered and threatened species lists. This will include identifying species and their associated habitats for which we do not have adequate information, as well as protected species that could be in trouble in the future if steps are not taken now to conserve them. Washington's list of Species of Greatest Conservation Need is included as Appendices 1 and 2. The criteria used to evaluate over 700 fish and wildlife species is included as Appendix 3.

Guiding Principle 2: *"Build a plan of plans." Construct the Washington CWCS from a large body of existing work, including nine ongoing ecoregional assessments.*

WDFW and its public and private conservation partners are involved in a number of collaborative conservation planning efforts for species and habitats. These planning efforts are being conducted at many scales and levels of detail, from statewide to regional to county scales. The CWCS, for the most part, is not an original planning document but rather a summary of the goals and strategies articulated in other plans produced or influenced by WDFW. A more complete listing and description of these major planning efforts is included in Chapter III, State Overview.

Guiding Principle 3: *"Strengthen conservation partnerships." Expand existing partnerships and create new opportunities to cooperate with other conservation agencies, local governments, Indian tribes, nongovernmental organizations and the private sector.*

Development and implementation of the Washington CWCS provides a good opportunity for WDFW to engage with a range of public and private conservation partners and stakeholders. An active, three-phase outreach program was initiated in 2003 to inform partners about the CWCS and to later solicit their input on the draft CWCS. Implementation of many of the conservation actions included in the CWCS will require the involvement of conservation partners, including other state, federal and tribal agencies, colleges and universities, conservation and outdoor recreation groups, local governments and private landowners. WDFW's CWCS Outreach Plan is included as Appendix 4.

Guiding Principle 4. *"Emphasize biodiversity conservation." Promote the long-term conservation of Washington's biodiversity and coordinate development and implementation of the CWCS with the Washington Biodiversity Council.*

In 2002 Washington became one of the first states to articulate a state policy on biodiversity when the Washington State Legislature passed legislation calling for and partly funding the development of a state framework for biodiversity conservation. In 2004 the Washington Biodiversity Council was established by Governor's Executive Order to establish a 30-year vision for conserving the state's biodiversity, primarily through locally driven, nonregulatory, incentive-based programs on both private and public lands.

WDFW participates in the Washington Biodiversity Council and has joined with The Nature Conservancy and Washington Department of Natural Resources in a partnership to produce nine ecoregional assessments, which classify and prioritize

biodiversity across Washington's landscapes. These assessments may serve as a landscape focus for an overall state biodiversity strategy. The ongoing ecoregional assessments (EAs) are discussed in more detail in Chapter VI, Washington's Ecoregional Conservation Strategy and in Volume Two, Approach and Methods.

Guiding Principle 5. "Inform the public." Create a document that is concise, readable, informative and available to a wide range of publics and stakeholders.

The CWCS has been organized and written so that the both the general public and the conservation and wildlife recreation community can gain a good understanding of the wildlife species, habitats and conservation actions that will guide fish, wildlife and biodiversity conservation in Washington for at least the next 10 years. The main report, Volume One, describes nine ecoregions and includes discussions of wildlife species and their habitats of greatest conservation need, as well as conservation problems, strategies and actions. The section documenting the Approach and Methods, which may not be important to the casual reader, is included as Volume Two. Detailed appendices have been included in a single CD-ROM. The Washington CWCS will be available on WDFW's website (www.wdfw.wa.gov/wlm/cwcs) with appropriate links to other plans and partners. The web-based strategy and appendices will be updated as often as appropriate and necessary.

Guiding Principle 6. "Inform decision makers." Use the CWCS to draw attention to important wildlife conservation issues—for Congress, the Washington Legislature, local decision makers, the media and the public.

The challenges of maintaining a healthy economy, accommodating growth, and conserving the state's wildlife, habitats and biodiversity can be met only through strong public awareness and support from a broad spectrum of publics and decision makers. Narrative and data in the CWCS will help meet that challenge.

WDFW and its conservation partners will use the CWCS, ecoregional assessments and other plans and assessments on which they are based to raise public awareness and gain support for conservation measures necessary to sustain fish and wildlife populations, habitat and biodiversity. Ecoregional assessments and other data sources will be used to develop county-level habitat assessments and other tools to better inform public and private landowners, and to help local decision makers and planners administer the Growth Management Act and other local conservation programs.

B. Washington Department of Fish and Wildlife

Washington Department of Fish and Wildlife
Mission Statement

Sound stewardship of fish and wildlife; protecting, restoring and enhancing fish and wildlife and their habitats, while providing sustainable fish and wildlife-related recreational and commercial opportunities.

Washington Department of Fish and Wildlife
Strategic Goals

- *Healthy and diverse fish and wildlife populations and habitats*
- *Sustainable fish and wildlife-related opportunities*
- *Operational excellence and professional service*

The Washington Department of Fish and Wildlife is one of the largest and most diverse state wildlife agencies in the country, with almost 1,800 employees working in six regional offices and the Olympia headquarters. The Washington State Legislature created WDFW in 1994 by merging the existing departments of Wildlife and Fisheries, both of which had been separate agencies since the 1930s. The WDFW Director is appointed by a nine-member Fish and Wildlife Commission. The Governor appoints commission members to six-year staggered terms.

WDFW is responsible for the protection and management of all marine, anadromous and freshwater fish; shellfish; and terrestrial wildlife—thousands of animal species statewide. WDFW regulates all legal harvest of commercial fish, sportfish and wildlife, enforces wildlife protection laws, and manages about 840,000 acres of land. More than half of these managed lands are owned by WDFW. The remainder is leased from other state and federal agencies, including the Washington Department of Natural Resources and the U.S. Bureau of Reclamation.

WDFW's conservation mission is administered through three resource management programs: Wildlife, Fish, and Habitat. On-the-ground implementation of these conservation programs is directed from the Olympia headquarters and accomplished through six Regional Offices, located in Spokane, Ephrata, Yakima, Mill Creek, Vancouver and Montesano (Figure 1).

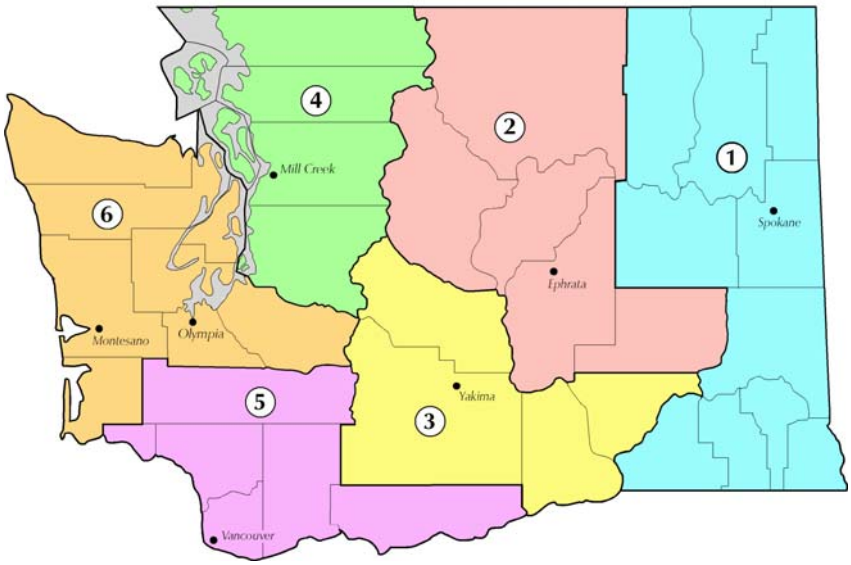


Figure. 1. Locations of WDFW Olympia headquarters and regional offices.

C. Major Conservation Partners and Programs

Conservation of fish and wildlife in Washington is primarily the responsibility of the Washington Department of Fish and Wildlife, although it requires the cooperation and active participation of many other public and private partners, including federal, state and tribal agencies, local governments, private landowners, commercial fish and shellfish harvesters, and nonprofit conservation and wildlife recreation organizations.

Many of WDFW's most important governmental conservation partners own and manage large blocks of public land and wildlife habitat, including the USDA Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Management, Bureau of Reclamation, Department of Defense, National Park Service, Washington Department of Natural Resources, and the Washington State Parks and Recreation Commission. Others such as the National Marine Fisheries Service, Northwest Power and Conservation Council, Salmon Recovery Funding Board and Puget Sound Action Team do not directly manage wildlife or habitat, but establish policies, administer programs and regulations, or direct funding to conservation of the state's fish and wildlife resources. Washington's treaty Indian tribes, many of which have been designated as co-managers of the state's fish resources by the federal courts, also own and manage large blocks of reservation lands as habitat. The Tribes exercise considerable influence over the protection, management and harvest of fish and wildlife, both on and off their reservations. Much of Washington's forested land base is in private ownership and managed for timber and wood products; these landowners are also important partners of WDFW in protecting and managing the state's wildlife and other natural resources.

The potential role of many of WDFW's major conservation partners in implementing the Washington CWCS is discussed again in Chapter V, Implementation. Many of these major partners are listed in Appendix 5.

II. BIODIVERSITY CONSERVATION

A. The Challenge

Species extinction is occurring at a rate of 100 to 1000 times greater than rates recorded through recent geologic time. The extinction crisis is not happening one species at a time; whole suites of species are placed in jeopardy as entire ecosystems and landscapes are being altered or lost.

The five main questions for wildlife and biodiversity conservation are: 1) what should be conserved, 2) how much should be conserved, 3) how can it be conserved, 4) where should it be conserved, and 5) how can it be measured and monitored? The state of the science and availability of information govern the extent to which these questions are addressed in the CWCS. While science can inform decision-makers, the answers to questions two and four are actually choices that society will make based on values, acceptable risk and opportunity. The CWCS is designed to be a "living" document that will be expanded in scope and updated on a biennial basis; so new information, strategies and priorities will be added with each iteration.

While conservation of Washington's biological diversity is one of the guiding principles of the CWCS, it is ultimately the responsibility of multiple agencies and private conservation organizations. In keeping with WDFW's mission, the CWCS focuses on animal and animal habitat diversity. It does not address rare flora, plant associations or abiotic features that are covered by the Washington Department of Natural Resource's (WDNR) Natural Heritage Plan, nor does it use the larger ecological systems of the ecoregional assessments discussed in Chapter VI and Appendix 12.

At some point in the future, all of these documents may be combined into a coordinated statewide biodiversity conservation strategy, perhaps through the Washington Biodiversity Council. In the meantime, WDFW is fulfilling its role in biodiversity conservation in several ways.

B. <u>What Should Be Conserved</u>?

Much of WDFW's traditional management has been single-species oriented. Statewide species recovery and management plans determine how and where fish and wildlife species should be conserved or managed for sustainable harvest. These plans are listed in Appendix 6 and Appendix 7.

While the single species approach is still needed to recover endangered species and maintain harvestable surplus of game or commercial fish and wildlife, it is impractical for managing thousands of species. Nor is the single species approach sufficient to prevent major losses in biodiversity. Biological diversity occurs at a variety of levels, from genes to species to ecosystems and at multiple spatial scales, from sites to landscapes to biomes. In the 1970s, conservation biologists at The Nature Conservancy realized that a systematic approach was needed and developed the "coarse filter/fine filter" approach that is used by NatureServe and the various state Natural Heritage Programs. Figure 2 below illustrates this coarse filter/fine filter approach:

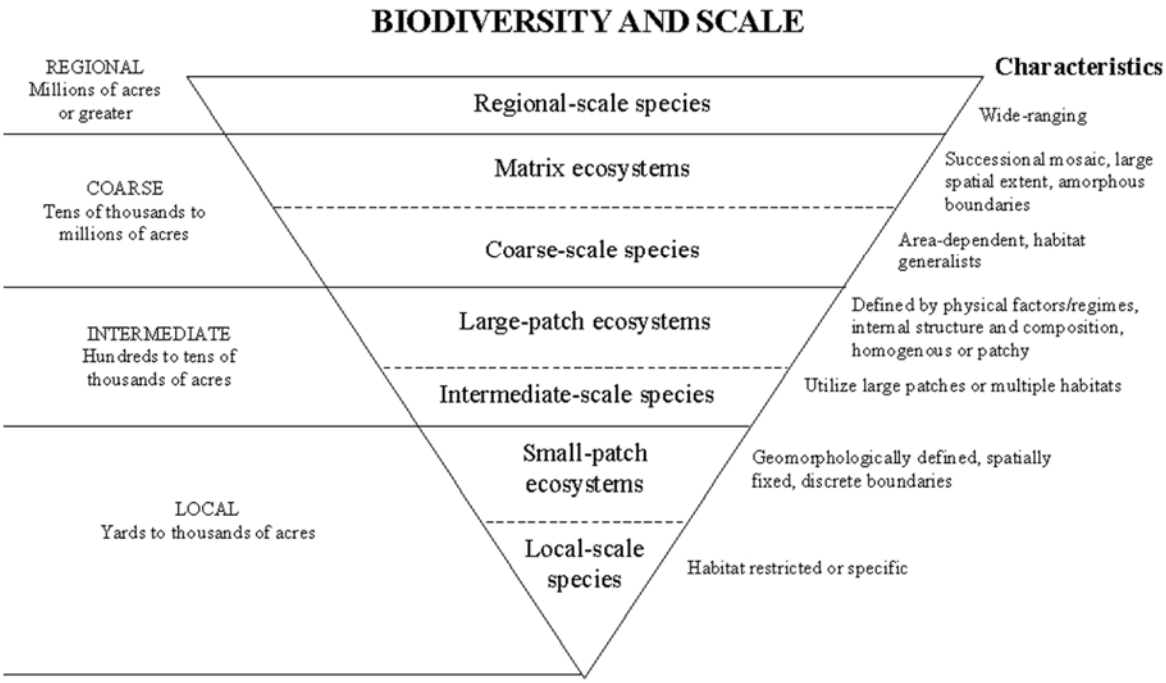


Figure 2. Coarse filter/fine filter assessment approach.

A brief explanation of the coarse filter concept is that by conserving large, representative examples of all of the ecological systems or habitat types in a region, the majority of common species will also be protected. However, a fine filter is needed to address the rare and imperiled species that might otherwise not adequately be protected by the coarse filter. The fine filter also includes wide-ranging species that have special needs for habitat connectivity over large expanses. The coarse filter/fine filter concept has evolved to a continuum approach that results in an assemblage of conservation targets spanning many spatial scales and multiple levels of biological organization. The four main categories of conservation targets are subspecies, species, communities, and ecological systems.

The CWCS uses the coarse/fine approach with respect to wildlife species by addressing both habitats and species of greatest conservation need.

C. How Much and Where Should Biodiversity Be Conserved?

A mix of science and societal values generally shape a conservation vision. Conservation goals or objectives determine where and how limited conservation resources are spent. There are crucial gaps in the science, including limited knowledge of species' distributions and large-scale, long-term dynamics of ecosystems, which must be addressed to improve conservation objectives. Because we cannot afford to wait for perfect knowledge, conservation biologists are exploring various ways to address this question. In 2001, WDFW and WDNR reviewed various biodiversity assessment methods and chose to join The Nature Conservancy in developing ecoregional assessments for the Pacific Northwest. The ecoregional assessment process is well documented, transparent with regard to limitations, and based on the best available science.

The ecoregional assessments attempt to address how much and the best places to conserve the full range of biological diversity. This is done through an iterative computer analysis that uses numeric goals for how much of each conservation target should be represented and a suitability index to select the least-impacted places to conserve biodiversity. Expert review of the computer-generated results is a crucial element to compensate for data errors and data gaps. The result of the process is an efficient portfolio of conservation sites. Alternative portfolios are developed by altering the goals. While the goals are somewhat subjective, they can be updated with new information and the analysis rerun. Regardless of the goal levels, the highest priority sites are always included in the portfolio, and thus part of the portfolio shows the best starting points for allocation of limited conservation resources.

Two products of the ecoregional assessments were used in developing the CWCS. The conservation target lists were used in selecting the Species of Greatest Conservation Need (SGCN). The Conservation Utility Maps, initially displayed for three ecoregional chapters of the CWCS, display the relative conservation value of landscapes/watersheds across each ecoregion. WDFW is using the ecoregional assessments to guide activities that contribute to protecting the full range of biodiversity and to help keep common species common. The agency will also continue to develop species recovery and management plans to maintain viable populations of listed species and surplus population levels of harvested species. These plans include estimates of the amount of habitat and the management actions needed to achieve population goals.

D. How Can Biodiversity Be Conserved?

WDFW began cooperating with other state agencies on biodiversity conservation when the Washington Natural Heritage Advisory Council was formed in the early 1980s. Currently, several state agencies assist the Washington Department of Natural Resources (WDNR) with updating the Washington Natural Heritage Plan. The plan identifies, prioritizes and tracks the elements of biodiversity that are protected in the Washington Natural Area Preserves System. The plan can be accessed at http://www.dnr.wa.gov/nhp/refdesk/plan/index.html.

In 2001, WDFW joined with The Nature Conservancy, WDNR's Washington Natural Heritage Program, and other partners to conduct ecoregional assessments that identify and prioritize places for conserving biodiversity at the ecoregional scale. High priority places are identified based on factors such as species rarity, richness, and representation as well as site suitability and overall efficiency. The assessments use the fine/coarse filter concept described above. Information from these technical assessments is included in the CWCS, even though they will not be completed until 2006.

In 2002 the Washington State Legislature passed Engrossed Substitute Senate Bill 6400, which called for the development of a framework for state biodiversity conservation and directed the establishment of a temporary, broad-based, public/private Washington Biodiversity Conservation Committee to assess the state's current efforts at biodiversity conservation and make recommendations for a state biodiversity strategy. The Committee process was facilitated by The Nature Conservancy of Washington and their recommendations were provided to the Governor and Legislature on October 1, 2003. WDFW participated on, and provided major funding for, the Biodiversity Conservation Committee. The Committee's 2003 recommendations are available at: http://www.iac.wa.gov/Documents/IAC/Special_Projects/Biodiversity/BiodiversityStrategyReport.pdf).

In 2004, a new Washington Biodiversity Council was appointed by Governor's Executive Order. The Council was directed to review the recommendations of the earlier Biodiversity Committee and develop a 30-year strategy to protect the full range of Washington's biodiversity. The new Council, which will expire in 2007, is also a broad-based organization that includes participation by WDFW and other public agencies and private stakeholder groups. (http://www.iac.wa.gov/biodiversity/default.htm)

As mentioned above, biodiversity occurs at multiple scales and the CWCS attempts to address wildlife conservation at three scales: statewide, ecoregion and local. Chapter III, State Overview, discusses problems and strategies that are common throughout Washington. The preponderance of biological information and conservation problems and actions are presented in the ecoregional chapters. Ecoregions are defined through broad ecological patterns in the landscape and provide a useful framework for cooperating with neighboring states and provinces on conservation planning. Efficient conservation strategies should begin at a regional level, but conservation decisions and actions are increasingly occurring at the local level. Local conservation efforts can be most effective when made within the context of a broader, regional-scale strategy. WDFW staff participate in many local conservation projects, providing both expertise and a state and regional perspective. Descriptions of some local biodiversity conservation projects that attempt to address the questions of what, where and how much to conserve are discussed, with Internet links, in Chapter VII, Monitoring and Adaptive Management.

E. How Can Biodiversity Be Measured and Monitored?

Currently, there is no coordinated effort to monitor or measure changes in biodiversity over time; in fact, there is no agreement yet on how it would be done if we were monitoring biodiversity. However, WDFW is taking a lead role in proposing the development of a Biodiversity Index, which would be used to track and monitor long-term changes in Washington's biodiversity.

One of the ideas being proposed to the Washington Biodiversity Council and other partners, such as WDNR's Washington Natural Heritage Program, is the establishment of a Biodiversity Monitoring Committee to lead the design and implementation of the new Biodiversity Index. This committee, if established, would be responsible for designing scientific protocols and implementing strategies to guide the new biodiversity monitoring program. Measures of biodiversity will include species (plants and animals) and their habitats, and the protocols developed by the Committee will determine which species and habitats will be targeted for long-term biodiversity monitoring. The concept of a Biodiversity Index is discussed again in Chapter VII, Monitoring and Adaptive Management.

III. STATE OVERVIEW

A. Physiography and Climate

Although Washington is the smallest of the contiguous western states (less than half the size of Montana), it is geographically and ecologically diverse. Several natural features—the Olympic Peninsula, Cascade Range, Puget Sound and the Columbia River—determine and define the climate, economy, physiography and biodiversity of Washington.

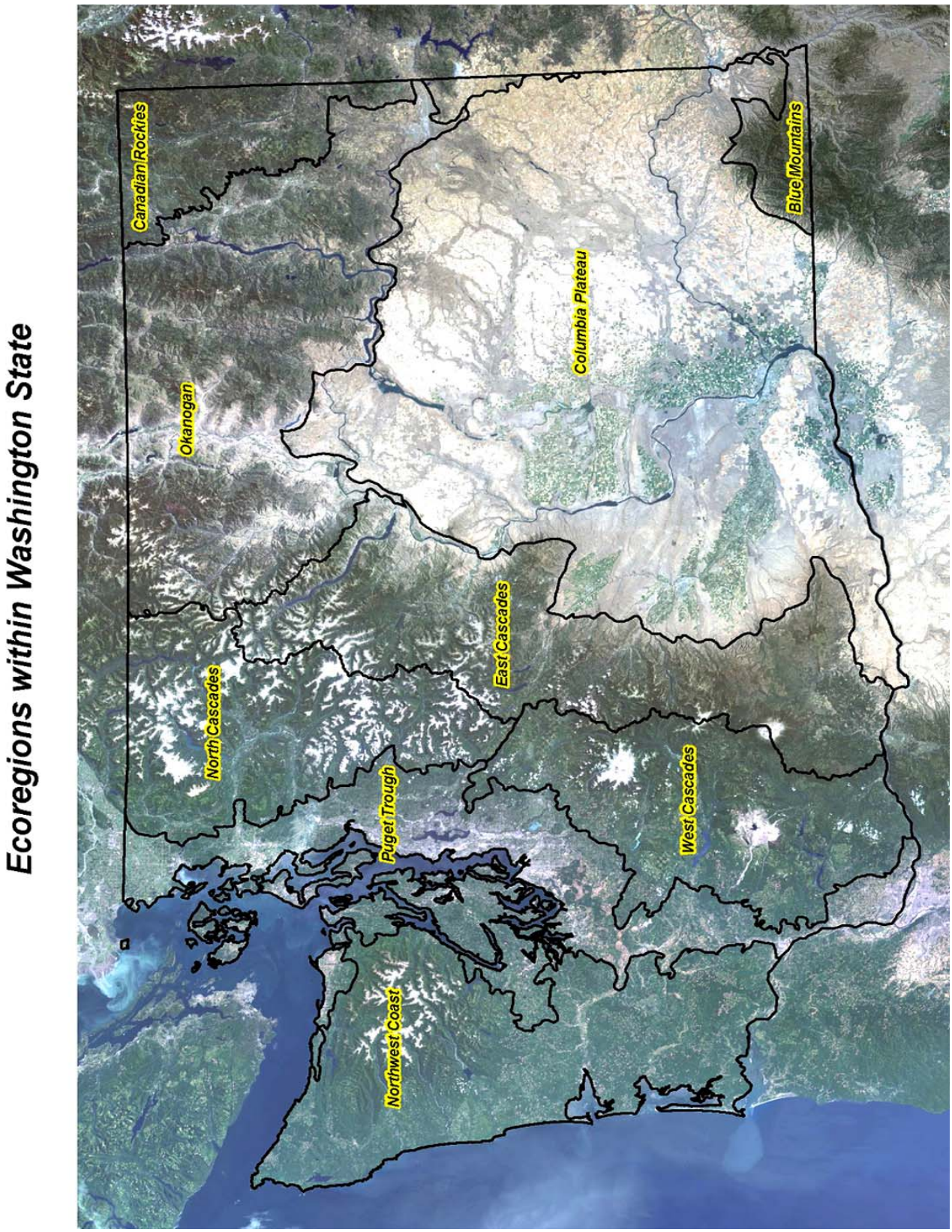
The Cascade Mountains, which extend the length of the state from the Columbia River to the Canadian border, divide the state into wetter west and drier east regions. The western slopes of the Cascades drain to Puget Sound and the Pacific Ocean and eastern slopes drain primarily to the Columbia River. The Columbia River flows into Washington from Canada and courses 745 miles to the Pacific Ocean.

Washington's climate is heavily influenced by prevailing westerly winds, which travel up to 4,000 miles across the Pacific Ocean before reaching land. Ocean currents warm these moisture-laden winds; as they reach the coast, the air rises and cools, dropping heavy precipitation on the Cascades, the Olympic Mountains, and other coastal ranges. Annual rainfall on the western slopes of the Olympics exceeds 200 inches—the highest in the contiguous United States. The Cascades also intercept Pacific Ocean storms and experience both heavy rain and snowfall in winter.

The Cascade and Olympic mountain ranges work together to create rain shadow effects in both the Puget Sound basin and the Columbia Plateau by shielding them from the heaviest rains. Rainfall in the Puget Sound region ranges from 17 to 50 inches annually, depending on the "rain shadow" effect of the Olympics. The rain shadow effect of the Cascades extends east across the Columbia Plateau, where the rainfall rarely exceeds 14 inches and shrub-steppe, grasslands and dry ponderosa pine forests predominate.

Figure 3 depicts Washington's diverse range of topographic features and includes the ecoregional boundaries for orientation.

Figure 3.


Ecoregions within Washington State
Canadian Rockies
Okanogan
North Cascades
Puget Trough
Northwest Coast
East Cascades
Columbia Plateau
West Cascades
Blue Mountains

B. Land Ownership and Human Population

Washington ranks 16th among all 50 states in population and is second only to California in both population size and population density in the West. The state's population increased from 4.1 million in 1980 to 5.8 million in 2000, and is projected to grow by another 2 million by 2020. Population density in 1990 was estimated at about 87 people per square mile, compared to 196 people per square mile in California and 42 people per square mile in Oregon.

Most (65%) of the state's population and rapid population growth is centered in the Puget Sound region, from Bellingham to Olympia, although rapid growth is also taking place in other metropolitan areas, especially Vancouver, Spokane, Yakima, Wenatchee, and the Tri-Cities (Richland, Pasco and Kennewick). According to the 2000 census, Clark County (Vancouver), across the Columbia River from Portland, Oregon, was the fastest-growing area of the state. Thurston County, where Washington's capitol city of Olympia is located, is expected to exceed all other counties in population growth in the next decade.

About 40% of Washington's land base (17,697,000 acres) is in public ownership, including military bases, the Hanford nuclear reservation, and state and federal parks, forests and wildlife refuges. This total does not include tribal lands, which account for another six percent. About 30% of the state's marine tidelands and 75% of freshwater shorelands are also owned by the State of Washington, the remainder having been sold into private ownership after statehood in 1889. Although parks and many wildlife areas are available to the public, not all public lands are open to public access.

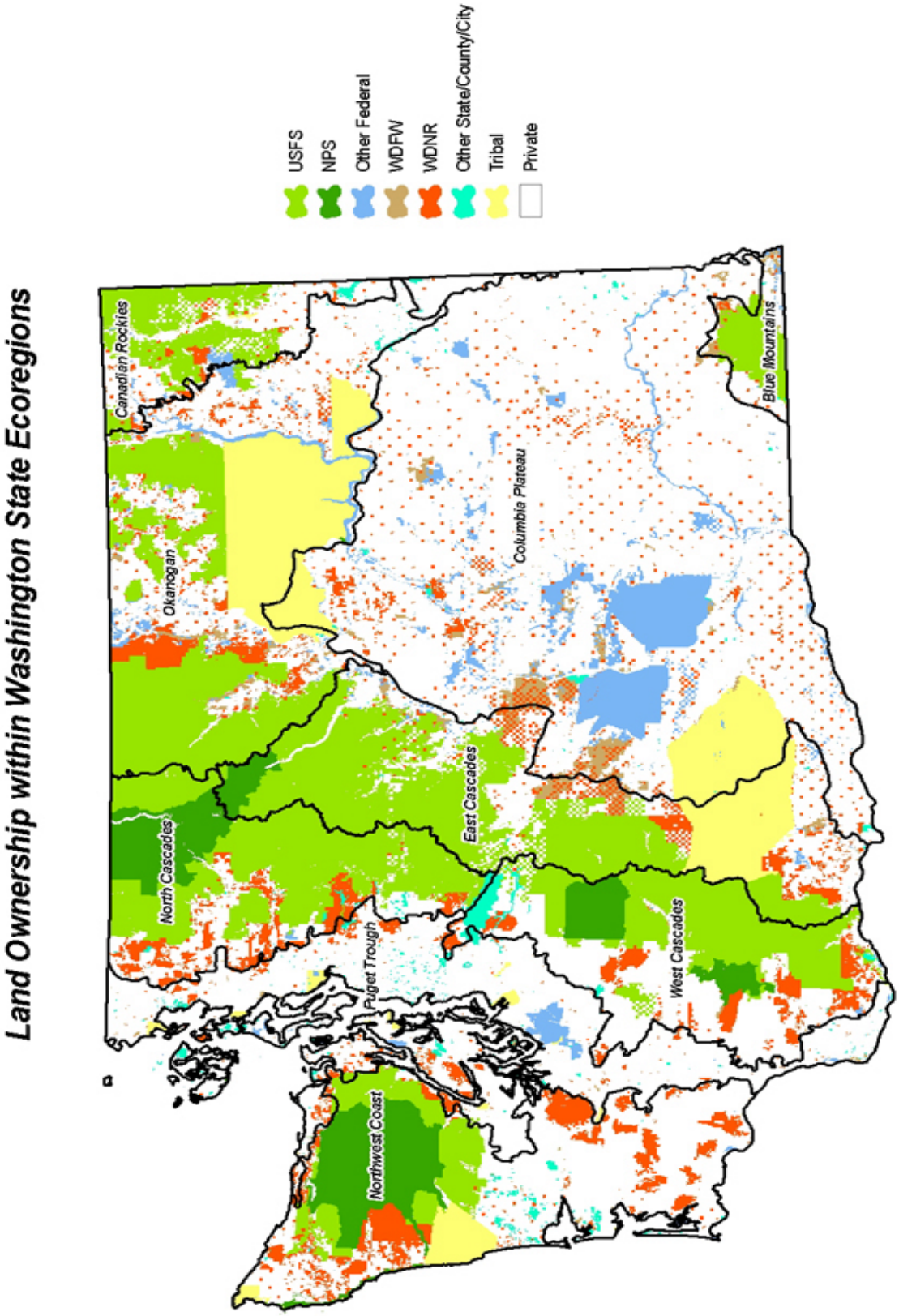
Although Washington's percentage of public land is lower than other western states such as Nevada (84%) and Oregon (54%), much of the state's public land and protected wildlife habitat is located in high-elevation forests and managed as National Forests, National Parks, or State Trust Lands. The largest public land manager in the state is the USDA Forest Service, followed by the Washington Department of Natural Resources. Lower-elevation public lands (including wetlands, riparian corridors, prairies, shrub-steppe grasslands and forests below 3,000 feet) make up about 56 percent of the state's public land and habitat base. The table below shows the acreage of state, tribal and federal lands in Washington. The map (Fig. 4) on the following page also depicts public and private land ownership.

Public land ownership in Washington

OWNERSHIP	ACRES
Federal	12,766,860
State	3,597,527
Tribal	3,091,998
City	156,047
County	79,496

Much of the private land in Washington outside metropolitan areas is in timber or agricultural production. Forests cover 40% of the state's total land area, and private corporate timberlands account for 8.7 million acres. Agriculture accounts for another 15.3 million acres, about one-third of the state, with half of that in crop production and the rest in range, pasture and other agricultural uses.

Figure 4.


Land Ownership within Washington State Ecoregions
USFS
NPS
Other Federal
WDFW
WDNR
Other State/County/City
Tribal
Private
Canadian Rockies
Okanogan
North Cascades
Puget Trough
Northwest Coast
East Cascades
Columbia Plateau
West Cascades
Blue Mountains

C. Washington's Biodiversity

Washington is one of the most ecologically diverse states in the United States. This diversity is due to a number of natural factors such as the state's varied topography, its exposure to Pacific Ocean currents and weather patterns, and its location on the migratory path of many wildlife species including birds, California gray whales and all seven species of Pacific Northwest salmon. Geographic diversity includes seacoast, shrub-steppe, native grasslands and prairies, river canyons, mountain ranges and the huge inland estuary known as Puget Sound. In fact, Washington contains most of the major ecosystem types found in the western United States, including two that are found nowhere else in the world—the channeled scablands of eastern Washington and the Olympic rainforest.

Biodiversity is partially defined or characterized by species richness—the number of plants and animals that spend all or part of their lifecycle in a particular area. Washington is permanent or temporary home to thousands of plant and animal species, including 140 mammals, 470 freshwater and saltwater fish species and 341 species of birds that either breed here or stop here on their annual migrations. Washington also hosts 150 other vertebrate species, 3,100 vascular plant species, and more than 20,000 classified invertebrates. More than 3,000 of the invertebrate species are butterflies and moths. While Washington's CWCS only focuses on fish and wildlife species and their associated habitats, it is important to try to frame the discussion in the larger context of the state's full biological diversity. Most of the state's native animal species fall within the legal definition of "wildlife" and are under the purview of WDFW. Responsibility for the conservation of native plants, including those designated as rare plant species, rests with the Natural Heritage Program of the Washington Department of Natural Resources.

Biodiversity is not a constant, even in a naturally evolving environment. Changes are accelerated by rapid human population growth and increased economic activity, and Washington's biodiversity is impacted every day by human disturbance to natural ecosystems. Much of the state is forested, and most of that has been harvested and reforested at some point in time. A small part of the forested landscape is unharvested. Estuarine (coastal) wetlands are extremely productive biologically, yet more than 90 percent of these wetlands in the greater Puget Sound area have been lost since the turn of the century. As Washington continues to grow and develop, fish and wildlife habitat is being altered and sometimes lost, resulting in a net loss of biodiversity. To be effective in stemming the loss of biodiversity, including important fish and wildlife resources, WDFW and its conservation partners must work together and improve efforts to identify and prioritize the most important places in Washington for biodiversity conservation. The ecoregional assessments described below are one effective method for addressing biodiversity conservation. The ecoregional assessments described below and participation in the Washington Biodiversity Council are two ways of addressing biodiversity conservation in Washington.

D. Washington's Ecoregions

Ecoregions are defined through broad ecological patterns in the landscape. Each ecoregion exhibits special physical and environmental characteristics, including unique combinations of soils, geology and climate, that give rise to a distinctive composition and distribution of plant communities and associated wildlife. These

factors have encouraged WDFW and its conservation partners to conduct biological assessments and conservation planning at the ecoregional scale.

The ecoregional boundaries used in this CWCS are derived from boundaries originally developed by the U.S. Environmental Protection Agency and USDA Forest Service, and were used by the Washington Department of Natural Resources in their Washington Natural Heritage Plan (http://www.dnr.wa.gov/nhp/refdesk/plan/index.html) adopted in 2003. These boundaries are also used by The Nature Conservancy and its partners for developing ecoregional assessments and plans across North America. There are 63 ecoregions delineated in North America, and nine of these ecoregions occur partly within Washington. Figure 5 depicts the extent of these nine ecoregions within Washington.

Figure 5. Washington's ecoregions.

E. Wildlife Species Distribution, Status and WDFW Management Priorities

Washington is home to a wide array of vertebrate and invertebrate wildlife species. The distribution and richness of these species is largely a function of the habitat available to them, both within Washington and, in the case of migratory species, outside the state. For purposes of the Washington CWCS, the term "wildlife" includes all organisms in the animal kingdom, from sponges to mammals. However, only about 700 wildlife species were considered in the first-round evaluation for the Species of Greatest Conservation Need (SGCN) list, discussed below.

As Washington's habitat base has changed over the last hundred years, so has the distribution and status of the state's wildlife. Wild runs of Pacific salmon have diminished in both numbers and diversity with the construction of dams, water development projects and land use changes. Species such as the greater sage-

grouse that are dependent on native shrub-steppe habitat have declined in numbers and distribution as shrub and grassland habitat has been converted to farms, orchards and other economic uses. On the other hand, water development in the Columbia Basin has created new areas of wetland habitat for migrating and wintering waterfowl, and the clearing of forests for agriculture in northeast Washington has facilitated the expansion of white-tailed deer into many areas where they did not occur prior to statehood. The 651 terrestrial vertebrate species cited in *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil, 2001) might be more or fewer in number in 2005. Their abundance and distribution is almost certain to have changed over time with changes in the habitat base, as well as other factors such as competition, predation and hybridization.

The Washington Department of Fish and Wildlife (and its pre-merger parent agencies of Wildlife and Fisheries) has always classified fish and wildlife species for purposes of management and harvest regulation. Historically, the management emphasis was almost exclusively on commercially harvested species (salmon, shellfish and other food fish) and game species. This began to change in 1972 when the Department of Game established a Nongame Program funded from the sale of personalized license plates. The mission of the program was to identify and conserve species not identified as game species. In 1980 the Department of Game developed a state list of Endangered Species, which has since been expanded to include Candidate and Monitor species. In 1990, the Fish and Wildlife Commission adopted WAC 232.12.297, which defines procedures for state listing and delisting of species as Endangered, Threatened or Sensitive.

In 1989, WDFW created a statewide list of Priority Habitats and Species (PHS), which has been used to provide important fish, wildlife and habitat information to local governments, state and federal agencies, private landowners and consultants, and tribal biologists for land use planning and wildlife conservation purposes. For more information, go to http://wdfw.wa.gov/hab/phspage.htm. PHS is currently the agency's primary means of transferring fish and wildlife information from fish and wildlife resource experts to those who protect and manage habitat on both public and private land.

In 2001, WDFW was a major funding partner and participant in the production and publication of *Wildlife-Habitat Relationships in Oregon and Washington*. The document is an important bi-state, public-private effort that combines a number of state-level species lists into one Northwest regional list, with consistent scientific and common names and occurrence information. It includes a list of 753 terrestrial vertebrate species for Oregon and Washington in the following five occurrence categories: Occurs, Accidental, Non-native, Reintroduced, and Extirpated. Of these 753 species, 651 were determined to occur in Washington; the rest occur only in Oregon.

Species of Greatest Conservation Need (SGCN)

In 2004, WDFW began preparation of the Comprehensive Wildlife Conservation Strategy (CWCS) with the development of a statewide wildlife Species of Greatest Conservation Need (SGCN) list. Details of this list are included in Chapter IV, species of Greatest Conservation Need and in Volume Two: Approach and Methods.

Other Managed Species

In addition to adopting strategies to manage species on the statewide SGCN list, WDFW will continue to conserve and manage other fish and wildlife species and associated habitats for recreational use and/or commercial harvest. The term "other managed species" includes game species not on the SGCN list, including non-natives such as ring-necked pheasant, chukar partridge and largemouth bass, as well as commercially harvested marine fish, anadromous fish and shellfish. Many conservation actions undertaken for SGCN, especially actions that protect or restore habitat, will also benefit many game and commercially harvested species.

In 2003 WDFW published the *2003-2009 Game Management Plan*, which articulates management and research objectives, priorities and policies for all terrestrial game species managed by WDFW. Go to: http://wdfw.wa.gov/wlm/game/management/. Similar plans for sportfish, commercial fish and shellfish have also been adopted by WDFW. More complete lists of WDFW management plans are included as Appendix 6 and Appendix 7.

F. CWCS Habitats of Conservation Concern

The statewide Habitats of Conservation Concern list was determined using two sources, the official Priority Habitats and Species (PHS) list of 20 basic habitats maintained by WDFW since 1989 http://wdfw.wa.gov/hab/phshabs.htm, and the various priority habitats associated with identified Species of Greatest Conservation Need (SGCN) for each ecoregion, as discussed in Volume Two, Approach and Methods. For purposes of consistency, we have used the definitions for the basic habitats defined in *Wildlife-Habitat Relationships in Oregon and Washington* (WHROW). These habitats are listed below and fully described in Appendix 8.

The process that David Johnson and Tom O'Neil developed for defining these habitats in WHROW started with the definition of 287 plant alliances across the landscape of Washington and Oregon. Then, through a process of grouping and crosswalking (coordinating) these plant alliances, they were eventually able to isolate and describe 32 basic wildlife habitats—terrestrial, aquatic and marine—29 of which occur in Washington (see below) and three of which occur only in Oregon. WHROW also documented the degree of association of these 32 wildlife habitat types with 753 identified wildlife species considered by Johnson and O'Neil in their project. For purposes of the CWCS, specialized habitats such as cliffs, talus slopes, vernal ponds, and sand dunes are considered features within the 32 wildlife habitat types discussed in Appendix 8.

By associating the SGCN list with the 29 basic habitat types found in Washington, and by further coordinating this list with the official PHS habitat list described above, it was determined that the following 20 habitats, broken into Priority One and Priority Two categories, will be considered the highest priorities for current statewide conservation action in Washington. The designated Priority One habitats have a greater number of associated Species of Greatest Conservation Need (SGCN) than the Priority Two habitats.

WHROW HABITATS IN THE STATE OF WASHINGTON Listed by Priority
Priority One
Bays and Estuaries
Eastside (Interior) Grasslands
Shrub-steppe
Eastside (Interior) Riparian-Wetlands
Herbaceous Wetlands
Marine Nearshore
Ponderosa Pine Forest and Woodlands (includes Eastside Oak Woodlands)
Westside Grasslands
Westside Lowland Conifer-Hardwood (Mature) Forest
Westside Riparian-Wetlands
Priority Two
Coastal Dunes and Beaches
Coastal Headlands and Islets
Eastside (Interior) Mixed Conifer Forest
Inland Marine Deeper Water (Puget Sound)
Lodgepole Pine Forest and Woodlands
Montane Coniferous Wetlands
Montane Mixed Conifer Forest
Subalpine Parkland
Upland Aspen Forest
Westside Oak and Dry Douglas-fir Forest and Woodlands
Other
Agriculture, Pasture and Mixed Environs
Alpine Grassland and Shrublands
Desert Playa and Salt Scrub Shrublands
Dwarf Shrub-steppe
Eastside (Interior) Canyon Shrublands
Marine Shelf
Oceanic
Open Water: Lakes, Rivers and Streams
Urban and Mixed Environs

G. Major Statewide Conservation Problems and Issues

Most of the major statewide problems affecting Washington's wildlife and biodiversity are the direct or indirect result of human influence on the state's habitat base. Rapid, sustained population growth since the end of World War II has resulted in substantial losses of fish and wildlife habitat in urbanizing areas of the state, as well as a constant invasion of exotic plant and animal species across the landscape.

These habitat losses and changes are most profound in the Puget Sound region, where most of the state's population resides and where development pressure and urban runoff affect a host of terrestrial and aquatic habitats, and the greater Puget Sound estuary itself, as well as the Columbia Plateau, where much of the native shrub-steppe and grassland habitat has been converted to agriculture.

Washington's population is projected to double by the middle of the 21st century. With this population growth will come more cars and roads, more demand for water, energy and developable land, and increased need for the treatment and disposal of solid waste, sewage and stormwater runoff—all of which will impact the state's wildlife and habitat resources. In the face of this projected growth, WDFW and its conservation partners find themselves in the difficult position of applying limited funds and staff resources to try to identify, conserve and manage what's left of the state's native habitat base, species and biodiversity.

The following major influences have the greatest impact on Washington's fish, wildlife and habitat base:

- Habitat loss through conversion, fragmentation and degradation
- Invasive alien plant and animal species
- Water quantity—allocation and diversion of surface water
- Water quality issues
- Salmon recovery
- Forest conservation and management practices
- Agricultural and livestock grazing practices
- Disease and pathogens
- Inadequate data on wildlife species, populations, and habitat

Habitat loss through conversion, fragmentation and degradation: Habitat conversion, fragmentation and degradation together pose the most serious statewide threat to Washington's native fish and wildlife resources. Since statehood in 1889, these combined problems have cost the state more than half of its highest priority functioning habitats, including an estimated 70 percent of estuarine wetlands, 50 to 90 percent of riparian habitat, 90 percent of old growth forest, 70 percent of arid grasslands and more than 50 percent of shrub-steppe. These four native habitat types alone are among the most diverse and productive for the state's native fish and wildlife. About 75 percent of Puget Sound's estuaries and their adjacent habitats, such as grasslands, mixed woodlands and floodplain forests, have been modified so significantly that they no longer provide their original functions.

Once native habitat is converted to other uses, the remaining habitat is often left as isolated fragments in a matrix of multiple land uses. Wildlife populations associated with these fragmented habitats are often blocked from their normal movement patterns and migration routes, and thus subjected to isolation from other breeding

populations. Habitat loss and fragmentation also causes increased competition with other species, predation and increased conflicts with other land uses. In a fragmented landscape, animals have to move from one patch of habitat to another and when this happens, migrating wildlife populations become broken into smaller, isolated units that are more susceptible to population decline and possible extirpation.

It is estimated that functional habitat for wildlife continues to be altered at a rate of 30,000 to 80,000 acres per year, not counting impacts due to forest practices or hydroelectric projects. The following Washington habitat maps, as represented by Johnson and O'Neill in *Wildlife-Habitat Relationships in Oregon and Washington* (WHROW), illustrate general habitat changes in Washington from 1850 until the present time (Figures 6, 7 and 8).

Transportation systems such as major highways and roads are also a major cause of habitat loss and fragmentation, as well as direct barriers to wildlife movement and causes of direct mortality from roadkill. When wildlife populations are low, roadkill mortality is significant, especially for slow-moving animals such as turtles and salamanders, as well as wide-ranging carnivores that have to cross many roads.

Washington will continue to experience significant population growth into the foreseeable future. This growth and development will result in continued loss, conversion and fragmentation of fish and wildlife habitat. Steps are being taken by WDFW, other state and federal agencies, local governments and many private conservation organizations to identify and conserve the most important and productive habitats. Many different nonregulatory and regulatory strategies and tools, as varied as habitat acquisition and administration of the Growth Management Act (GMA), are discussed at both statewide and ecoregional scales in the CWCS.

Figure 6. Legend for Washington wildlife habitat maps.

Figure 7.

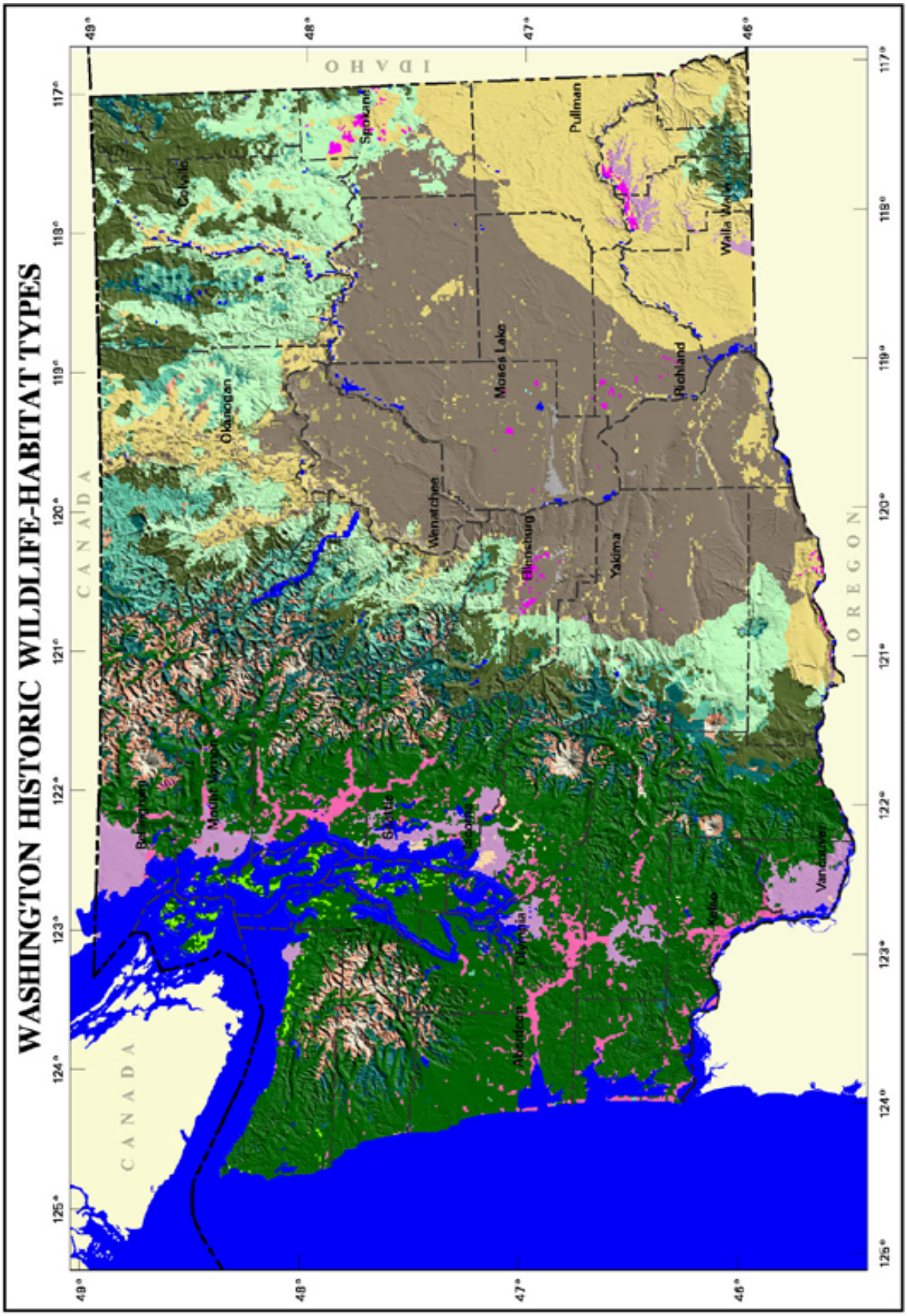
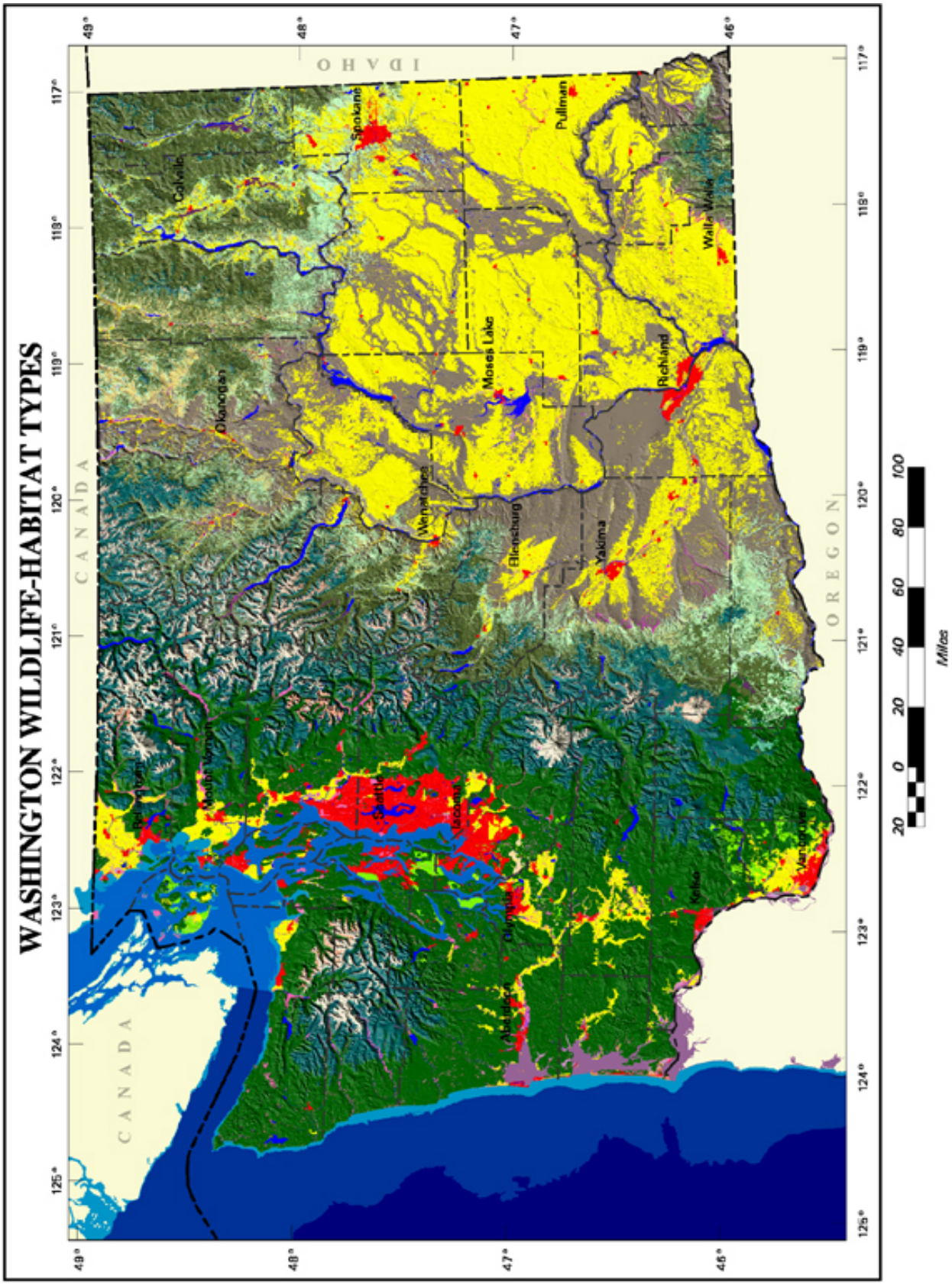

WASHINGTON HISTORIC WILDLIFE-HABITAT TYPES
CANADA
CANADA
IDAHO
OREGON
Colville
Spokane
Pullman
Okanogan
Moses Lake
Walla Walla
Richland
Wenatchee
Ellensburg
Yakima
Bellingham
Mount Vernon
Everett
Seattle
Tacoma
Olympia
Aberdeen
Kelso
Vancouver
125°
124°
123°
122°
121°
120°
119°
118°
117°
49°
48°
47°
46°
20
0
20
40
60
80
100
Miles

Figure 8.


WASHINGTON WILDLIFE-HABITAT TYPES
CANADA
IDAHO
OREGON
Colville
Spokane
Pullman
Walla Walla
Okanogan
Moses Lake
Richland
Wenatchee
Ellensburg
Yakima
Seattle
Tacoma
Olympia
Aberdeen
Kelso
Vancouver
Mount Vernon
Bellingham
48°
47°
46°
117°
118°
119°
120°
121°
122°
123°
124°
125°
20
0
20
40
60
80
100
Miles

Invasive alien plant and animal species: Invasive species constitute a severe and growing threat to Washington's native wildlife, habitat and biodiversity—second only, many believe, to habitat fragmentation. Everywhere in the state, aggressive non-native plants and animals are displacing native species, profoundly altering natural systems and affecting the state's economy and human health. These alien plants and animals have become introduced through both intentional and unintentional releases, including "hitchhiking" on horses and other livestock, trucks and boats; transport on ocean currents and in ballast water; importation in aquaculture and horticulture products, and the pet/aquarium trade; and accidental releases from research institutions and laboratories. Although many non-native species are unable to form self-sustaining populations and soon disappear, some become established and thrive, often outcompeting native species and adversely changing ecosystems in the process. They evolved in other parts of the world, and arrive in Washington without natural predators and diseases that would normally keep their growth in check in their native environment. The number and abundance of introduced species is an indicator of declining ecosystem health.

The effect of invasive species is especially severe in the shared inland marine waters of Puget Sound and the Georgia Basin to the north. Examples include cord grasses (*Spartina*), Japanese eelgrass, oyster drill, varnish or dark mahogany clam and the European green crab. Cordgrass outcompetes and eliminates native salt marsh vegetation and raises the level of the marsh substrate. Oyster drills prey upon young oysters. The green crab, first reported in Willapa Bay in 1998, is a voracious predator that feeds on many types of organisms, particularly bivalve mollusks (clams, oysters and mussels), polychaetes and small crustaceans. It also outcompetes Dungeness crab for habitat and food supply, and will eat juveniles. In freshwater habitats, the proliferation of non-native bullfrogs has had a severe impact on declining species such as western pond turtles, northern leopard frogs, and other native species. Alien zebra mussels have invaded the Great Lakes, and it is probably only a matter of time before they are found in other freshwater environments. Laws to regulate the introduction of invasive plant and animal species are inadequate now and, as the problem increases, more regulatory authority and enforcement resources will be sought at both the federal and state levels.

Some of the most destructive invasive plants are found in the shrub-steppe, grassland and forested communities of eastern Washington, where they thrive

through the effects of agriculture, grazing, mining and certain natural disturbances such as catastrophic wildfire and floods. These invaders not only outcompete native plants, but also present a severe and growing problem for farmers, ranchers and forest managers. Perhaps the most widespread and problematic of the dryland invasive species is cheatgrass, originally from Eurasia, which has replaced native grassland communities all over the Intermountain West. Cheatgrass has limited or no food value for wildlife and livestock, and it presents a significant fire hazard in both shrub-steppe deserts and ponderosa pine forests, where it can add to the fire fuel load, resulting in hotter wildfires and more damage to native vegetation. Other examples of invasive, nuisance plant species include yellow starthistle, Japanese knotweed, knapweed species, Dalmatian toadflax and sulfur cinquefoil.

Many freshwater aquatic invasive plants found in Washington were originally brought here as ornamental plants for aquariums or water gardens. These ornamentals are usually hardy species and, when introduced to Washington's waters, often thrive and outcompete native plants. Eurasian water milfoil is one aquatic noxious weed that is a particular problem statewide. It reproduces by fragmentation and proliferates to form dense mats of vegetation in the littoral zone of lakes and reservoirs, where it crowds out native aquatic vegetation, reduces dissolved oxygen and can severely degrade the ecological integrity of a water body in just a few growing seasons.

The invasion of alien plant and animal species is recognized as a critical problem in Washington, not just for native fish, wildlife and biodiversity, but for the state's vital agricultural industry. The problem is currently being addressed at many different levels in Washington, within the constraints of budgets and staffing resources. Examples include Washington's Noxious Weed Control Board, which serves as the state's noxious weed coordination center for the activities of 48 county noxious weed control boards and districts. The Washington Department of Agriculture also has a lead role in coordinating an aggressive state/federal/private effort to eradicate or at least stop the spread of invasive cordgrass (*Spartina*), which has taken over much of Willapa Bay on Washington's Pacific coast and is spreading throughout Puget Sound. In 2000, the Washington Legislature passed a ballast water management law that requires oceangoing vessels and vessels involved in coastal trade to conduct any ballast water exchange at least 50 miles offshore and to report all ballast water discharges to the Coast Guard or the State.

Water quantity—allocation and diversion of surface water: The survival, distribution and diversity of Washington's fish and wildlife is determined by the availability of water, including water to support aquatic and marine species, water to drink, water to grow wildlife food plants and water to support the annual upstream and downstream migration of anadromous fish. Water is as important in the Olympic rainforests, which can receive more than 200 inches of moisture a year, as it is in the Juniper Dunes wilderness of eastern Washington, which averages only 8 to 14 inches of annual precipitation. Without adequate water to support fish and wildlife, other conservation issues become secondary.

The relative abundance of water has been a major factor in the growth and development of Washington's landscape and economy since the late 1800s. The seemingly unlimited supply of surface and groundwater encouraged the growth of cities and development of irrigated agriculture, not to mention the generation of hydroelectric power and production of aluminum, both of which require massive amounts of water. Until recent years, water was considered to be so plentiful in the

Northwest that plans were considered to divert water from the Columbia River and ship it south to California and other states.

The notion of surplus water is no longer a topic of serious discussion in Washington. Many of the state's rivers have already been developed for hydropower production and agriculture. Unfortunately, the water needs of fish and wildlife have often been overlooked until serous problems occurred, such as the decline and listing of certain stocks of Columbia River salmon under the federal Endangered Species Act.

Dams: There are currently 1,025 dams on Washington's rivers and tributary streams. Because they obstruct the natural flow of rivers, these dams can have many detrimental effects on the aquatic environment, including altering the natural flow cycles of rivers, interrupting the transport of nutrients and sediments normally deposited in deltas and estuaries, and hindering anadromous fish migration between the ocean and upstream spawning areas. Older dams without fish ladders, including Grand Coulee Dam on the Columbia River, block the upstream migration of fish. Even on newer dams, spinning turbines that generate electricity often disorient, injure or kill juvenile fish on their downstream migration to the sea.

Water diversions: Salmon and other aquatic wildlife depend on reliable water flows during critical periods in their lifecycles. Unless adequate minimum flows are established for fish and wildlife and enforced by Washington state agencies, water withdrawals may result in dewatering important mainstream habitats as well as pools and quiet backwater areas that provide essential habitat for juvenile fish-rearing, amphibians and aquatic invertebrates. Inadequate flows and water depth in these backwater areas deprive developing fish eggs of oxygen, make it easier for fish predators to find their prey, and generally interfere with the journey of migrating fish. Interrupting or delaying migration can cause adult fish to resort to spawning in unsuitable habitat.

There are many ongoing state and federal efforts to mitigate for the adverse impacts of past water diversions and dams, ranging from adding or improving fish ladders on hydroelectric dams, to screening fish out of irrigation culverts, to requiring adequate year-round instream flows for fish and wildlife. These efforts, many of which are addressed in the ecoregional chapters of this CWCS, have become more aggressive and better-funded since the listing of a number of Northwest salmon stocks under the federal Endangered Species Act. One important statewide effort is the Watershed Planning Act (ESHB 2514) passed by the Washington Legislature in 1998, which established a collaborative framework for developing solutions to water quantity and other watershed issues on a watershed scale. WDFW and 11 other state agencies signed a Memorandum of Understanding for implementation of ESHB 2514 and have actively participated in watershed planning to conserve fish and wildlife resources. Go to: www.ecy.wa.gov/watershed/background.html.

Water quality issues: Major water quality discussions in Washington usually revolve around preserving the quality of public drinking water supplies and the effects of non-point source contamination on ground and surface waters. However, the effect of surface water quality on the health of aquatic ecosystems and wildlife also is becoming increasingly important. The most common water quality problems affecting fish and wildlife in Washington's waters are: 1) fecal coliform bacteria contamination, which affects more than 44% of our polluted waters; 2) contaminated sediments, which are a particular problem in Puget Sound; 3) elevated water

temperature, which can quickly alter or degrade an aquatic ecosystem; 4) increased sediment in streams, which can blanket important food sources and fish spawning areas; and 5) excess nutrients and pesticides washed into lakes from lawns, golf courses and agricultural fields, which can directly poison aquatic organisms or contaminate waterways. Water quality issues related to potential contamination of the Columbia River from the Hanford Nuclear Reservation are also of concern, particularly if long-buried radioactive waste reaches the river or its tributaries.

Although water quality is not a direct responsibility of the Washington Department of Fish and Wildlife, it is critical for the long-term health and survival of the state's fish and wildlife, including marine species in Puget Sound and adjacent waters. WDFW supports many other agencies to reduce water pollution from various sources listed above and maintain water quality standards that support healthy fish and wildlife populations. The federal Environmental Protection Agency and the Washington Departments of Ecology, Health and Natural Resources all have important responsibilities for water quality, as does the Puget Sound Action Team.

Salmon recovery: Washington's eleven species and subspecies of native salmonid fish have important biological, cultural, commercial and recreational values. As a keystone species, salmon are a critical component of the state's overall wildlife diversity and an important indicator of ecosystem health. Unfortunately, the state's salmon resource has been under heavy pressure from human population growth and development for many years. Urban and industrial land conversion, forest and agricultural practices, water diversion, municipal water demands, overfishing and hydropower development have all contributed to the decline of the number and health of salmon stocks in Puget Sound watersheds and the Columbia River system.

During the 1990s, this documented decline in populations of several salmon species resulted in numerous listings as Threatened or Endangered under the federal Endangered Species Act. A large ESA recovery effort at the local, state and federal levels is now underway in Washington and other Northwest states, as well as in Canada, to prevent further declines and improve the condition of imperiled salmon stocks.

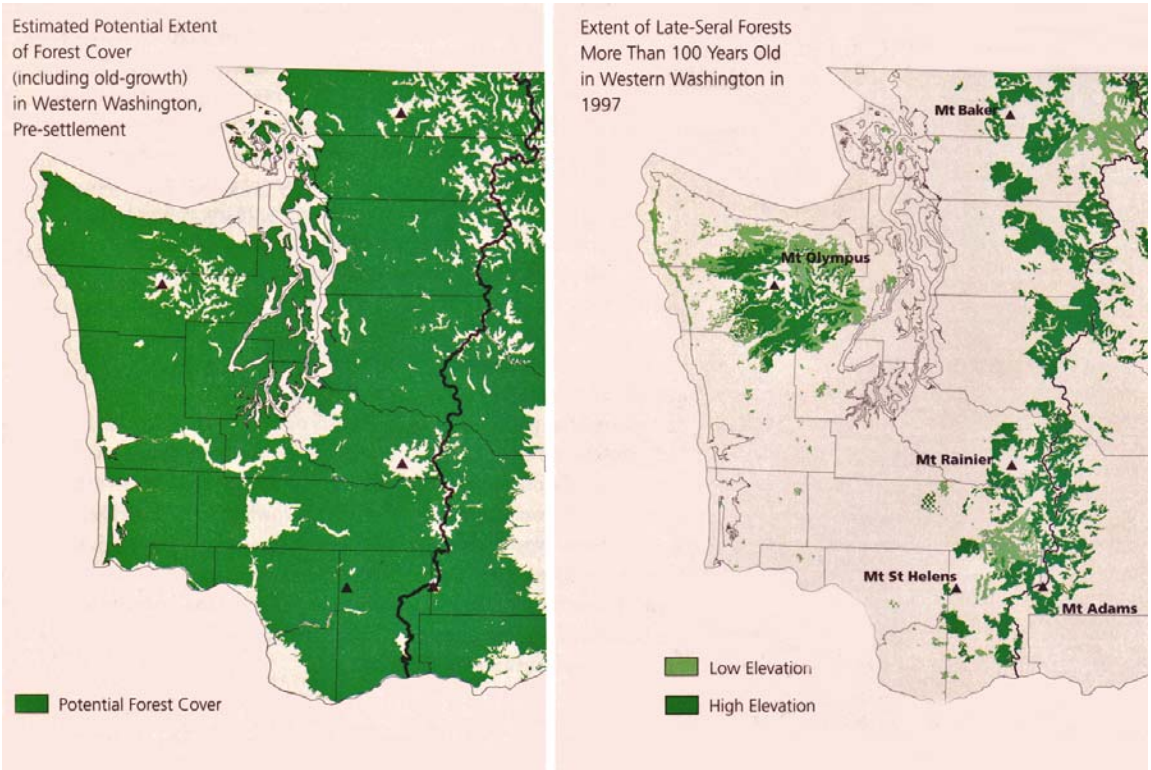
WDFW is heavily invested in coordinated salmon recovery at the regional, state and watershed levels. These coordinated efforts are discussed in more detail in this chapter under Major Conservation Strategies, and in the referenced salmon recovery plans, as well as in the nine ecoregional narratives in Chapter VI.

Forest conservation and management practices: Over half the land area of Washington is covered in forests, ranging from the temperate rain forest of the Olympic Peninsula to the Douglas-fir dominated lowland forests of the Puget Trough, and from the stunted, slow growing trees of the alpine forests to the dry, ponderosa pine dominated forests of eastern Washington. The management and commercial harvest of timber on both public and private lands has been and remains an important part of Washington's history, economy and culture.

Since the turn of the 20th century (1900), most of Washington's diverse forestlands have been affected by management practices and conversion to other uses, including the loss of most of the state's old growth forests and the resulting decline in biological diversity and habitat for old growth-dependent wildlife species. Since the

1970s more than 2.3 million acres of Washington's remaining forestlands have been converted to other uses or designations, especially west of the Cascade Mountains, although almost nine million acres, about 10 percent of the state, remains in privately owned forestland.

In western Washington, forests have been fragmented by urbanization, transportation corridors and other land development. In remaining forested areas, commercial harvest and replanting has changed the natural forest structure, resulting in simplified forest habitats and a reduction in overall biological diversity. Some commercial timberlands are also being sold to non-industrial owners and in many instances, the new owners choose to convert the land to non-forest uses. The overall loss and fragmentation of forest land in western Washington has resulted in a parallel loss of fish and wildlife habitat and wildlife movement corridors as well as diminished water quality in streams and rivers (Figure 9).



Courtesy of Washington Department of Natural Resources

Figure 9. Forest fragmentation in western Washington.

Eastern Washington forests have also been harvested for timber and timber products for many years. Although timber harvest activities have affected the long-term structure and diversity of eastern Washington forests, these forests are nearly as extensive today as they were in 1900. The pressures of urbanization and deforestation are not as great in eastern Washington as they are west of the Cascade Mountains. One of the most severe long-term problems for wildlife and habitat in eastern Washington forests is the suppression of natural fires on both public and private forestland. Frequent, low intensity ground fires were historically part of the

forest ecosystem, including forest-associated wildlife, and the recent emphasis on fire suppression has eliminated an important natural means for removing fuels and thinning stands. The lack of fires often results in denser tree cover, particularly at low elevations, and changes in both species composition and structure of natural timber stands, leading to overcrowding and increased susceptibility of these stands to damage by bark beetles and defoliating insects.

Historically, the construction of logging roads near streams or across wetlands was often destructive to fish and wildlife habitat. Although modern forest practices under state and federal rules provide much more protection for wetlands and riparian zones, there are still potential adverse impacts from construction and operation of logging roads that do not meet modern forest practice standards. Improperly constructed or maintained logging roads may trigger or accelerate slope failure, erode stream channels, block fish migration and deposit sediment into streams and wetlands.

WDFW is heavily involved with the Department of Natural Resources and other agencies, organizations, and private forest landowners in promoting, developing and implementing forest practices that best protect the Washington's fish and wildlife resources. This coordinated effort is discussed in more detail in this chapter under Major Conservation Strategies, as well as in the nine ecoregional narratives in Chapter VI.

Agricultural and livestock grazing practices: Agriculture, like forestry, is an important part of Washington's landscape and economy. About one-third of the state's land area (15 million acres) is in agricultural production, including cropland, pastures and orchards. However, the conversion of native grassland, shrub-steppe and wetlands to agricultural purposes since the turn of the 20th century has resulted in extensive losses and fragmentation of habitat and associated wildlife. The statewide habitat maps shown earlier in this chapter illustrate the dramatic changes in eastern Washington's landscape due to agricultural development.

Agricultural development has tended to be concentrated in low elevation valleys all over the state, which has significantly reduced and fragmented valley bottom grasslands, shrublands and forested riparian habitats. Agricultural operations in valley bottoms and riparian zones have also increased sediment loads of rivers and tributary streams and unintentionally introduced herbicides and pesticides into aquatic ecosystems. The conversion of dry hillsides and benches to dryland wheat and other crops in eastern Washington has eliminated, altered and/or fragmented once-abundant shrub-steppe and native grassland habitats.

Livestock grazing throughout Washington over the last century has had widespread impacts on the structure and composition of native vegetation and wildlife habitat. Although properly managed grazing can be neutral or even beneficial to wildlife, improper management of grazing (overgrazing) can destroy native vegetation, change the balance of plant species, compact soil, accelerate soil erosion, and reduce the abundance and diversity of native wildlife. The severity of these impacts depends on the number and type of livestock (e.g. cattle, sheep, and horses) and their grazing pattern. Improper grazing practices also promote the spread of invasive plants and eventually reduce the productivity of native grasslands for both wildlife and livestock.

WDFW works at many different levels, including with many individual farmers and ranchers, to influence grazing and other agricultural practices to protect fish and wildlife habitat and biodiversity on private land. Many these nonregulatory efforts are addressed in the nine ecoregional narratives in Chapter VI. In 1993, the Washington State Legislature enacted House Bill 1309, which directs WDFW and WDNR to develop consistent grazing standards that preserve, protect and perpetuate fish, wildlife and habitat on state public lands. The Washington Biodiversity Council, referenced elsewhere in this CWCS, is looking at a whole range of new and expanded landowner incentives to encourage agricultural landowners to identify and protect important wildlife habitat and other elements of biodiversity on their lands.

Disease and pathogens: The rapid spread of new wildlife diseases in the United States and around the world since the beginning of the 21st century has created new challenges for both wildlife managers and public health officials. The social and economic impacts of wildlife diseases can be large, not only affecting wildlife populations and habitat but also human health, agriculture and food safety, and many nature-based industries.

A number of serious diseases currently affect Washington's wildlife populations and species at risk in every region of the state. These diseases include notoedric mange, which has become a serious risk to western gray squirrel populations; West Nile virus, a mosquito-borne virus that can cause encephalitis and/or meningitis in birds, horses and humans; avian botulism, which occurs principally in waterfowl and other birds living in an aquatic environment; and hair loss syndrome, which causes hair loss, emaciation and often death in Columbian white-tailed deer. Whirling disease, which has devastated wild rainbow trout in Montana, has now been found in wild steelhead juveniles in southeast Washington's Grande Ronde River. Chronic wasting disease, a contagious and fatal disease of deer and elk, was thought to be limited to relatively small areas in the Midwest and Rocky Mountain states, but has recently been found in several new areas of North America.

WDFW works closely with neighboring states and Canadian provinces, as well as federal wildlife and fisheries agencies and the veterinary medicine and academic communities, to identify and respond to outbreaks of wildlife disease such as West Nile Virus and Chronic Wasting Disease (CWD). Many of these wildlife disease problems are regional or local in nature and addressed in the nine ecoregional narratives in Chapter VI.

Inadequate data on wildlife species, populations and habitat: Although many of the wildlife species under WDFW's purview, including game species, commercially harvested fish and shellfish species, and most of the species on the SGCN list, are fairly well understood in terms of life history, populations and habitat requirements, the ecology of many others is poorly known. Some species may play an important but as yet unknown role in the ecological web; but without more research we will never know, and in some cases it might be too late. The ecoregional assessments and other surveys and plans have also identified certain habitats for which additional research is needed, including eastern Washington wetlands, cave habitats in the Columbia Plateau, and deepwater habitats of Puget Sound. WDFW and its conservation partners, including the Washington Natural Heritage Program, need to design, implement and monitor additional applied research and surveys for many of the identified Species of Greatest Conservation Need and associated habitats identified in Washington's CWCS.

During the development of the Species of Greatest Conservation Need discussed in Chapter IV, many species were identified and added to the list because there was a lack of information about their status, distribution, and life history. The CWCS also references in many places the lack or shortage of good information on habitat trends. Development of the SGCN and list of associated habitats will help direct and focus the efforts of WDFW and its conservation partners to collect more and better information in the future on wildlife species, populations and habitats. The general problem of inadequate data collection for species and habitat is also addressed in Chapter V, Implementation and Chapter VII, Monitoring and Adaptive Management, as well as the nine ecoregional narratives in Chapter VI.

H. Major Conservation Strategies

Many tools and strategies are available to WDFW and its partners to address the conservation of fish and wildlife habitat and biodiversity in Washington, on both public and private lands. These range from direct conservation efforts such as law enforcement and habitat protection, as well as indirect but equally important programs such as environmental education, habitat assessment and research.

Many Washington residents and decision makers care deeply about their quality of life, including their fish and wildlife resources, and they have consistently been willing to pass laws and fund programs to help identify and protect important wildlife, habitat and biodiversity. It may or may not be necessary to pass new laws or create new programs, but it is important to effectively administer and enforce existing laws and to coordinate the various federal, state and private programs that are already in place—all of which require adequate funding, staffing and support from the public and decision makers at all levels.

Some of the most effective programs, strategies and tools used by WDFW and its public and private conservation partners are briefly discussed below.

Species conservation strategies: WDFW works closely with other conservation agencies and organizations to identify wildlife species in need of special conservation measures. The U.S. Fish and Wildlife Service and National Marine Fisheries Service classify and protect fish and wildlife species under the federal Endangered Species Act, and the Washington Department of Natural Resources uses the NatureServe methodology for listing state and globally ranked plant and animal species (see Volume Two, Approach and Methods). For purposes of implementing the CWCS, WDFW will focus attention on those wildlife species that are included on the Species of Greatest Conservation Need (SGCN) list (Appendices 1 and 2), which include many classified by Washington as endangered, threatened, candidate or monitor species. It also includes a number of species that are not included in one of those classifications but which have been identified as needing additional research or funding attention. A range of conservation actions are recommended for identified Species of Greatest Conservation Need, from the development of recovery plans for Endangered or Threatened species to baseline population surveys for other species. A series of additional species matrices have been developed that display life history, population status, distribution, problems and conservation and monitoring actions recommended for all designated Species of Greatest Conservation Need, except for the salmon GDUs mentioned above. These matrices, grouped by taxon, are provided as Appendices 9, 10 and 11a-f.

Coordinated salmon recovery: In 1999, after salmon listings were made under the Endangered Species Act, Washington developed the *Statewide Strategy to Recover Salmon: Extinction is Not an Option* to outline the vision, goals and objectives necessary to keep salmon from becoming extinct in Washington. The Strategy identified four main areas of recovery emphasis, referred to as the “four Hs”—habitat, harvest, hatcheries and hydropower—and stressed that recovery efforts need to be appropriately integrated and coordinated at the federal, state, regional and watershed levels. Since then, large-scale, coordinated salmon recovery efforts have been underway in Washington, involving many federal, state, tribal and

local agencies, as well as organized conservation groups and the public. Go to: http://www.governor.wa.gov/gsro/strategy/strategy.htm

Salmon recovery is a complex and expensive proposition in the Pacific Northwest. WDFW and many of its conservation partners are committed to assuring that these various efforts are successful in recovering salmonid populations. Salmon recovery is being coordinated in seven regions of the state (Figure 10).

Figure 10. Salmon recovery regions in Washington.

A number of salmon populations (classified as genetically distinct units or GDUs) were ranked and included as a component of the overall Species of Greatest Conservation Need list (see Appendix 2). Recovery plans have been written for many of these species by regional recovery groups, which include participation from local governments, tribes, state and federal natural resource agencies, and other interested parties. There are six regional groups in Washington that have been actively engaged in salmon recovery planning for four or more years.

Each region is completing a draft plan and submitting it to the Governor's Salmon Recovery Office (http://www.governor.wa.gov/gsro/regions/recovery.htm). Many other plans, assessments and databases were used in developing these regional plans, including the Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP) and the Salmonid Stock Inventory Database (SaSI). These databases are described and linked to their respective websites in Section J below. The regional plans are too large to include within the CWCS, but those that are completed can be viewed at the following web links:

The Upper Columbia Salmon Recovery Region
http://okanogancounty.org/water/Documents%20on%20Site/UCSRP%206-30-05%20Draft.pdf

The Lower Columbia Salmon Recovery Region
http://www.nwr.noaa.gov/1srd/Recovery/domains/willow/WMU_Plan/pdfs/RegionalPlan/RPOverview.pdf

The Snake River Salmon Recovery Region
http://www.snakeriverboard.org/pdf_files/DraftPubSummary06005.pdf

The Hood Canal Summer Chum Recovery Region
http://www.hccc.wa.gov/SalmonRecovery/SalmonRecoveryTOC/default.aspx

The Puget Sound Chinook Recovery Region
http://www.sharedsalmonstrategy.org/plan/docs/Draft%20Salmon%20Recovery%20Plan,%20Executive%20Summary.pdf

The Middle Columbia Recovery Region
http://www.co.yakima.wa.us/yaksubbasin/Library/ExecutiveSummary.pdf

The National Marine Fisheries Service and U.S. Fish and Wildlife Service are currently reviewing the regional plans and working with regional organizations to make revisions. Following this review and revision cycle, the plans will be published in the Federal Register as draft plans and a formal public review process will begin. Implementation of the plans is expected to commence in January 2006, while the plans are still undergoing formal public review.

In 1999, the Legislature also created the Salmon Recovery Funding Board (SRFB), composed of five citizens appointed by the Governor and five state agency directors, which provides grant funds to protect or restore salmon habitat and assist related activities. It works closely with local watershed groups known as lead entities. SRFB has helped finance over 500 salmon recovery projects since its creation. Go to: http://www.iac.wa.gov/srfb/default.asp.

Habitat conservation on public lands and waterways: Approximately 40 percent of Washington's land base is in public ownership, and conservation of wildlife and habitat may be easier to accomplish on these public lands and waterways than on private property, depending on the legal mission of these public lands. Most of Washington's public lands and water resources are either managed specifically for fish and wildlife or managed under a multiple-use concept that addresses the conservation of important habitat in the context of other uses. All public land and water management agencies have some responsibility for protecting fish, wildlife and habitat on their lands. The Department of Defense and Department of Energy operate or fund active fish and wildlife programs on their lands, including Fort Lewis, the Yakima Training Center and the Hanford Nuclear Reservation.

WDFW manages a statewide network of more than 840,000 acres of land and water that provide important habitat for wildlife while offering a range of fishing, hunting and other wildlife-related recreational opportunities. Most of these lands are designated as state Wildlife Areas or Wildlife Access Points, and are found in almost every county in Washington. Washington Department of Natural Resources (WDNR)

manages almost 3 million acres of public lands and trust lands, not counting aquatic lands, which include lands managed for timber, agriculture, recreation and conservation.

Protecting wildlife habitat and biodiversity on other public lands, including state and federal lands, depends on each agency's mission, management priorities, funding, knowledge of natural resources, and their willingness to actually identify and conserve areas important for fish, wildlife and biodiversity. WDFW has many cooperative conservation agreements with other agencies and provides fish and wildlife information and habitat management recommendations to other public land management agencies on request. Through individual species recovery and management plans, wildlife area management plans, and the potential future development of a habitat conservation plan (HCP) for WDFW lands through 2005, WDFW will give priority consideration to identified Species of Greatest Conservation Need, associated habitats and biodiversity in the future management of its publicly owned land base.

Implementation of HB 1309, enacted by the Washington Legislature in 1993, has resulted in the development and application of consistent standards for grazing and other agricultural practices on public lands to protect fish, wildlife and habitat.

Habitat conservation on tribal lands: About 16% of the land area of Washington is within tribal reservations. Reservations are not really public land, although some are administered by the federal Bureau of Indian Affairs, nor are they private land, although there is private land within many reservations. Conservation of fish, wildlife and habitat within tribal reservations is the responsibility of the governing tribal councils. WDFW, as well as other state, federal and private conservation partners, work closely with the various tribal councils to identify and conserve important fish and wildlife resources on tribal lands. The largest Indian reservations in Washington are the Yakama, Colville, and Quinault reservations.

Habitat conservation on private lands: Because about 60% of Washington's land base is in private ownership, WDFW and its conservation partners have had to devise many different approaches or tools for identifying and protecting important wildlife species, habitats and biodiversity on these private lands. Conservation tools include direct and indirect regulation, habitat acquisition and landowner incentives.

All conservation tools are important, but no single approach is ever going to be enough to adequately identify, protect, restore and properly manage the state's wildlife resources and biodiversity, especially on private lands. State and federal regulations only go so far in protecting habitat on private land. Regulations currently in place often focus narrowly on endangered species rather than areas important for biodiversity. Land acquisition programs are very effective in permanently protecting important habitats that cannot be saved in any other way; but not all land is for sale, and funds available for acquiring habit, including conservation easements, are very limited.

One of the most cost effective ways to ensure the protection of important wildlife and habitat on private lands is through the application of financial and non-financial landowner incentive programs. These landowner incentives include direct local property tax reductions by counties; acquisition of conservation easements by agencies and land trusts; and programs such as WDFW's voluntary Upland Wildlife

Restoration program, which provide direct incentives to willing agricultural landowners to protect and restore wetlands and other important habitat on their land. WDFW will continue to work with landowners, private conservation organizations, county extension agents, and conservation districts to provide technical assistance and encouragement to landowners to implement land and water management practices, including grazing practices that benefit fish and wildlife on private land. WDFW will also work closely with the Washington Biodiversity Council to develop and expand various conservation incentives available to private landowners.

The Washington Growth Management Act (GMA) and other local conservation efforts require that local governments have access to reliable landscape-scale data and the best available science to protect important wildlife habitat and other critical areas. WDFW is assisting with a number of collaborative projects around Washington that address wildlife habitat conservation at the local scale. These pilot efforts are led by a variety of county governments and conservation organizations working together. They include King County Greenprint (http://www.tpl.org), Kitsap County Alternative Futures (www.psat.wa.gov/Programs/growth/LID_futures.htm), Pierce County Biodiversity Network (http://www.co.pierce.wa.us/pc/services/home/property/pals/other/biodiversity/htm) and Spokane County Landscape Linkages and Wildlife Corridors (no active web link at this time).

Habitat acquisition: For WDFW and conservation partners like the Washington Department of Natural Resources, U.S. Fish and Wildlife Service, The Nature Conservancy, the Trust for Public Land and local land trusts, acquisition of land from willing landowners is an important nonregulatory tool for protecting areas with high habitat or biodiversity values. Although the cost of acquiring land can be significant compared to other alternatives, in some cases it is the best or only alternative for long-term protection and stewardship of critical habitats. The term “acquisition” is usually associated with the outright purchase of land, but may also include conservation easements, land donations or land trades.

WDFW has a long and successful history of identifying important habitat areas and protecting them through fee-title acquisition. The State’s habitat acquisition program began in 1939, shortly after the Department of Game was established by the legislature. It tapered off in the 1970s after about 340,000 acres of habitat had been purchased, but continues today, although in a much more targeted and collaborative fashion.

In 2004, the Washington State Legislature passed Substitute Senate Bill 6242, which directed the Interagency Committee for Outdoor Recreation (IAC) to develop a study report by June 30, 2005 that would include a statewide strategy for future coordination of acquisition, exchange or disposal of state habitat and recreation lands.
http://www.iac.wa.gov/Documents/IAC/Special_Projects/6242/senate_bill_6242.pdf

In 2005, WDFW completed a new policy plan to guide its future acquisition and management of habitat and wildlife recreation lands. This plan, entitled *Lands 20/20: A Clear Vision for the Future* is available for review at http://wdfw.wa.gov/lands/lands2020/. In addition to the Lands 20/20

plan, WDFW will use the CWCS, ecoregional assessments, species recovery and management plans and other tolls to set priorities for future habitat acquisition.

A number of state and federal funding programs have been established over the last twenty years to address habitat acquisition, and these programs are administered in Washington by a mix of federal, state and local agencies, partnerships and conservation organizations including the Pacific Coast and Intermountain West joint ventures and an expanding system of regional and local land trusts. Below is a list of state and federal programs and web links.

Washington Wildlife and Recreation Program
http://www.iuac.wa.gov/iac/grants/wwrp.htm

Salmon Recovery Funding Board (Washington)
http://iac.wa.gov/srfb

Trust Land Transfer Program (Washington)
http://www.dnr.wa.gov/htdocs/adm/comm/qafiles/tlt2.htm

Aquatic Lands Enhancement Account (ALEA) (Washington)
http://www.iac.wa.gov/iac/grants/alea.htm

Land and Water Conservation Fund (federal)
http://www.nps.gov/lwcf/

Cooperative Endangered Species Conservation Fund (federal)
http://www.fws.gov/endangered/grants

North American Wetlands Conservation Act (federal)
http://www.fws.gov/birdhabitat/NAWCA

National Fish and Wildlife Foundation
http://www.nfwf.org

National Coastal Wetland Conservation Grant Program (federal)
http://www.fws.gov/coastal/CoatalGrants

Cooperative Endangered Species Conservation Fund grants alone have provided more than $20 million to habitat conservation in Washington since 2000.

The WWRP is an especially successful statewide program established by the Washington Legislature in 1989. More than $402 million has been appropriated since 1989 for state and local agencies to acquire habitat and outdoor recreation lands. In 2005 the Legislature recommitted, restructured and refunded the program with a $50 million biennial appropriation.

Research, monitoring and surveys of fish, wildlife and habitat: Scientific research has long provided the foundation for fish and wildlife management in Washington, and WDFW conducts ongoing research and field investigations into the ecological requirements, population status, migrations and habitat relationships of many fish and wildlife species. WDFW also conducts genetic research on terrestrial wildlife and fisheries, performs DNA forensic analysis to support WDFW enforcement

investigations, and provides technical support and expertise in wildlife veterinary medicine, including training on humane and safe handling and immobilization of wildlife species. WDFW also develops, analyzes and maintains computerized wildlife and fisheries survey databases. To ensure that conservation priorities always reflect the current conservation needs of wildlife species and habitats, research and surveys will continue to be a high priority for WDFW. Monitoring of species, habitats and biodiversity is addressed in Chapter VII, Monitoring and Adaptive Management. Also go to: http://wdfw.wa.gov/wildlife.htm, http://wdfw.wa.gov/habitat.htm, and http://wdfw.wa.gov/fish-sh.htm.

Direct enforcement of state laws to protect fish, wildlife and habitat: WDFW's direct authority for the protection of wildlife habitat is limited, although the agency does enforce state laws to protect bald eagle habitat, fish habitat (Hydraulic Project Approval), bald eagle habitat, and fish passage and diversion standards. Through the Washington Fish and Wildlife Commission, WDFW also establishes regulations for the legal harvest of game and commercially harvested fish and wildlife, and WDFW officers enforce those harvest regulations statewide in cooperation with other state, federal and tribal enforcement personnel. Harvest regulations are generally conservative and designed to allow sustainable harvest that has no adverse impact on fish and wildlife populations. However, the illegal overharvest of wildlife or the destruction of critical protected habitats can have a profound impact on fish and wildlife populations that are rare, depressed or threatened with extinction. WDFW Enforcement officers are fully commissioned. They ensure compliance with licensing and habitat requirements and enforce prohibitions against the illegal taking or poaching of fish and wildlife. The Fish and Wildlife Enforcement Program is primarily responsible for enforcing **Title 77**, the Fish and Wildlife Code.

Indirect enforcement of local, state and federal laws to protect fish, wildlife and habitat: WDFW works closely with other agencies including local and tribal police agencies, the Washington Department of Natural Resources, U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) to enforce laws and regulations that are both within and outside WDFW's jurisdiction. For example, migratory birds and marine mammals are protected and regulated under both state and federal law and jointly enforced by WDFW, U.S. Fish and Wildlife Service and National Marine Fisheries Service. WDFW also works closely with other agencies in publicizing, implementing and sometimes enforcing laws, regulations and permit conditions that prevent the destruction or degradation of important habitat, including the federal Endangered Species Act, Northwest Power Planning Act and Clean Water Act, the Washington Forest Practices Act, Shoreline Management Act and the locally administered Washington Growth Management Act. WDFW also works with the Washington Departments of Transportation and Ecology in developing and implementing mitigation measures for projects with potential adverse impacts on fish and wildlife.

Because much of Washington's authority to protect fish and wildlife habitat is shared with cities and counties, WDFW puts a high priority on providing good biological information to local planners and decision makers to improve their ability to administer the Growth Management Act and other locally administered land use laws. The Priority Habitats and Species (PHS) program has provided good site-based information to local governments since 1989. With the completion of statewide

ecoregional assessments in 2006, WDFW will be able to provide even better assessment data to local governments on the location of critical habitats and biodiversity for land use planning.

Wildlife information and conservation education: Effective conservation of habitat and biodiversity can only be accomplished if the public and policymakers understand the biological needs of fish and wildlife, the importance of biodiversity to our overall quality of life, and how citizens can be involved and contribute to conservation efforts. It is also critical that the public have opportunities to observe and enjoy wildlife in its natural surroundings. As Washington's population grows, so does public demand for wildlife information and wildlife-related recreation opportunities on both public and private lands, including hunting, sportfishing and wildlife viewing.

WDFW's Public Affairs Office communicates with the news media, the public and various government agencies and conservation groups about wildlife conservation and recreation. Information is disseminated in a variety of ways, including "Wild About Washington," a monthly television program aired on about 30 public TV stations around the state. In its 2005-07 Strategic Plan (http://wdfw.wa.gov/depinfo/strategic_plan05-07.pdf), WDFW committed to developing effective communication strategies to increase the public understanding of the health of the state's fish, wildlife and habitats and the opportunities to enjoy, protect and recover them. One of the most successful and popular has been the development of web-based wildlife viewing cameras (WildWatchCams) http://wdfw.wa.gov/wildwatch/index.html, showing rarely seen life history footage and educating the public about the species' needs and challenges.

In 2003, WDFW joined with other agencies, educators and businesses to develop and promote a new public-private Pacific Education Institute (PEI). PEI will integrate environmental education with the public school curriculum and state learning standards by providing K-20 educators with the training and materials to offer academically rigorous education activities focused on natural resources and the surrounding environment. In 2004, the Governor's Council on Environmental Education and other partners released a *Report Card on the Status of Environmental Education in Washington State*, which provides a roadmap for expanding environmental education. This plan may be viewed at http://www.eeaw.org/EE%20Report/2004_WAEE_Report_Card.pdf. The Washington Biodiversity Council is also considering recommendations to better integrate biodiversity education into the public school curriculum.

"In the end we will conserve only what we love;
We will love only what we understand;
We will understand only what we have been taught."

--Baba Dioum,
Senegalese ecologist

Wildlife recreation programs: Demand for traditional hunting and fishing activities remains steady in Washington. The 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation indicated that the state of Washington is eighth in the nation in spending by recreational fishers, generating an estimated $1.14 billion in annual revenues to the state. A major focus of both recreational and commercial fishing is Washington's salmon resource, which includes healthy stocks as well as depressed populations, and ESA listing of certain salmon populations. The same survey showed that recreational hunting generates another $350 million in annual revenue to the state each year.

The fastest growing sector of wildlife recreation demand, however, is watchable wildlife. An estimated 47 percent of Washington's residents participated in some form of wildlife watching in 2001. WDFW has embraced the national Watchable Wildlife movement and is working with the Washington Division of Tourism, Department of Transportation, Washington State Parks and Recreation Commission, Audubon Washington, and other partners to develop programs such as the Washington State Birding Trail program to both meet this growing demand for non-consumptive wildlife recreation and to increase public awareness of the need for conservation of wildlife and wildlife habitat. In 2004 a new statewide strategic plan for watchable wildlife was provided to the Governor and Washington Legislature. This plan, titled *Wildlife Viewing Activities in Washington: A Strategic Plan* is available at http://wdfw.wa.gov/viewing/wildview.htm.

As the state's population grows, so does the demand for wildlife-related recreation opportunities and public access to wildlife on both public and private lands. WDFW will continue to work with public and private conservation organizations and landowners to try to meet this growing public demand for wildlife recreation.

Harvest management: The sustainable management of game and commercially harvested species and the allocation of harvest for licensed hunters, sport anglers and commercial fishers will continue to be an important management focus for WDFW. WDFW works closely with the U.S. Fish and Wildlife Service and National Marine Fisheries Service to establish and enforce rules for harvesting migratory species, including salmon and waterfowl, and with Washington's Treaty Indian Tribes for harvesting fish and wildlife for which the Tribes have co-management responsibilities. A number of recent plans have been adopted which shape the future

of WDFW's game and commercial harvest program, including the *2003-2009 Game Management Plan,* nine elk herd management plans, *Outline for Salmon Recovery Plans* (2003), *Bull Trout and Dolly Varden Management Plan* (2000), *Forage Fish Management Plan* (1998), and the Puget *Sound Groundfish Management Plan* (1998). A more complete list of these plans is included as Appendix 6 and Appendix 7.

Forest practices management: Over half the land area of Washington is forested, and most of the state's forested landscapes continue to be managed for timber and timber products. Because of the influence of commercial forestry on the state's forest lands and wildlife habitat, it is imperative that WDFW and its conservation partners continue to put a heavy emphasis on influencing the forest practices used in managing and harvesting these public and private timberlands. In the last 20 to 25 years, however, Washington's forest practices regulations have been dramatically improved and are now considered by some to be the best in the nation.

Timber management and harvest on federal land, including National Forests, is regulated by the Northwest Forest Plan, adopted by the federal government in 1994 to provide for maintenance and restoration of a functional and interconnected late-successional forest ecosystem. The management and harvest of timber on non-federal land in Washington, both public and private, is regulated by the state Forest Practices Act. Since the federal listing of the northern spotted owl as a Threatened species in 1990 and the passage of the Northwest Forest Plan in 1994, there have been a number of proactive efforts and agreements among public agencies, Indian tribes, conservation groups and forest landowners. These agreements work to protect listed species and their habitat, and to avoid further listings of forest species under the Endangered Species Act, while protecting the economic viability of the timber industry in Washington.

One of the most recent and successful of these public-private efforts is the Washington Forests and Fish Agreement initiated in 1997 by state and federal agencies, Indian tribes, conservation groups and private forest landowners. The rules that resulted from this agreement were developed in concert by all parties and are a good example of how a high degree of habitat protection can be achieved through collaboration. This agreement sets high standards for logging practices and road maintenance, while ensuring that forest landowners receive the technical support they need in order to comply with the new rules. (http://www.dnr.wa.gov/forestpractices/rules/forestsandfish.pdf)

In addition to the Forests and Fish Agreement, WDFW and many of its conservation partners are heavily involved in other efforts to influence and ensure sound forest practices on the state's public and private forest lands, including active participation on the Washington Forest Practices Board and implementation of current forest practices rules and regulations. Washington's Forest Practices rules apply to some eight million acres of private forestlands and protect about 60,000 miles of streams.

The development of Habitat Conservation Plans (HCPs) with private forest landowners, and most recently, public land management agencies, is a good alternative to additional federal regulation to protect ESA-listed wildlife species and habitats. In 1997, the Washington Department of Natural Resources and federal fish and wildlife agencies signed a multi-species Habitat Conservation Plan that covers 1.6 million acres of state-owned trust forestlands. WDFW is contemplating a similar

federally funded HCP that would apply to the management of lands owned and managed by WDFW.

Biological assessments, local planning and information services: Land use planning and conservation of land and water resources are largely the responsibility of local governments in Washington. While both cities and counties are required to plan under the state Growth Management Act, counties have a special responsibility to administer the optional local conservation futures and open space property tax incentive programs, and to support local conservation districts, land trusts and watershed councils that provide assistance to private landowners. WDFW is constantly working to provide better, up-to-date fish, wildlife and habitat information in formats and scales that are most useful for local planners.

WDFW currently maintains the Priority Habitats and Species (PHS) program, which gives counties data on the location of priority fish and wildlife habitats as well as habitat management recommendations. But the current PHS approach does not address larger landscape issues such as habitat connectivity, regional or local species viability, prioritization of habitat areas, cumulative effects of development, or multi-county habitat management. WDFW and its partners are developing other tools to help counties address these needs, including new landowner incentives being investigated by the Washington Biodiversity Council.

The ecoregional assessments described in Chapter VI, Washington's Ecoregional Conservation Strategy, are another important tool being developed by WDFW and the Washington Department of Natural Resources to identify areas of ecoregional significance. Finer scale assessments such as the local habitat assessments are yet another tool that will help connect sites of ecoregional biodiversity importance with habitats of local significance. By incorporating existing data, including that from PHS and the Washington Natural Heritage Program, the local habitat assessments produce digital "conservation utility maps" that portray the relative importance of wildlife habitat and biodiversity across the landscape. Both the ecoregional and local assessments should be useful to local governments in understanding where habitat is likely to be lost or gained under various land use plan alternatives, as well as informing funding and incentive programs. Finally, guidance documents that address the needs of specific native fish and wildlife species are being developed to improve technical assistance for landowners and land use planners.

Several Washington counties have begun incorporating fish and wildlife or biodiversity assessments into their local growth management plans. These efforts are briefly discussed below.

I. Major Statewide Conservation Planning and Assessment Initiatives

WDFW, working with many public, tribal and private conservation partners, is involved in a number of large conservation planning and assessment efforts for fish and wildlife species, habitats and biodiversity. These collaborative efforts are conducted at various levels of detail, concluding statewide, regional and county scales. WDFW also develops and implements management and recovery plans for many species, management recommendations for priority habitats, and strategic planning for administration of the agency. One of the primary opportunities for cooperation between WDFW and other public and private partners has been and will

continue to be participation in the collaborative development of statewide and regional conservation plans and habitat assessments, as well as initiatives such as the Washington Biodiversity Council.

Some of the most important of these collaborative planning and assessment efforts are described below. Many of these plans and assessments were consulted and incorporated into the discussion of wildlife species, habitats and conservation strategies in the Washington CWCS. Many of the same planning and assessment efforts, as well as others not mentioned, will provide opportunities for WDFW and other conservation partners to work together to implement the various wildlife species and habitat recommendations in the Washington CWCS.

State of Washington Natural Heritage Program: The Washington State Legislature established the Washington Natural Heritage Program (WNHP) in 1982, through an amendment to the Natural Area Preserves Act (RCW 79.70), placing the program within the Department of Natural Resources. One of the requirements of the amended Natural Area Preserves Act is that the NHP must prepare and/or update a Natural Heritage Plan each biennium. The S*tate of Washington Natural Heritage Plan*, updated in 2003 by ecoregion, provides the framework for a statewide system of natural areas by 1) identifying the criteria and process by which natural areas are selected, 2) identifying priority ecosystems and species for protection, 3) outlining methods of protection, and 4) identifying the roles of agencies/organizations in natural area protection. The statewide natural areas system is meant to provide habitats for rare and/or declining species and places for healthy functioning ecosystems, as well as opportunities for scientific research and education. The statewide system includes natural areas managed by state agencies (including DNR's Natural Areas Program, WDFW and State Parks), federal agencies (including the USDA Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service, National Park Service and the U.S. Department of Defense) and private conservation organizations (http://www.dnr.wa.gov/nhp/).

Washington Biodiversity Council: The Washington Biodiversity Council was created in 2004 to develop and promote more effective ways of conserving Washington's biodiversity. Comprised of 23 members, the Council is directed to develop a proactive blueprint for biodiversity protection that is comprehensive, enables policymakers to target limited funds, and goes beyond the crisis-driven policies that currently dictate many of our conservation efforts. In short, it is an opportunity to shape Washington's first-ever biodiversity strategy. http://www.iac.wa.gov/biodiversity/default.htm

Northwest Forest Plan (NWFP): The Northwest Forest Plan (NWFP) presents a vision for a sustainable future for federal natural resources (lands managed by the USDA Forest Service and the U.S. Bureau of Land Management) and for local timber-dependent communities within the range of the northern spotted owl, which encompasses all or portions of 17 National Forests in Washington, Oregon and California. The NWFP, adopted in 1994, amended individual Land and Forest Management Plans for each of seven National Forests in Washington and established new management approaches such as Late Successional Reserves (LSR), which are designed to promote the long-term conservation of late successional-dependent wildlife species such as the northern spotted owl. Within the area covered by the Northwest Forest Plan, over 85% of the USDA Forest Service and Bureau of Land Management land base is now within a "reserve" classification designed to protect

either old growth- or riparian-dependent wildlife species. The NWFP also includes Aquatic Conservation Strategies designed to further protect habitat for salmonids and other aquatic species. http://www.fs.fed.us/r6/nwfp.htm

Northwest Power and Conservation Council Fish and Wildlife Program: The Northwest Power Act of 1980 directs the Council to develop a program to protect, mitigate and enhance fish and wildlife of the Columbia River basin that have been impacted by hydropower dams. This program is being implemented through a partnership of federal and state agencies. Coordinated fish and wildlife plans have been developed for 58 subbasins in Washington and other Northwest states. http://www.nwcouncil.org/fw/program/Default.htm

Ecoregional Assessments (EAs): To provide an ecoregional perspective for multi-species conservation and ecosystem-level habitat protection, WDFW and the Washington Department of Natural Resources joined a public-private partnership in 2001 with The Nature Conservancy to conduct nine ecoregional assessments for the state's nine ecoregions. These assessments will guide the state's future actions by identifying high priority areas for the conservation of biological diversity in each ecoregion, and they will provide usable, comprehensive information for planning and decision making at both regional and statewide scales. The EAs are discussed in more detail in Chapter VI, Washington's Ecoregional Conservation Strategy and in Volume 2, Approach and Methods.

Puget Sound Water Quality Management Plan: The Puget Sound Water Quality Management Plan is Washington's long-term strategy for protecting and restoring Puget Sound. The management plan provides the framework for managing and protecting the Sound and coordinating the roles and responsibilities of federal, state, tribal and local governments. The management plans also serves as the federally approved Comprehensive Conservation and Management Plan (CCMP) for Puget Sound under Section 320 of the federal Clean Water Act, which established the National Estuary Program.
http://www.psat.wa.gov/Publications/manplan00/mp_index.htm

Puget Sound Nearshore Restoration Project: The Puget Sound Nearshore is defined as that area of marine and estuarine shoreline extending from the Canadian border throughout Puget Sound and out the Strait of Juan de Fuca to the Pacific Ocean (approximately 2,500 miles). The Puget Sound Restoration Project was initiated in 2003 to identify significant ecosystem problems, evaluate potential solutions, and restore and preserve critical nearshore habitat. The project represents a partnership between the state and federal government organizations, Indian tribes, industries and environmental organizations.
http://www.pugetsoundnearshore.org/

Salmon Recovery Plans and Assessments: WDFW is either leading or heavily involved in all statewide and regional assessments and plans that specifically address salmon recovery in Washington. Included are the Salmon & Steelhead Habitat Inventory & Assessment Project (SSHIAP), Puget Sound Shared Salmon Strategy, Salmon Recovery Funding Board and the Puget Sound Comprehensive Chinook Management Plan. Other statewide or regional conservation plans such as the Puget Sound Action Plan, while not specific to salmon, do address the protection and management of important salmon habitat and migration corridors. The National Marine Fisheries Service has the lead federal role in recovering ESA-listed salmon

stocks in Washington and other states. As co-managers of the salmon resource, Washington's Treaty Indian tribes also play a major role in developing and implementing salmon recovery efforts in Washington. A more complete list of salmon recovery plans and assessments is included as Appendix 7. http://wdfw.wa.gov/recovery.htm or http://www.governor.wa.gov/gsro/regions/recovery.htm.

U.S. Fish and Wildlife Service Comprehensive Refuge Management Plans: Under the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act), all national wildlife refuges are required to develop a Comprehensive Conservation Plan (CCP), a document that provides a framework for guiding refuge management decisions. All refuges are required by law to complete their CCP by 2012. The CCP process complies with standards outlined in the National Environmental Policy Act (NEPA). NEPA requires CCPs to examine a full range of alternative approaches to refuge management and also to involve the public in selecting the alternative best suited to the refuge's purposes. Of Washington's 20 National Wildlife Refuges (NWR), only Little Pend Oreille and Nisqually NWRs have completed a CCP. Comprehensive conservation planning is currently underway for 12 more refuges, and the remaining seven refuges will have completed CCPs by 2011. http://pacific.fws.gov/planning/

Intermountain West Joint Venture Coordinated All-Bird Conservation Plan for Eastern Washington: The Intermountain West Joint Venture (IWJV) was established in 1994 as the eleventh public-private partnership to implement the habitat goals of the North American Waterfowl Management Plan. The IWJV encompasses parts of eleven Western states, including all of eastern Washington. Western Washington is covered within the Pacific Coast Joint Venture. IWJV partners work to identify, protect, restore and enhance wetlands and other important habitats for waterfowl and other migratory birds, as well as native resident birds such as sage-grouse and sharp-tail grouse. In 2005, the IWJV adopted "all-bird" conservation plans for all eleven states within the IWJV. These plans reflect a multi-year, collaborative effort among many federal, state and private conservation partners who collectively identified and ranked priority bird species, priority habitats, and hundreds of landscape-level Bird Habitat Conservation Areas (BHCA). The coordinated all-bird plan for eastern Washington includes 43 such BHCAs. http://www.iwjv.org

Interior Columbia Basin Ecosystem Management Project: In July 1993, the USDA Forest Service was directed to "develop a scientifically sound and ecosystem-based strategy for management of eastside forests." Over 170 different GIS data layers or themes were developed, focusing on the upper Columbia River basin east of the Cascades. Much of the information is derived from other data providers, including the USDA Forest Service, Bureau of Land Management, Environmental Protection Agency, National Marine Fisheries Service, U.S. Fish and Wildlife Service and U.S. Geological Survey. In 2003 these federal agencies signed a memorandum of understanding to implement the Interior Columbia Basin Ecosystem Management Strategy. http://www.icbemp.gov/

Washington GAP Project: The Gap Analysis Program: A Geographical Approach to Planning (GAP) data are based on an interpretation of vegetation types and habitat associations. The GAP program is funded by the Biological Resources Division of the U.S. Geological Survey and located within the Washington Cooperative Fish and

Wildlife Research Unit at the University of Washington. http://www.fish.washington.edu/naturemapping/wagap/public_html/

Important Bird Areas (IBA) Programs: The IBA Program is an international, site-based approach to bird conservation that began in Europe in the mid-1980s. The Washington IBA Program was initiated in 1997 as a joint effort of Audubon Washington and WDFW. Between 1998 and 2000, 75 sites were formally nominated and evaluated, and 56 of these sites were described in *Important Bird Areas of Washington*, published in 2001 by Audubon Washington. The IBA Program is currently being updated and expanded by Audubon Washington, which is also developing a statewide Washington Birding Trail system that will reflect and be compatible with the Washington IBA Program. For more information, go to http://wa.audubon.org/new/audubon.

Partners in Flight (PIF): The national Partners in Flight (PIF) program began in 1989 as a coordinated effort to document and reverse apparent declines in the populations of neotropical migratory birds, those birds that breed north of Mexico and then migrate to Mexico, Central and South America, and the Caribbean in the winter months. The development of a conservation strategy for Partners in Flight in Washington has been accomplished by the Oregon-Washington Partners in Flight Working Group that released five provincial plans for landbird conservation in both states in 2000. Three of these provincial plans together provide a landbird conservation strategy for eastern Washington: Conservation Strategy for Landbirds in the Columbia Plateau of Eastern Oregon and Washington, Conservation Strategy for Landbirds of the East Slope of the Cascade Mountains of Eastern Oregon and Washington, and Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington. For more information on the national and Washington PIF efforts, go to: http://www.partnersinflight.org.

Pacific Marine Fisheries Council Groundfish Strategic Plan: This strategic plan is intended to provide guidance for groundfish management in 2001 and beyond. It is intended to be a resource for efforts to rebuild depleted stocks and maintain healthy stocks and to guide efforts to reduce the size of the fishing fleet to a level that is both biologically sustainable for the resource and economically sustainable for the fishing fleet. http://www.pcouncil.org/groundfish/gfother/stratplan.pdf

Washington Forest Practices Rules: The Washington Forest Practices Board has the authority and responsibility to regulate forest practices on both state and private lands. Current rules and regulations address wildlife resource issues such as snag and leave tree requirements, wetland and riparian buffers, and establishment of critical habitat for the bald eagle, gray wolf, grizzly bear, mountain caribou, Oregon silverspot butterfly, peregrine falcon, greater Sandhill crane, northern spotted owl, western pond turtle, and marbled murrelet. The Forest Practices Board is currently engaged in implementation issues related to the new Forests and Fish regulations designed to protect forested habitat for salmonids and a select group of amphibian species. In addition, the Board has adopted a comprehensive wildlife work plan that includes three primary elements: 1) an assessment of species-specific rules (e.g. bald eagle, northern spotted owl), 2) a landscape-level wildlife habitat assessment, and 3) development of incentives to promote habitat protection and landscape planning. Adaptive management will be incorporated into the three elements as needed. http://www.dnr.wa.gov/forestpractices/board, http://www.forestsandfish.com.

WDFW Wildlife Area Plans: These plans define the goals and objectives for priority habitat and species management and protection on WDFW lands. The plans address issues to achieve sustainable wildlife populations and to provide compatible fish and wildlife-related recreational opportunities on Wildlife Areas. Each plan will provide management direction for individual Wildlife Areas. The plans will be updated annually to maintain their value as flexible working documents. Each plan will identify needs and guide activities on the area based on the Washington Department of Fish and Wildlife Agency Mission of "Sound Stewardship of Fish and Wildlife" and its underlying statewide goals and objectives as they apply to local conditions. http://wdfw.wa.gov/viewing/wildarea/wildarea.htm.

J. Major Fish and Wildlife Species and Habitat Databases

A number of major fish, wildlife and habitat databases and information sources are available to WDFW and its conservation partners to help design fish and wildlife conservation programs and implement the Washington CWCS. These databases and information sources are summarized with appropriate web links in Section J below.

Washington Priority Habitats and Species (PHS) List

The Priority Habitats and Species (PHS) List is a catalog of those species and habitat types identified by the Washington Department of Fish and Wildlife as priorities for management and preservation. Because information on fish, wildlife, and their habitats is dynamic, the PHS List is updated periodically.

Priority species require protective measures for their perpetuation due to their population status, sensitivity to habitat alteration, and/or recreational, commercial, or tribal importance. Priority species include State Endangered, Threatened, Sensitive, and Candidate species; animal aggregations considered vulnerable; and those species of recreational, commercial, or tribal importance that are vulnerable. Priority habitats are those habitat types or elements with unique or significant value to a diverse assemblage of species. A Priority habitat may consist of a unique vegetation type or dominant plant species, a described successional stage, or a specific structural element.

There are 18 habitat types, 140 vertebrate species, 28 invertebrate species, and 14 species groups currently on the PHS List. These constitute about 16 percent of Washington's approximately 1,000 vertebrate species and a fraction of the state's invertebrate fauna. Mapping of priority habitats and species was initiated in 1990 and includes about two-thirds of Washington's 43 million acres. The remaining third generally involves federal and tribal lands. Mapping consists of recording locational and descriptive data in a Geographic Information System (GIS). These GIS databases represent WDFW's best knowledge of fish and wildlife resources and occurrences. It is important to note, however, that priority species or priority habitats may occur in areas not currently known to WDFW biologists or in areas for which comprehensive surveys have not been conducted. Site-specific surveys may be necessary to rule out the presence of priority habitats or species on individual sites.

Included in the PHS system of databases are WDFW's PHS Points and Polygon Databases, StreamNet, and the Wildlife Heritage Database. Other information

sources include the Department of Natural Resources Aquatic Lands Division database on kelp beds and the U.S. Fish and Wildlife Service's information on the National Wetlands Inventory (NWI).

The PHS Internet home page can be accessed via the World Wide Web at: www.wa.gov/wdfw/hab/phspage.htm

Washington Natural Heritage Information System

The Washington Natural Heritage Program (WNHP) was established by the State Legislature and placed within the Washington Department of Natural Resources (WDNR) in 1982. The main objectives of establishing the program were 1) to develop and maintain an objective classification of the state's species and ecosystems, 2) to develop an inventory of the locations of priority species and ecosystems, 3) to use the information to help guide the development of a statewide system of natural areas, and 4) to share the information with agencies, organizations and individuals for environmental assessment and land management purposes.

Since its establishment, the WNHP has been gathering information on rare species and both rare and common ecosystems. The WNHP maintains the primary statewide information system on rare plant species, managing information on more than 350 species of rare plants and more than 5,000 locations of those species statewide. The WNHP also has information and expertise on select groups of rare animal species. The WNHP zoologists work cooperatively with WDFW zoologists on individual projects and on setting species priorities. The WNHP's vegetation ecologists are responsible for the development and maintenance of the statewide ecosystems classification used in ecoregional assessments and other conservation planning purposes.

The Washington Natural Heritage Information System is a major source of information for individuals, agencies and organizations engaged in land use planning and decision making. During the two-year period 2003-2005, the WNHP provided information to more than 1,000 private companies, local governments, state and federal agencies, conservation organizations and educational institutions.

The WNHP is a member of a network of similar programs throughout the western hemisphere. The network, NatureServe, has member programs in all 50 states, all Canadian provinces, and several Latin American and Caribbean nations. All programs use the same basic methodology and data management tools to assess rarity and set conservation priorities. This allows for improved sharing of information and consistency of conservation efforts across political boundaries.

The WNHP home page can be accessed via the Internet at:
http://www.dnr.wa.gov/inhp/index.html
Additional information about NatureServe is available via the Internet at:
http://www.natureserve.org

Interactive Biodiversity Information System (IBIS)

IBIS is an informational resource developed by the Northwest Habitat Institute (NHI) to promote the conservation of Northwest fish, wildlife, and their habitats through education and the distribution of timely, peer-reviewed scientific data.

The IBIS web site is in the early stages of development; however, NHI staff, with the support of many project partners, has been developing the data for over five years. The IBIS database was initially developed by NHI for Oregon and Washington during the Wildlife-Habitat Types in Oregon and Washington project. IBIS data is currently being refined and extended to include all of Idaho, Oregon, Washington, and the Columbia River Basin portions of Montana, Nevada, Utah and Wyoming. IBIS will eventually include species range maps, wildlife-habitat maps, extensive species-habitat data queries, and interactive wildlife-habitat mapping applications allowing dynamic spatial queries for the entire Pacific Northwest as previously defined.

The IBIS Internet Home Page can be accessed via the World Wide Web at:
http://www.nwhi.org/ibis/home/ibis.asp

Washington GAP Database

The Washington GAP Analysis Program (GAP) is a nation-wide program currently administered by the Biological Resources Division of the US Geological Survey (BRD-USGS; formerly the National Biological Service [NBS]). The overall goal of GAP Analysis is to identify elements of biodiversity that lack adequate representation in the nation's network of reserves (i.e., areas managed primarily for the protection of biodiversity). GAP Analysis is a coarse-filter approach to biodiversity protection. It provides an overview of the distribution and conservation status of several components of biodiversity, with particular emphasis on vegetation and terrestrial vertebrates. Digital map overlays in a Geographic Information System (GIS) are used to identify vegetation types, individual species, and species-rich areas that are unrepresented or underrepresented in existing biodiversity management areas. GAP Analysis functions as a preliminary step to more detailed studies needed to establish actual boundaries for potential additions to the existing network of reserves.

The network of Conservation Data Centers (CDC) and Natural Heritage Programs established cooperatively by The Nature Conservancy and various state agencies maintain detailed databases on the locations of rare elements of biodiversity. Conservation of such elements is best accomplished through the fine-filter approach of the above organizations. It is not the role of GAP to duplicate or disseminate Natural Heritage Program or CDC Element Occurrence Records. Users interested in more specific information about the location, status, and ecology of populations of such species are directed to their state Natural Heritage Program or CDC.

The Washington GAP Analysis Internet Home Page can be accessed via the World Wide Web
at: http://www.fish.washington.edu/naturemapping/waGAP/public_html/index.html

National Wetland Inventory (NWI)

The National Wetlands Inventory (NWI) of the U.S. Fish and Wildlife Service produces information on the characteristics, extent, and status of the Nation's wetlands and deepwater habitats. The National Wetlands Inventory Center information is used by federal, state, and local agencies, academic institutions, U.S. Congress, and the private sector. The NWIC has mapped 90 percent of the lower 48 states, and 34 percent of Alaska. About 44 percent of the lower 48 states and 13 percent of Alaska are digitized. Congressional mandates require the NWIC to produce status and trends reports to Congress at ten-year intervals. In addition to status and trends reports, the NWIC has produced over 130 publications, including manuals, plant and hydric soils lists, field guides, posters, wall size resource maps, atlases, state reports, and numerous articles published in professional journals.

The NWI National Center in St. Petersburg, Florida, includes a state-of-the-art computer operation, which is responsible for constructing the wetlands layer of the National Spatial Data Infrastructure. Digitized wetlands data can be integrated with other layers of the NSDI such as natural resources and cultural and physical features, leading to production of selected color and customized maps of the information from wetland maps, and the transfer of digital data to users and researchers world-wide. Dozens of organizations, including federal, state, county agencies, and private sector organizations such as Ducks Unlimited, have supported conversion of wetland maps into digital data for computer use. Digitized wetland data are also available for portions of 37 other States. Once a digital database is constructed, users can obtain the data at no cost over the Internet, or through the U.S. Geological Survey for the cost of reproduction.

The National Wetlands Inventory Internet Home Page can be accessed via the World Wide Web at: http://wetlands.fws.gov/

Salmonid Stock Inventory Database (SaSI)

WDFW developed SaSI in 1992 to identify changes in salmonid stock health and to prioritize recovery efforts. SaSI is a standardized, uniform approach to identifying and monitoring the status of Washington's salmonid fish stocks. The inventory is a compilation of data on all wild stocks and a scientific determination of each stock's status as healthy, depressed, critical, unknown or extinct. SaSI is a cooperative product of WDFW and tribal co-managers. (http://wdfw.wa.gov/fish/sassi/intro.htm).

A total of 515 stocks have been identified. Of these, 201 stocks (39%) were rated as healthy, 124 stocks (24%) were rated as depressed, 18 (3%) were rated as critical, and 171(33%) were of unknown status. The percentage of stocks of unknown status varies considerably, from 11% in sockeye to 72% in bull trout/Dolly Varden.

Salmon and Steelhead Habitat Inventory and Assessment Program Database (SSHIAP)

The Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP) supports a spatial data system that characterizes salmonid habitat conditions and distribution of salmonid stocks in Washington at the scale of 1:24,000. SSHIAP is co-managed by the Washington Department of Fish and Wildlife (WDFW) and the Northwest Indian Fisheries Commission (NWIFC); NWIFC has primary stewardship in

Water Resource Inventory Areas (WRIAs) 1 – 23; WDFW is the primary data steward in WRIAs 24 – 62. The foundation of the SSHIAP data system is a 1:24,000-scale cleaned and routed hydrography layer. This hydrolayer provides a consistent spatial data foundation for integrating a wide variety of habitat information and for subsequent analyses. The SSHIAP data system quantitatively characterizes habitat conditions, incorporates a wide variety of information sources, and links habitat conditions and stock distribution with productivity modeling efforts. SSHIAP is designed to support regulatory, conservation, and analysis efforts such as Washington State Watershed Analysis, State Salmon Recovery, Habitat Conservation Planning, Ecosystem Diagnosis and Treatment (EDT), and others.

SSHIAP data may be viewed on SalmonScape, an interactive, user-friendly, map-based web application. Data layers include hydrography, fish distribution, Salmonid Stock Inventory (SaSI), barriers to fish passage, habitat characteristics such as stream gradient, and Ecosystem Diagnosis and Treatment model output. Data can be displayed over shaded relief or orthographic photos. Users can query by stream or spatial location and can make limited queries of data content.