



WASHINGTON BIODIVERSITY CONSERVATION STRATEGY



Sustaining Our Natural Heritage
For Future Generations

DECEMBER 2007

WASHINGTON
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Washington Biodiversity Council Members

Maggie Coon, Chair
The Nature Conservancy

Brad Ack, Vice Chair
Formerly of the Puget Sound Action Team

Ken Berg
U.S. Fish and Wildlife Service

Dave Brittell
Washington Department of Fish and Wildlife

Bonnie Bunning
Washington State Department of Natural Resources

Bill Clarke
At-Large, Washington REALTORS™

Donna Darm
NOAA Fisheries

Robert Fimbel
Washington State Parks and Recreation Commission

John Marzluff
University of Washington

Jackie Reid
Thurston County Conservation District

Ken Risenhoover
Port Blakely Tree Farms

David Roseleip
Washington Agriculture and Forestry Education Foundation

Mark Schaffel
Pacific Coast Shellfish Growers Association

Ron Shultz
Puget Sound Partnership

Kate Stenberg
At-Large

Naki Stevens
At-Large, People for Puget Sound

Steve Tharinger
Clallam County Commission

Wade Troutman
At-Large, Open Heart Ranch

David Troutt
Nisqually Indian Tribe

Dick Wallace
Washington State Department of Ecology

Josh Weiss
Washington Forest Protection Association

Megan White
Washington State Department of Transportation

Emeritus Biodiversity Council Members

Bill Brookreson
At-Large

Brian Collins
Skokomish Nation

Peter Goldmark
Double J Ranch

Yvette Joseph
Colville Confederated Tribes

Mel Moon
Quileute Tribe

Consulting Services provided by

Cascadia Consulting Group

Graphic Design

Mather Design

Biodiversity Council Staff

Lynn Helbrecht
Executive Coordinator

Sarah Gage
Senior Project Associate

Washington Biodiversity Council

1111 Washington Street SE
PO Box 40917
Olympia, WA 98504-0917
360-902-3000

Administrative services provided by the
Recreation and Conservation Office.

Persons needing this information in an alternative
format call 360-902-3000 or TDD 360-902-1996

For more information: www.biodiversity.wa.gov

**WASHINGTON BIODIVERSITY
CONSERVATION STRATEGY**

**Sustaining our Natural Heritage
for Future Generations**

DECEMBER 2007

Fellow Washingtonians:

As Chair of the Washington Biodiversity Council, I am pleased to present you with the Washington Biodiversity Conservation Strategy: Sustaining our Natural Heritage for Future Generations. Three years ago the Council was charged with creating a long-term, comprehensive strategy to sustainably protect Washington's biodiversity heritage. This document delivers on that challenge.

As you will learn in the following pages, Washington's biodiversity is at risk and under increasing pressure from our growing population, development, and climate change. Despite many successful efforts in recent years, scientists continue to mark declines in ecosystem health across our state.

In this strategy, the Council sets forth a bold set of actions designed to turn the tide—to marshal our collective efforts toward a common purpose and increase attention in key areas, including:

- Adopting a landscape approach to focus our investments on the ground and better conserve biodiversity where we work, play, and live.
- Enhancing voluntary incentives for private landowners.
- Linking citizens with scientists to monitor biodiversity and enhance our knowledge.

By carrying out the recommendations described herein, Washington can make great strides toward conserving biodiversity in ways that provide rich benefits for all of us and our communities.

Crafting this strategy has been an exciting journey for us as Council members. The experience has deeply reinforced our sense of wonder at the beauty and richness of Washington's natural landscapes. We have enjoyed the process and have been inspired along the way by the commitment of the people we've met. As a highly diverse group ourselves, the Council has repeatedly sought input from a wide variety of individuals and organizations. Their thoughtful perspectives have fundamentally shaped our approach and we deeply appreciate their contributions.

Together, we can achieve much by building on the strong foundation and good work already underway. All of us, no matter where we live or work, have important roles to play in conserving our natural heritage. We invite you to join with us in the vital effort to sustain Washington's biodiversity for the future.



Maggie Coon

Chair, Washington Biodiversity Council

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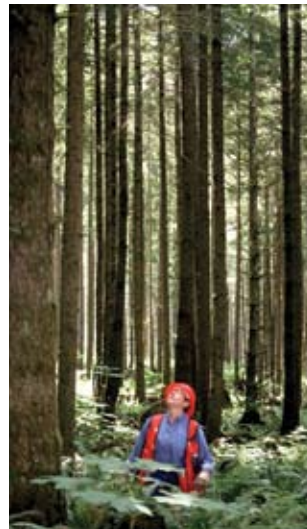
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JEAN BOYLE



BEN LEGLER



WASHINGTON FOREST PROTECTION ASSOCIATION

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Washington State is blessed with a unique bounty of natural environments and resources, from the rich fertile soils of the Palouse to the diverse marine life of Puget Sound. This bounty supports an extraordinary diversity of life including the world’s tallest Douglas-firs, the salmon, wheat, and apples that have made our state famous, and millions of tiny organisms that are the foundation of the food chain.

This natural resource heritage—the biological diversity of organisms and habitats—is our state treasure. Yet as our population has soared and our economy prospered, our state’s natural heritage has steadily diminished. Since Washington became a state in 1889, we have lost significant portions of our wetlands, riparian habitat, old-growth forests, shrub-steppe, and arid grasslands. Consequently, the health of many of our lands and water systems is declining. Today, for example, the vitality of Puget Sound is threatened to the extent that we are contemplating spending billions of dollars to restore its health and productivity. Other ecosystems across the state may also be in danger if current trends continue.

In the face of these trends, the Washington State Legislature in 2002 enacted ESSB 6400, which recognized the critical importance of biodiversity to the well-being of the state’s citizens, businesses, and agriculture. This legislation directed the State to develop a comprehensive framework to safeguard Washington’s rich biodiversity heritage for the benefit of current and future generations. The Washington Biodiversity Conservation Committee produced an interim strategy report in 2003 setting forth guiding principles and desired outcomes, including recommendations to establish a standing Council to develop a comprehensive long-term strategy. The Governor subsequently established the Washington Biodiversity Council and charged it with developing a “30-year, comprehensive prioritized strategy and implementation plan for the state of Washington that enables the state to sustainably protect its biodiversity heritage.”¹

The Washington Biodiversity Council defines biodiversity as the full range of life in all its forms. This includes the habitats in which life occurs, the ways that species and habitats interact with each other, and the physical environment and the processes necessary for those interactions.



KELLY MCALLISTER



BEN LEGLER



JULIE BENNETT



AARON BARNA

¹ Gary Locke, March 1, 2004, Executive Order 04-02, “Establishing the Washington Biodiversity Council.”

The Washington Biodiversity Council—Diverse stakeholders coming together

The Washington Biodiversity Council is comprised of individuals representing a diverse set of interests concerned with stewardship of our natural resources, including farmers, foresters, tribal members, shellfish growers, environmentalists, business interests, academics, and officials from local government, conservation districts, and state and federal agencies. The recommendations in this document benefit from this diversity of interests—the multiple perspectives, a healthy discussion of differences, and a strong desire from all members to present a bold strategy that can move the state forward to a new era of cooperation and collaboration to sustain and enhance our state’s vital biodiversity resources.

Vision and Goals

Early on in its deliberations, the Council articulated a vision for the future of the state’s biodiversity that has served as the driving force behind the development of the strategy:

In our lifetimes, the native plants and animals, along with their air, water and land habitats, are healthy and in harmony with our working landscapes and residential communities. The vital importance of biodiversity conservation is recognized in principle and practice. Washington citizens see themselves as stewards of our natural resources diversity and accept a responsibility to pass the heritage along to their children and future generations in a healthy condition.

As the Council moved to translate this vision into action, it reached consensus on the objective of making significant progress towards conserving, protecting, and restoring the state’s biodiversity over the next thirty years. Accordingly, this strategy has been created so that Washington State will:

- **Protect quality of life for people**, by making significant progress in ensuring that healthy natural systems sustain and support a high quality of life for humans. Indicators of success related to achieving this goal could include:
 - Increasing access to nature for cultural and spiritual enrichment and recreation.
 - Ensuring Washington has clean air and climate mitigation opportunities by storing carbon emissions in forests, lakes, and other natural resources.
 - Providing clean water and flood control through protection of wetlands and forested watersheds.
 - Improving soil stability and productivity.
 - Sustaining the productivity of our natural resources.
- **Conserve species diversity**, by making significant progress toward conserving and restoring viable populations of native species. Indicators of success related to achieving this goal could include:

- Maintaining populations of plants and animals that are currently healthy.
- Improving the health of populations and species that are currently at risk.
- Maintaining the broad spectrum of native species currently living in the state.
- **Restore and care for ecosystems,** by making significant progress toward restoring and protecting intact, functioning ecosystems. Indicators of success related to achieving this goal could include:
 - Improving the health of natural systems that are currently at risk.
 - Maintaining natural systems that are currently healthy and functioning.
 - Measuring the quality of waters flowing through watersheds around the state.

The Council recognized that Washington State as a whole is making important progress toward achieving this vision and these goals. Washington citizens, businesses, nonprofits, local governments, and state agencies, along with federal agencies, are organizing and taking actions that help conserve and protect our biodiversity resources. Many landowners and commercial operators, from small farmers to large timber companies, provide shining examples of outstanding stewardship, where farming, forestry, and fishing are done in such a manner as to sustain the vitality of both the environment and the economic base. At the local level, many governments have taken action to protect important species, habitats, and landscapes. State and federal agencies including the Washington State Department of Natural Resources, Washington Department of Fish and Wildlife, and the Washington State Department of Ecology are actively pursuing strategies and implementing programs that support conservation of biodiversity.

Yet with many ecosystems and species in decline statewide, much more needs to be done. The recommendations presented in this report are a strategic mix of actions, activities, and programs intended to have an immediate impact and to build capacity for lasting change to support conservation of the state's biodiversity.

Achieving these goals means, for example, that in the coming years we will take the steps necessary to restore Puget Sound to health, that we will protect the vitality of our waterways and riparian habitats so that salmon and bald eagles can thrive, that we will do what we can to ensure that native species and habitats are sustained in the face of unprecedented climate change, and that we will be proactive in preserving unique natural areas of our state, including the native grasslands and remaining shrub steppe habitats of eastern Washington.

Guiding Principles

The following core principles have guided the Council's work since its inception, and together they form the foundation for its strategy and recommendations.

- **Recognize existing efforts and maximize coordination.** The quantity and scope of ongoing efforts to conserve Washington's biodiversity on the part of federal, state, and local governments as well as nonprofits, citizens, and the private sector is truly impressive. This strategy is designed to build on these existing activities, facilitating improved coordination, whenever possible.

- **Expand the focus of conservation to include ecosystems.** While protection of individual species is important and serves as the basis for many of our existing laws and programs, conservation of biodiversity necessitates a broader ecosystem or ecoregional approach. An ecosystem focus offers the greatest potential for enabling at-risk species to survive, for keeping common species abundant, and for ensuring that healthy lands and waters support our quality of life and economic vitality.
- **Build on sound science.** Effective and efficient natural resource policies and programs must necessarily be based on sound science. Our scientific understanding of the complexity of natural systems and the factors needed to sustain life's diversity in the face of trends such as rapid population growth and climate change continues to develop. Nevertheless, science provides the foundation for this strategy, particularly the Conservation Opportunity Framework in Chapter 4.
- **Recognize and encourage active stewardship by private landowners.** More than 60% of Washington's lands are privately owned. Thus, private landowners are on the frontlines of efforts to conserve biodiversity. The Council's strategy recognizes their central role and seeks to foster good stewardship through positive recognition, incentives, and market-based mechanisms rather than increased regulation or mandates.
- **Foster local decision making.** It could be said that all biodiversity is local. While the benefits of biodiversity resources may be regional and even international in scope, control and management of the resource is often in the hands of local decision makers (except for federal and state-owned lands and regulated waterways). Accordingly, this strategy seeks to give local decision makers, both public and private, the capacity, tools, and understanding to make sound decisions about their biodiversity resources and how best to conserve them.
- **Work across political boundaries.** Species, ecosystems, and landscapes do not recognize political boundaries. This strategy seeks to facilitate effective biodiversity conservation through cooperation among local jurisdictions; between Washington, its neighboring states and province, and federal entities; and among private and public landowners.



TARA GALUSKA



TARA GALUSKA



JULIE BENNETT



SARAH GAGE

Why a Biodiversity Conservation Strategy

With resources, time, and funds being invested in biodiversity conservation across agencies and organizations, the need for a comprehensive strategy is essential and widely supported. At the same time, habitat fragmentation and other impacts related to growth mean action is needed now to conserve biodiversity for our benefit and for the benefit of future generations.

As a result, the Biodiversity Conservation Strategy was designed to emphasize voluntary action, establish priorities, build a strong scientific foundation, engage citizens and support local governments.

The strategy consists of a comprehensive set of recommendations in six areas intended to secure Washington's natural heritage for the next 30 years. While the Council recommends phased action on all recommendations, three broad initiatives form the heart of the strategy. Taken together, these three initiatives offer a bold new approach to defining priorities, fostering widespread landowner engagement and measuring our progress

The Strategy proposes:

- **A new landscape approach to guide investments and actions** so that we will indeed conserve our most important biodiversity where we work, play, and live.

As part of its efforts, the Biodiversity Council developed a tool to classify lands and waters by their biodiversity significance and the risks faced by growth and development. Maps were created for different ecological regions of the state that provide the basis for identifying the highest priority lands for conservation and identifying conservation strategies that can be tailored to different landscapes. With technical and financial support from the state, this tool can be used by local governments, state agencies, and others to adopt a landscape approach to conservation, and promote better coordination, efficiencies and outcomes.

- **Better incentives and markets for landowners**, to improve the value proposition for conservation on working lands and open spaces.

Now is the time for organizations with expertise in this arena to join together to offer an expanded, integrated suite of incentives and market based programs to private landowners. These programs should be easily accessible, and make voluntary stewardship and conservation a practical and rewarding option. Simply put, the goal is for landowners to increase their income through conservation actions. These incentive programs must be structured to especially encourage investment in high priority landscapes—so that we save our natural heritage and keep working lands working.

- **Citizens and scientists working together** to inventory and monitor Washington's biodiversity.

This initiative seeks to unleash the potential inherent in a vibrant citizen science network where engaged adults and students under the guidance of scientists are counting and cataloguing biodiversity resources in the streams, forests, and fields near

where they live, work, or go to school. A Science Panel and related Science Center are needed to spearhead this initiative, which offers the promise of building our knowledge and keeping us accountable for improvements at a fraction of the cost of traditional approaches.

Multiple benefits are associated with developing and implementing this strategy:

- **Coordinating responses to overlapping natural resource issues will increase the impact and efficiency of our efforts.** Through implementation of the strategy, biodiversity will become an organizing principle and a common underlying framework to link together the state's many different natural resource agencies and programs. State agencies have already increased cooperation on natural resource issues as a by-product of development of this strategy. In the future, biodiversity can become a common thread which links people, integrates government, and generates effective action on natural resources.
- **Informing the state's efforts to fight and manage the impacts of climate change.** New bio-based energy strategies will need to be implemented in such a way that our biodiversity resources are maintained and even strengthened. Over time, wildlife and plant life corridors will likely be needed to allow for the migration of species vital to our state's natural resource and economic base. And our state's forests and stewardship farms will contribute as carbon offsets for our commercial and industrial activities.
- **Addressing conservation needs proactively to help avoid future ecosystem collapses.** By taking action now, we can seek to avoid massive clean-up and recovery efforts such as that occurring in Puget Sound.
- **Emphasizing incentives and voluntary actions to conserve biodiversity** to build support from a broad base of stakeholders, citizens, businesses, and landowners, and represent an alternative approach to achieving outcomes.
- **Using a system-wide approach to better protect species** of interest at lower cost and with less friction.
- **Supporting related high-priority initiatives** of Washington's citizens and businesses, including the following:
 - The strategy supports and embraces the work of the **Puget Sound Partnership**. Going forward these efforts will be linked in many ways, as the Partnership will essentially be adopting a biodiversity conservation approach to restoring the vitality of Puget Sound.
 - The strategy provides a landscape-based approach to implementation of the state's **Working Lands Initiative**, as well as new tools and incentive programs that can benefit farmers, foresters, and other owners of productive working lands. The Council envisions that the newly established Office of Farmland Preservation will be directly involved in implementing several of the recommendations

- The strategy links directly to the Governor’s **Environmental Education** priority, with learning about the state’s biodiversity resources becoming a cornerstone of that initiative.
- Finally, the strategy is intricately related to the work of the **Invasive Species Council**. It will help establish priorities for action to manage invasive species. Achieving success here will require understanding the ecology of native species and their habitats—a product of the science-related research recommendations.

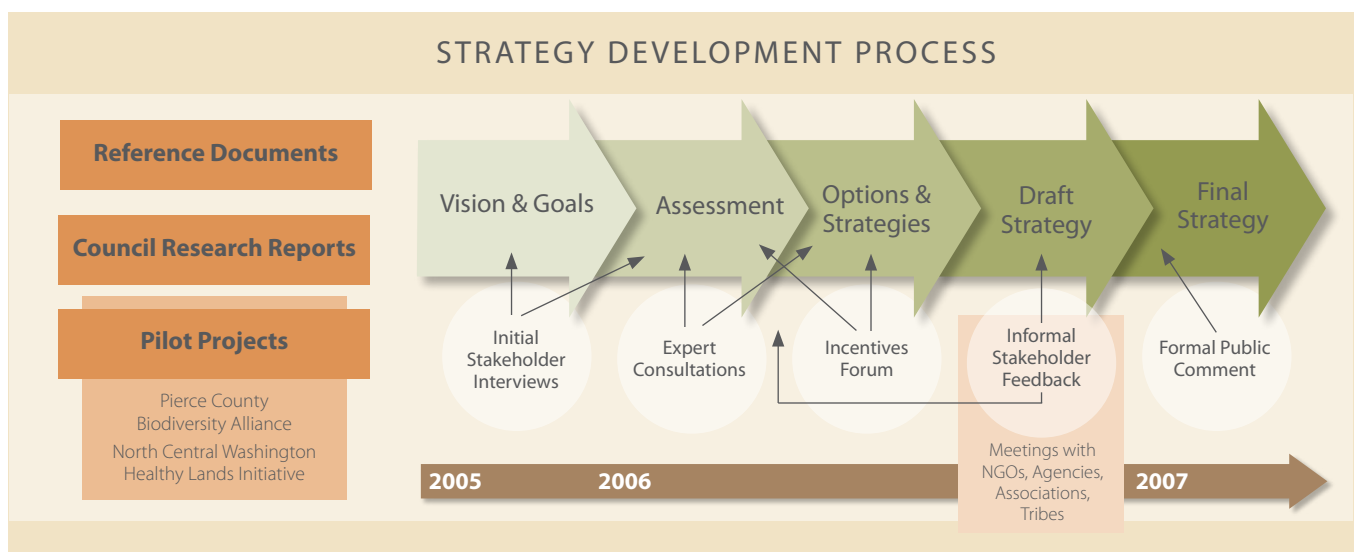
Ultimately, biodiversity is the basis for our prosperity, economic vitality, and quality of life. Protecting biodiversity now ensures we will continue to enjoy its benefits.

Strategy Development: A Collaborative Process

In the course of developing this strategy, the Council conducted background research on critical issues and consulted with groups of experts and stakeholders from a variety of disciplines, including educators, scientists, landowners, business interests, and environmentalists. The Council also funded two pilot projects, which explored education and incentive based approaches to conservation, and met frequently with project participants to discuss findings. The Council itself met many times, and engaged in vigorous discussions as it developed a framework for the strategy and worked through a multitude of issues. Council members participated in workgroups and technical committees involving outside experts.

Research Projects

The Council conducted research on issues that have informed the development of this strategy. Projects included a baseline report on the status of and threats to biodiversity in Washington, an analysis of existing and potential landowner incentives in Washington, and a study on the potential impacts of climate change on biodiversity. These reports are available on the Washington Biodiversity Project website (<http://www.biodiversity.wa.gov/>) and are listed in Chapter 5.



Existing Plans and Strategies

Staff reviewed existing state conservation plans for important background and guidance in developing the Biodiversity Conservation Strategy. These plans included the Washington Natural Heritage Plan, the Comprehensive Wildlife Conservation Strategy, the Puget Sound Action Plan as well as the Washington Biodiversity Conservation Committee's Strategy Report.

Pilot Projects

Pilot projects in Pierce County and in north central Washington explored different approaches to educating and engaging citizens in conservation and to making conservation incentives work for landowners. These projects spanned 18 months and involved a number of partnering organizations. Members of the Council met regularly with pilot project participants and discussed challenges, successes, and opportunities to integrate pilot project findings with emerging recommendations of the strategy.

Reports and background information for each of the pilot projects can be found in Appendix B.

Stakeholder Engagement

The Council and its staff met formally and informally with many stakeholders, sharing early recommendations and listening to issues, concerns, and new ideas. Collectively, these conversations served to identify new directions and highlight priorities for the Council. They have played a critical role in shaping this document. A list is found in the Acknowledgements.

In particular, the Council worked with a number of partners to host the Washington Forum for Conservation Incentives in January 2007. This event drew an over-capacity crowd and featured working sessions on specific issues and opportunities in the area of advancing incentives and markets for private landowners. The results of these working sessions helped to frame a number of the Council's strategies and recommendations. Full proceedings from the Forum can be found on the Washington Biodiversity Project website (<http://www.biodiversity.wa.gov>) and are listed in Chapter 5.

Strategy Organization

Chapter 2 of this Biodiversity Conservation Strategy provides an overview of biodiversity in Washington State—what it is, why it matters, the current status of our biodiversity, and key threats. Chapter 3 consists of recommended strategies and actions to move forward and address key gaps in current approaches to biodiversity conservation. Chapter 4 presents the results of the Council's work to identify conservation opportunities, priorities, and strategies on the land, considering both areas that are potentially at highest risk and areas that contain the most significant biodiversity.



BEN LEGLER



JULIE BENNETT



SHUTTERSTOCK.COM/NATALIA BRATSLAVSKY



JULIE BENNETT

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Biodiversity is the Web of Life

The Washington Biodiversity Council defines biodiversity as:

The full range of life in all its forms. This includes the habitats in which life occurs, the ways that species and habitats interact with each other, and the physical environment and the processes necessary for those interactions.

This definition includes all species found within the state, from tiny soil microbes to towering Douglas-firs. The definition also includes the interactions that sustain each species, such as predator-prey relationships, and the physical processes on which life depends, including chemical and nutrient cycling, water filtration, and climate regulation.

Biological diversity can be considered at four principal levels or scales. Ranging from smallest to largest, these are:

- **Genetic diversity** within and between species—that is, the unique genetic composition of individual members of a species;
- **Species diversity**, or the number and type of different species found in an area;
- **Ecosystem diversity**, or the different types of ecological systems of land, water, and organisms; and
- **Landscape diversity**, also referred to as ecoregional diversity, where ecoregions encompass multiple ecosystems to reflect broad ecological patterns.

The following sections further explain these four levels of biodiversity. Understanding these levels is helpful to understanding the overall concept of biodiversity. These different levels, as well as the interactions among them, highlight the need to conduct conservation activities at multiple scales.

Genetic Diversity

Genetic diversity is the fundamental building block of biodiversity and refers to the unique genetic composition of individual members of a species. The natural variations found in a genetically diverse population or species can help the group fight off new environmental stresses, like disease, and to adapt to changing environments. Species with less genetic diversity may be less capable of adapting to these environmental changes and face greater threats of decline or extinction.

We are only beginning to understand how genetic diversity is distributed within and among species. Scientists have accumulated detailed knowledge on the genetic variability of only a limited number of species, including certain at-risk species such as the steelhead trout and the wildflower, golden paintbrush. These data have helped to guide conservation plans and actions for these particular species.

Species Diversity

Washington is home to a vast number of species ranging from mule deer to sea anemones. A species can be defined as a group of organisms that can interbreed in the wild and produce fertile offspring. The number of different species in a given area is referred to here as species diversity.

In addition to those that spend their entire life cycle within the state, Washington also hosts many species that spend only part of their lives in the state. For example, gray whales and southern resident orcas swim in waters both within and outside of our borders, and migratory birds are here only seasonally. Among the species found in our state, at least 53 species are found nowhere else on earth. Termed “endemic,” these species include the showy stickseed, a flowering plant found only on steep rocky slopes covered with granite scree in Chelan County, and the Van Dyke salamander, found only in the Olympic Mountains, Willapa Hills, and south Cascade Mountains.¹

Number of species found within the state's borders include:	
Birds	341
Mammals	140
Fishes	470
Amphibians	25
Reptiles	21
Invertebrates	estimated at 20,000
Vascular plants	3,300
Mosses, lichens, liverworts, fungi	estimated in the thousands

Ecosystem Diversity

Ecosystems are integrated ecological systems of land, water, and living organisms in contiguous areas, the scale of which may range from a small wetland to Puget Sound.

Washington contains most of the major ecosystem types found in the western United States, including two found nowhere else in the world: the Olympic rainforest and the channeled scablands of the Columbia Plateau.

Various ways to classify ecosystems exist, and these approaches may differ between terrestrial and aquatic systems. For example, scientists estimate that Washington has about 100 terrestrial ecosystems, such as oak woodlands and interior sand dunes, and 60 aquatic ecosystems, such as estuaries and deep marine waters. Ecosystems can be grouped together to classify wildlife habitats, 29 of which have been identified in the state.²

Landscape Diversity

Ecosystems and their components interact with each other to form an even higher level of diversity—the patterns of ecosystems distributed across the landscape. This document uses the concept of ecoregions to reflect these broad ecological patterns.

Terrestrial ecosystems in the state have been grouped by similar flora, fauna, geology, hydrology, and landforms into nine ecoregions. These ecoregions extend past our state borders

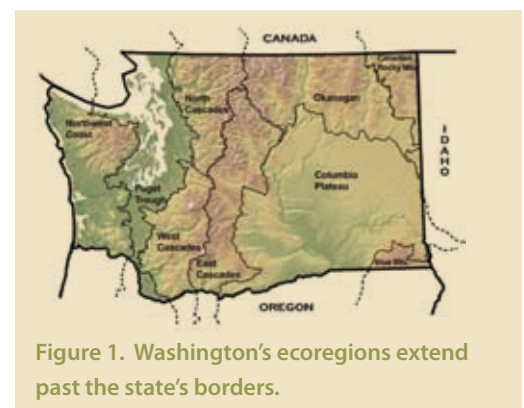


Figure 1. Washington's ecoregions extend past the state's borders.

1 V. D. Hipkins, B. L. Wilson, R. J. Harrod, and C. Aubry, "Isozyme Variation in Showy Stickseed, a Washington Endemic Plant, and Relatives," *Northwest Science* 77, no. 2 (2003): 170-177; Washington Biodiversity Project website, <http://www.dnr.wa.gov/nhp/refdesk/herp/speciesmain.html>

2 D. A. Johnson and T. O'Neil, 2001, *Wildlife-Habitat Relationships in Oregon and Washington* (Corvallis, Ore: Oregon State University Press, 2001), 736, <http://www.natureserve.org/explorer/>.

into British Columbia, Oregon, Idaho, Montana, Utah, and Nevada. Ecoregions are a practical unit on which to base conservation planning because they are large enough to encompass natural processes such as wildfire, entire populations of species, and related habitats.³

Why Biodiversity Matters

Biological diversity has provided humankind with enormous economic, health, and cultural benefits over the ages, and we have only recently begun to understand and quantify these benefits. They include the economic returns from the agriculture, forestry and fishing sectors, which generate roughly \$3.5 billion in income in Washington annually⁴; the 100 million gallons of water supplied to Seattle each day, filtered only by the forests of the Cedar River watershed; and the cultural and spiritual importance of interacting with nature for residents across the state.

Washington's Heritage

Washington's uniquely rich biodiversity heritage laid the foundation for our natural resource economy. Over the millennia, geological, climatic, and biological processes shaped the evolution of Washington's fertile soils, old-growth forests, and marine resources. These highly diverse ecosystems provided both sustenance and spiritual values for Washington's earliest peoples, who

harvested cedar, salmon, berries, camas, deer, and many other plants and animals.

The Pacific Northwest's abundance of natural resources astounded early European arrivals. British explorer George Vancouver wrote of the southern shore of the Strait of Juan de Fuca in 1792, "[T]he whole had the appearance of a continued forest extending as far north as the eye could reach," with "so delightful a prospect of fertility."⁵ In the following century, residents built fishing towns and salmon canneries to catch and process the seemingly endless stream of salmon, while timber mills and logging camps sprang up to harvest the huge evergreen trees.

Today's Economy—Benefiting from sustainable management

The bounty and riches of our biodiversity heritage, so crucial to the state's early success, continue to play a critical role in Washington's economy. In 2006, gross business incomes from forestry and logging approached \$2 billion;

Eelgrass exemplifies the marine richness that supports marine fisheries in Washington. Found in shallow bays, coves, and estuaries, eelgrass beds provide food, shelter, and breeding grounds to important commercial species such as herring, crab, salmon, and many other forms of marine life.



RANDY SHUMAN



JULIE BENNETT



AARON BARNA

3 Map reprinted from Washington State Department of Natural Resources, *State of Washington Natural Heritage Plan* (Olympia, Wash.: DNR, 2003), 64. The delineation of these ecoregions was developed by The Nature Conservancy and many partners on the basis of work done by Robert G. Bailey (U.S. Forest Service), James Omernik (U.S. Environmental Protection Agency), and other scholars.

4 Center for the Study of the Pacific Northwest, "Evergreen State: Exploring the History of Washington's Forests," <http://www.washington.edu/uwired/outreach/cspn/Website/Resources/Curriculum/Curriculum%20Main.html>.

5 Center for the Study of the Pacific Northwest, "Evergreen State: Exploring the History of Washington's Forests," <http://www.washington.edu/uwired/outreach/cspn/Website/Resources/Curriculum/Curriculum%20Main.html>.

agricultural gross incomes totaled approximately \$715 million, while supporting activities for agriculture and forestry totaled another \$536 million; and commercial fishing incomes in Washington totaled \$238 million.⁶ Profitable specialty crops, such as organic produce and wine grapes, benefit directly from biodiversity. Soils rich in microorganisms improve crop productivity, while various bird and invertebrate species help pollinate and control insect pests and weeds. Specialty agriculture industries are the mainstays of many local economies; for example, the tree-fruit industry employs roughly 19,000 Washingtonians, primarily in the Wenatchee and Yakima valleys in central Washington.⁷

While the resource-based industries of forests, farms, and fisheries continue to provide a key source of jobs and economic vitality, the growth of sectors such as nature-based tourism also contribute to the state's prosperity. The growing value of outdoor recreation has enabled small communities to develop tourist economies that depend on experiencing the local biodiversity. Activities such as fishing, hunting, and birding generated roughly \$2.7 billion in 2006 in Washington.⁸ Many of these dollars are spent on local goods and services, such as food, lodging, wildlife-watching festivals, and guide services.

While difficult to measure directly, Washington's biodiversity contributes to our quality of life in ways that draw new businesses, residents, and visitors crucial to our economy. For example, a survey of the 3.3 million visitors to Olympic National Park in 2000 indicated that scenery, wildlife, and natural beauty are among the top draws of the park.⁹ Many Washington residents live close to areas of spectacular biodiversity. Even in Washington's largest urban center, Seattle families can walk along beaches and look at wildlife without leaving the city limits. The degree to which we take advantage of these natural areas indicates that biodiversity is clearly of value to us: since 1987, Washington has ranked at least sixth in the nation in per-capita visits to parks.¹⁰

Ecosystem Services—Essential to our prosperity

"Ecosystem services" is a term used to refer to the benefits that healthy ecosystems produce. These services, including flood control, water purification, and crop pollination, are vital to human health and well-being. For example, agriculture in Washington thrives because of the honeybees, native insects, and birds that pollinate the apples, pears, peaches, berries, and other crops vital to our economy.



THOMAS G. BARNES

From December through February, hundreds of bald eagles visit the upper Skagit River to feast on salmon. Visitors to the Upper Skagit Bald Eagle Festival have increased tenfold since the 1980s, boosting the economies of several small towns.

⁶ Washington State Department of Revenue, <http://dor.wa.gov/content/AboutUs/StatisticsAndReports/Default.aspx>.

⁷ Washington State Horticultural Association and Washington Tree Fruit Research Commission, *Washington's Billion Dollar Secret – The Tree Fruit Producers Who Help Grow our Economy* (2004).

⁸ U.S. Fish and Wildlife Service, *2006 National Survey of Fishing, Hunting, and Wildlife-associated Recreation: State Overview* (2007).

⁹ State of Washington, Office of Financial Management, "Attendance at Federal Parks Located in Washington State," *Washington State Data Book* (2005); Chad Van Ormer, Margaret Littlejohn, and James H. Gramann, *Olympic National Park Visitor Study: Summer 2000*, Visitor Services Project, Report 121 (2001).

¹⁰ Washington State Economic and Revenue Forecast Council, *Washington State Economic Climate Study* (2006).



RALPH NAESS

Benefits of ecosystem services: The diverse forests of the Cedar River watershed serve as an effective filtration system for the 100 million gallons of water supplied each day to roughly 1.4 million people in the greater Seattle area.* By protecting this 91,800-acre watershed, the city has avoided constructing a costly water filtration plant.

* Friends of the Cedar River Watershed, "The Watershed," <http://www.cedarriver.org/watershed/index.shtml>, last accessed July 2007; Seattle Public Utilities, "Water Sources and Treatment," http://www.seattle.gov/util/About_SPU/Water_System/Water_Sources_&_Treatment, last accessed July 2007.

"We should preserve every scrap of biodiversity as priceless while we learn to use it and come to understand what it means to humanity." – E. O. Wilson

We have only begun to quantify the value of these services, but examples include the flood protection benefits that wetlands offer. Flood protection through engineered approaches is expensive, as are flood damages. Between 1990 and 2005, Skagit County lost an estimated \$78 million due to flood damages.¹¹ Healthy wetlands, with a variety of plants and other life, capture water and delay runoff during storms, reducing or preventing flood damage. These flood protection benefits of wetlands have been valued at a range of \$7,800-\$51,000 per acre.¹²

Similarly, Portland, Oregon, maintains the natural filtration of its water supply by spending \$920,000 annually to protect and restore the Bull Run watershed rather than building a \$200-million water filtration plant.¹³

Medicinal Benefits—Diverse ecosystems as nature's pharmacies

Our health also depends on biodiversity. Besides providing us with clean water, diverse ecosystems are the sources for many medicines, a concept some have referred to as "nature's pharmacy." Taxol, a successful cancer treatment, was originally harvested from Pacific yews growing in diverse mixed-conifer forests. Taxol is one example of the roughly 40% of all prescriptions dispensed in the United States that are derived from substances originally found in plants, animals, or microorganisms.¹⁴ Not-yet-investigated organisms among our fungi, lichens, mosses, and invertebrates are expected to yield new cures and treatments. Most of these species have yet to be rigorously examined for potential medicinal use, which underscores the importance of conserving our biodiversity for future study and research.

Intrinsic Value—Helping us find our place

While some biodiversity values can be quantified, they do not replace the intrinsic value of natural, dynamic, biological diversity. The intrinsic value of our natural heritage is important to Washington's people, as well as to all the

11 Skagit County, "Flood Awareness," <http://www.skagitcounty.net/Common/Asp/Default.asp?d=Flood&c=General&p=floodmain.htm>, last accessed July 2007.

12 Asia Pacific Environmental Exchange, *Untold Value: Nature's Services in Washington State* (2004).

13 Asia Pacific Environmental Exchange, *Ecosystem Services Enhanced by Salmon Habitat Conservation in the Green/Duwamish and Central Puget Sound Watershed* (2005).

14 Washington Biodiversity Council, *Washington's Biodiversity: Status and Threats* (2007).

other species residing in Washington. The biodiversity of the Pacific Northwest plays an important role in our collective culture, as expressed by local artists and writers, by our food, and by our traditions of outdoor activities. Northwest writers frequently describe the interactions between people and their

landscape, while the Northwest School of visual artists was influenced by the natural settings of western Washington, particularly the Skagit Valley¹⁵. Pacific Northwest cuisine is based on naturally abundant foods such as salmon, Dungeness crab, wild mushrooms, and berries. People around the state have many important outdoor rituals, from the start of fishing season or harvesting wild camas bulbs, to a Labor Day picnic or annual campout.¹⁶ Many residents feel ethical responsibilities to take care of our lands and waters to ensure a certain quality of the environment for future generations. Nature writers from John Muir to Aldo Leopold have noted the significance of diverse landscapes on the human psyche. As one writer noted, "Biodiversity records how life arrived at itself. Biodiversity plots the path to who we are."¹⁷

"When one tugs at a single thing in nature,
he finds it attached to the rest of the
world." - John Muir

Resilience—Staying healthy in the face of change

A rich and varied biodiversity increases the resilience of communities and ecosystems to environmental change. As our climate changes and our global lifestyles increasingly bring non-native species to our region, Washington's biodiversity helps keep our ecological systems functioning. The relationships among biodiversity, ecological function, and the susceptibility of ecosystems to invasive species are complex and only beginning to be understood.¹⁸

We know, however, that the cumulative loss of species leads to reductions in our ecosystems' abilities to provide valuable resources and eventually to function at all. Forests composed of many tree species, for example, are less susceptible than single-species monocultures to wholesale destruction from insects like mountain pine beetle or pathogens like pine blister rust. Similarly, each species differs in its ability to tolerate, move, or adapt to changes in temperature and rainfall. Accordingly, diverse communities are most likely to contain some species that can survive our changing climate and support continued ecosystem function in an uncertain future.

Biodiversity, like a diversified stock portfolio, keeps our options many and varied. Biodiversity moderates the chances that future changes will lead to the wholesale collapse of systems that we depend on for our basic needs, such as air, food, water, shelter, medicine, and spiritual well-being.

Why Biodiversity Matters Most—A legacy for our children

The scientist and writer E. O. Wilson has made eloquent cases for the protection of biodiversity, arguing that "[T]he one process now going on that will take millions of years to correct is the loss of genetic and species diversity by the destruction of natural habitats. This is the folly our

¹⁵ N. O'Connell, *On Sacred Ground: The Spirit of Place in Pacific Northwest Literature* (2003).

¹⁶ Greg Johnston, "Ancient Grasslands Are a Storehouse of History," *Seattle Post-Intelligencer* (May 18, 2006).

¹⁷ Ed Zahniser, "Memory As Inspiration in Advocating Wilderness and Wildness," Talk at the Wilderness Society (February 15, 2000).

¹⁸ S. Naeem, "Complexity Versus Diversity," in S. A. Levin, ed., *Encyclopedia of Biodiversity*, vol. 1. (San Diego, Calif.: Academic Press, 2001), 831-843; R. Thompson and B. M. Starzomski, "What Does Biodiversity Actually Do? A Review for Managers and Policy Makers," *Biodiversity and Conservation* 16 (2007): 1359-1378.



SHUTTERSTOCK.COM/GLENN R. MCGLOUGHLIN

Biodiversity gives us options in a variable world. Alaska's diversity of salmon species has allowed the total fishery to remain consistently productive despite annual variation in the abundance of any one species.*

* R. Hilborn, T. P. Quinn, D. E. Schindler, and D. E. Rogers, "Biocomplexity and Fisheries Sustainability," *Proceedings of the National Academy of Sciences* 100 (2003): 6564–6568.

descendants are least likely to forgive us.”¹⁹ Protecting Washington's biodiversity will allow future generations to enjoy our current quality of life and economic vitality. Our children and their children can continue to enjoy the shellfish harvests, clean water, flood protection, blueberries, forest trails, and beautiful vistas that we enjoy and depend on today.

What is Happening to Washington's Biodiversity Resources?

Current Status: Diverse and Declining

Washington is one of the most biologically diverse states in the nation, due to its varied topography, exposure to Pacific Ocean currents and weather patterns, and location on the migratory path of many wildlife species. As previously noted, Washington State has a tremendous variety of ecosystems, from estuaries to shrub-steppe landscapes, conifer forests to interior sand dunes, and deep marine waters to alpine meadows.

As the smallest and second-most densely populated of the rapidly growing western states, Washington has experienced a dramatic loss of its native biodiversity over the last 100 years and faces significant threats in the future. The following sections summarize the current status of our species and ecosystems and provide an overview of key threats affecting our biodiversity heritage.²⁰

Species

While a limited number of native species have increased in numbers, many species have experienced significant declines in Washington. In general, those species that can take advantage of disturbances or colonize altered environments have increased, such as the western scrub jay and the American robin. More frequently, changes in the landscape have resulted in significant declines for many of Washington's native species, both aquatic and terrestrial.

Diverse systems like those in Washington have a certain amount of redundancy, such that several species may serve similar functions within an ecosystem. This diversity and redundancy can help ecosystems and species assemblages be more resilient in the face of change. Other species play unique roles, like the predatory seastars that eat fast-growing mussels in our intertidal zones. Loss of even a single critically important “keystone species” can quickly disrupt ecological function.

19 E.O. Wilson. “Resolutions for the 80s” Harvard Magazine January – February 1980, pp. 22-26.

20 More details about Washington's biodiversity may be found in the report *Washington's Biodiversity: Status and Threats*, issued by the Biodiversity Council in January 2007 and available on the web at <http://www.biodiversity.wa.gov/council/docs.html>.

The federal Endangered Species Act (ESA) lists as endangered or threatened species that are of conservation concern nationwide. Currently, 40 animal species (including 15 fish species) and 10 plant species that occur in Washington are listed under the ESA. All are in danger of extinction.

However, the federal list of endangered and threatened species is not a true reflection of the number of species in Washington that warrant conservation attention. Many additional species are of conservation concern in Washington, though not nationwide. The Washington Department of Fish and Wildlife and Washington State Department of Natural Resources' Natural Heritage Program maintain lists that provide a more comprehensive view of the status of Washington's species. These listings include more than 500 species of plants and animals that are of concern in Washington.²¹ Many of these species are located in the Puget Trough and Columbia Plateau, which have had the highest levels of ecosystem conversion in the state.

Despite the long lists of threatened and endangered species, only two plants and two animals native to Washington are currently thought to have become globally extinct since European settlement. Other species are found elsewhere but appear to be extirpated from Washington, including the fisher, the Columbia River tiger beetle, and the yellow-billed cuckoo.²² The fact that populations of these species exist elsewhere provides us with an opportunity for reintroduction and recovery. However, the success of such efforts depends upon the existence of suitable habitat.

Native Washington species that appear to be globally extinct include pale bugseed, thistle milk-vetch, Tacoma pocket gopher, and Cathlamet pocket gopher.*

* Washington Department of Fish and Wildlife, *Status Report for the Mazama Pocket Gopher, Streaked Horned Lark, and Taylor's Checkerspot* (2005).

Ecosystems and Landscapes

Since statehood in 1889, Washington has experienced the loss or moderate-to-severe degradation of many diverse and productive habitats, ecosystems, and landscapes.

- Marine, estuarine, and nearshore ecosystems have been converted, modified, and contaminated.
- Riparian and freshwater aquatic ecosystems have been eliminated or degraded.
- Old-growth forests have been converted and altered.
- Shrub-steppe and grassland ecosystems have been converted.

Many of Washington's ecosystems have undergone significant declines, with certain systems experiencing more pressure and faster rates of decline. To the extent that these ecosystems are in trouble, the species found in each ecosystem are likely also at risk. As more ecosystems are degraded or reduced in their extent, more species will decline to the point of peril. The sections below describe the status of particular ecosystems of concern.

Marine, Estuarine, and Nearshore Ecosystems

Human development has modified up to 52% of the central Puget Sound shoreline. For example,

21 Washington State Department of Natural Resources, *State of Washington Natural Heritage Plan: 2005 Update* (April 2005); Washington Department of Fish and Wildlife, *Washington's Comprehensive Wildlife Conservation Strategy* (September 19, 2005).

22 Washington State Department of Natural Resources, *Washington Natural Heritage Program Information System* (2006).



JULIE BENNETT

The Puget Trough ecoregion was the first in the state to be logged, the first to be turned to agriculture, and the first to become densely settled. Over the years, forest plantations, farms and fields, cities, towns, and suburbs have largely replaced the once-continuous forests of Western hemlock, Western redcedar, and Douglas-fir.

the Puyallup River estuary has lost 99% of its marsh ecosystem and 95% of its intertidal mud flats through conversion to port facilities.²³ Contamination of marine areas has also taken its toll; for example, the Puget Sound basin has multiple Superfund sites.

Riparian and Freshwater Aquatic Ecosystems

More than 1,000 dams affect the flow of Washington's waterways,²⁴ and a natural flood regime has been entirely removed from both the Columbia and Snake rivers. Smaller riparian systems show increased stream temperatures, increased sediment loads, and altered stream flows. In the Columbia Plateau ecoregion, ecosystems dominated by non-native species, little to no shrub or tree cover, and altered stream profiles have replaced many of the natural riparian ecosystems. In total, according to the Washington State Department of Ecology, 60% of Washington's rivers are in poor to only fair health.²⁵

Forested Ecosystems

Over two-thirds of Washington's historical old-growth forests have been harvested.²⁶ Much of the logging has occurred in southwestern Washington and the Puget Trough lowlands. Single-species plantations have replaced many stands of mixed species and varied tree ages. Many forests today have fewer downed logs and standing snags than their historical counterparts; these logs and snags are important components of habitat for wildlife species and for ecosystem processes. Changes to the structure of some forests have made them more vulnerable to fire. For example, open stands of fire-resistant ponderosa pine trees historically characterized low-elevation forests in eastern Washington. Fire suppression and timber management have significantly changed the structure and species composition of these forests, making them more susceptible to fire.

Shrub-steppe and Grassland Ecosystems

Since 1870, 94% of the original Palouse grasslands has been converted to crops, hay, or pasture. Today's shrub-steppe and grassland ecosystems are highly fragmented, with many small, isolated remnants, primarily due to conversion to agriculture. Weed encroachment, and the loss of pollinators for native plants, are slowly reducing the size of these remnant patches of big sagebrush, bluebunch wheatgrass, and associated species.²⁷ Lack of continuous habitat poses challenges for many key species, such as the sage-grouse and the burrowing owl.

²³ Washington State Department of Natural Resources, *Puyallup River Delta Estuary Landscape Restoration Plan* (1999).

²⁴ Governor's Sustainable Washington Advisory Panel, *A New Path Forward: Action Plan for a Sustainable Washington – Achieving Long-term Economic, Social and Environmental Vitality* (2003).

²⁵ Washington State Department of Ecology, "1998 Washington State Water Quality Assessment, Section 305(b) Report," in Washington State Office of Financial Management, *Environmental Chartbook: A Collection of Indicators on Washington's Environment* (1999).

²⁶ Washington State Department of Natural Resources, "Timberland Acres in Washington State," in Washington State Office of Financial Management, *Environmental Chartbook: A Collection of Indicators on Washington's Environment* (1999).

²⁷ Anne E. Black, J. Michael Scott, et al., "Biodiversity and Land-use History of the Palouse Bioregion: Pre-European to Present," in U.S. Geological Survey, *Land Use History of North America* (2003), <http://biology.usgs.gov/luhna/chap10.html>.

Primary Threats and Drivers of Change

The following section discusses the most significant threats contributing to the declines in our biodiversity detailed above. Many of these threats are historically unprecedented. The threats include habitat fragmentation and loss, invasive species, climate change, pollution, and the disruption of natural processes such as water cycles.

Before we can address these threats in a meaningful way, however, we must consider the context in which these threats operate. Economic and demographic trends have a profound effect on our landscape and biodiversity. The following section concludes with an overview of these trends, or drivers of change, to help clarify the causes of decline and identify areas in which we can take action to conserve existing species and ecosystems.

Key Threats to Washington's Biodiversity

Population Growth and Land Conversion—Leading to habitat loss and fragmentation

Population growth is a major driver of the decline of biodiversity in the state. Washington's population has doubled in the past 40 years from 3 to 6 million residents. The population is expected to increase to more than 8 million in the next 20 years, equivalent to the addition of four more Seattle-sized cities spread over the state.

Over 50% of the state's growth is expected to occur in the Puget Trough ecoregion. Meanwhile, areas of high biodiversity in the Okanogan, Columbia Plateau, and Northwest Coast ecoregions will face the most rapid growth as a percentage of current population. While Seattle and other urban centers will gain the most new residents, many new parcels are being developed in rural areas outside the urban core, reducing native habitat for biodiversity.²⁸ Population growth in rural

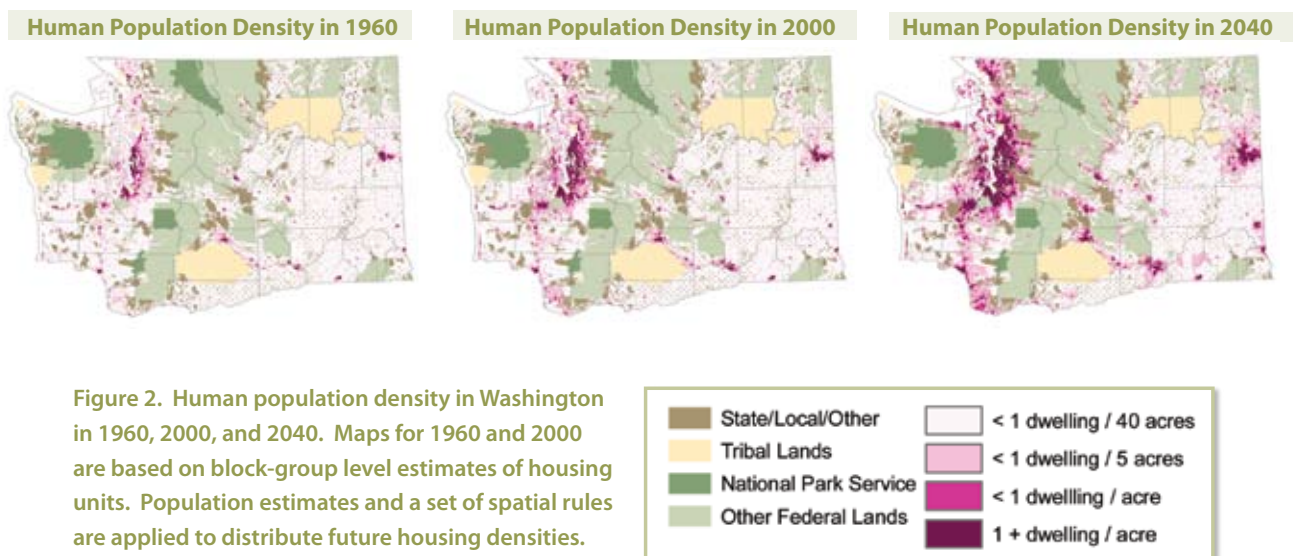


Figure 2. Human population density in Washington in 1960, 2000, and 2040. Maps for 1960 and 2000 are based on block-group level estimates of housing units. Population estimates and a set of spatial rules are applied to distribute future housing densities. More details are available at <http://www.centerwest.org/publications/pdf/futures.pdf>.

Source is W.R. Travis, D.M. Theobald, G.W. Mixon, T.W. Dickinson, Western Futures: A Look into the Patterns of Land Use and Future Development in the American West (2005).

²⁸ Doug Peters, Washington State Department of Community, Trade, and Economic Development, personal communication, May 5, 2006.

areas usually occurs in high-quality habitat, often converting agricultural and forest lands, and in a sprawling pattern which consumes 21% more undeveloped land than compact development (see Figure 2).²⁹

While the modification of native ecosystems to agricultural fields and managed timber lots has diminished biodiversity, working lands still offer a range of habitats for many species. Historically, intensive large-scale agriculture contributed fertilizers and pesticides to water bodies. Logging roads accelerated erosion and invasion of non-native species, while fire suppression altered forest structure and composition. Today, many farming and timber management practices protect biodiversity, whether through arrangements with land trusts, practices under the 1999 Forests and Fish Law and other Forest Practices rules, or enrollment in the Sustainable Forestry Initiative or Forest Stewardship Council certification. If current rates of land conversion continue, however, the good stewardship practiced by working landowners will ultimately have a limited impact in conserving Washington's biodiversity.

Climate Change

Climate change, fueled in part by land conversion and population growth around the globe, is emerging as a major threat to Washington's biodiversity. Washington is expected to have warmer weather and altered precipitation patterns, wetter in winter and drier in summer. This change will alter ecological relationships, affecting both larger natural systems and many individual species.

For example, reduced snow pack in warmer winters will affect stream-flow patterns, in turn affecting many freshwater systems. Higher temperatures and less summer precipitation will result in drier timber and grasslands, which will likely mean more frequent, intense, and extensive wildfires. Rising sea levels may inundate low-lying coastal areas and degrade nearshore habitats through coastal erosion, landslides, saltwater intrusion, and river-mouth flooding. Invasive species may be more successful in altered habitats; for example salmon are expected to face more competition from non-native, warm-water species.

A major concern for conservation efforts is how climate change will affect the ranges of species. Plant and animal species will tend to move, typically northward and upward, as temperatures increase and other conditions change. The most dramatic impact may be seen at the edges of a species' range, where its survival is already tenuous. Land conversion and habitat fragmentation may accelerate the loss of species at these margins. Species that are particularly sensitive to microclimates are expected to face the most severe habitat loss. For example, many amphibians may not be able to live in aquatic habitats with altered temperatures and nutrient concentrations. Thus, conservation efforts must consider not only current conditions but also predictions of future climate changes.³⁰

29 R. W. Burchell and S. Mukherji, "Conventional Development Versus Managed Growth: The Costs of Sprawl," *American Journal of Public Health* 91, no. 9 (2003): 1534-1540.

30 J. J. Lawler and M. Mathias, *Report on Climate Change and the Future of Biodiversity in Washington*, prepared for the Washington Biodiversity Council (2007).

Invasive Species

The rapid spread of invasive species across Washington currently poses a threat to an estimated 25% of the state's plant species. Non-native species are identified as a principal risk to the natural heritage in seven of Washington's nine ecoregions.³¹ Invasive species may not only out-compete native species for resources but also may prey on them and alter their habitats. Invasive species can alter key properties of an ecosystem (e.g., Eurasian water milfoil resulting in lower dissolved oxygen), change the physical structure of an area (e.g., *Spartina* converting open mud flats to grass meadows), or alter disturbance patterns (e.g., cheatgrass increasing fire frequency). Both the impacts on native species and the control of invasive species can be costly. Annual economic damage and control costs for all non-native species in the United States is estimated at \$122 billion per year.³²

Pollution

Pollution sources are many and varied, ranging from effluent and emissions from manufacturing facilities, to stormwater runoff from roads, buildings, lawns, and parking lots. For example, fertilizers and pesticides applied to lawns, golf courses, fields, and forests have found their way into streams, lakes, and Puget Sound. These sources and others contribute to the high levels of toxic chemicals that have been measured in shellfish, fish, birds, and marine mammals in Puget Sound.³³

Disruption of Natural Processes

Natural disturbances, such as fire, flooding, windstorms, and outbreaks of disease, play an important role in the patterns of abundance, distribution, and species composition of ecosystems. Human disruption of natural disturbance processes, such as fires and floods, has had far-reaching impacts on species and ecosystems in Washington. Population growth means increases in water demands, which in turn may lead to the construction of more water storage projects. Dams deprive downstream systems of such natural processes as flooding, scouring, and deposition of sediment and nutrients. An increasing number of houses in fire-prone areas on the urban fringe has yielded a more urgent need for fire suppression, which disrupts natural fire cycles.



WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

The invasive species *Spartina alterniflora* (cord grass) covered 10-15 acres in Washington in the early 1970s, growing to roughly 8,500 acres in 2003.* *Spartina* can displace native plants such as sea grasses which provide refuge and food for fish, crabs, waterfowl and other marine life.**

* Washington Invasive Species Council, *Biodiversity and Invasive Species in Washington State* (2007).

** Western Aquatic Plant Management Society, "*Spartina alterniflora* – Smooth Cordgrass," <http://www.wapms.org/plants/spartina.html>, last accessed August 2007.



SHUTTERSTOCK.COM/AARON WHITNEY

Orcas in Puget Sound's southern resident population, federally listed as endangered in 2005, have extremely high levels of polychlorinated biphenyls (PCBs) and fire retardants in their bodies. These toxic pollutants disrupt the orcas' endocrine systems and impair their reproduction and immune systems.‡

‡ Ken Olsen, "Orcas on the Edge," *National Wildlife* 44, no. 6 (2006).

31 Washington Invasive Species Council, *Biodiversity and Invasive Species in Washington State* (2007).

32 Washington Invasive Species Council, *Biodiversity and Invasive Species in Washington State* (2007).

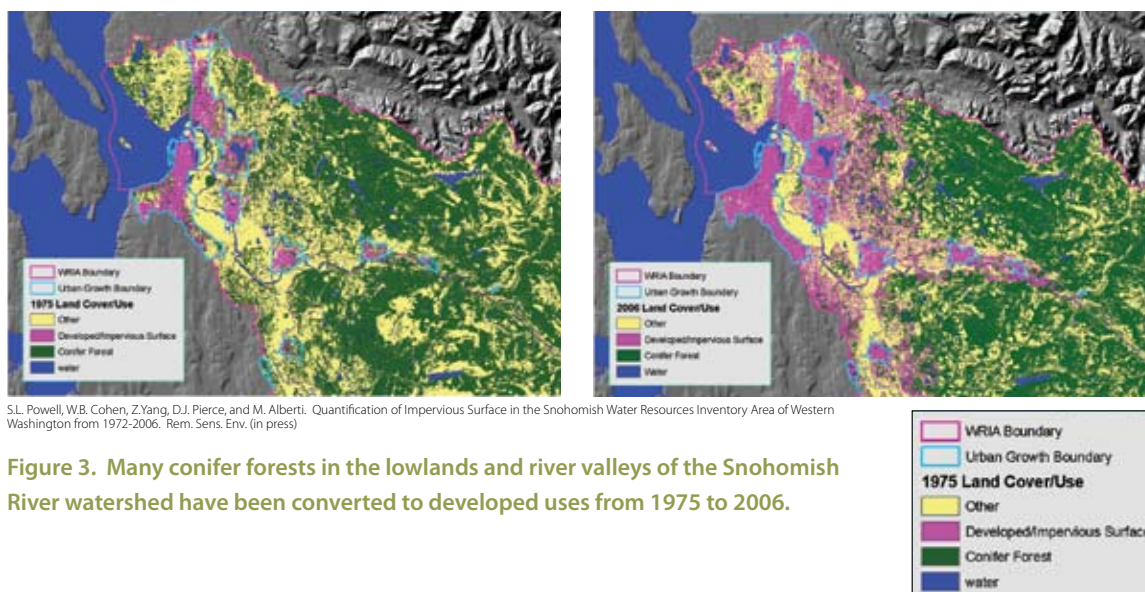
33 Washington State Department of Ecology, *Washington's Environmental Health 2004*, Publication No. 04-01-011 (2004).

Economic and Demographic Trends

Shifts in the nature of our economy, away from manufacturing and resource-based industries and toward knowledge- and service-based industries, will continue to affect both the threats to biodiversity as well as our ability to respond.³⁴

Shifts in the Economic Base

A primary shift is the decline of the resource-based economy, which puts pressures on farmers and foresters to convert their land to residential and commercial purposes. While scholars are still working to determine rates of conversion of forested lands and farms to more developed uses, conservative estimates are that 80 acres of forests in Washington are converted to other uses each day.³⁵ Many of these parcels are in areas of rich biodiversity, often near streams with high biological values.³⁶



As the resource-based economy declines, more than half of all the job growth in Washington will come from service-based industries over the next 25 years.³⁷ Most working farms and forests provide better habitat than the paved development that typically accompanies a service economy, and service jobs are growing in both urban centers and rural areas.

Prosperity and Consumption

Our increasingly consumptive lifestyles, facilitated by increasing wealth in the state, have brought benefits and increased living standards for many Washingtonians. This growth in consumption, however, puts pressure on our natural resources. The associated increases in housing development, commercial properties, energy and material use, roads, and waste can adversely affect natural habitats and biodiversity.

34 Washington State Economic and Revenue Forecast Council, *Washington State Economic Climate Study* (2005).

35 Ara Erickson, University of Washington, College of Forest Resources, personal communication, October 8, 2007.

36 Kirk Hanson, Washington State Department of Natural Resources, personal communication, May 17, 2006.

37 Office of Financial Management, State of Washington, *The 2005 Long-term Economic and Labor Force Forecast for Washington* (2005).

Demographic Shifts

Major demographic shifts accompany these economic shifts in Washington. These changing demographics affect the location of people on the landscape as well as the connections between people and the land. Several trends are worth noting, such as the prediction that 54% of Washington's population growth by 2025 will come from net migration³⁸. Rural counties, particularly in the Northwest Coast ecoregion, will see the fastest rates of growth from newcomers. Washingtonians aged 65 or older are expected to compose 19% of all residents by 2030, up from 11% today.³⁹ Some of these projected 1.7 million individuals are expected to accelerate demand for vacation or retirement homes. Others, including the more than 60% of current forest landowners older than 55, are expected to sell their working lands for development purposes at an increased rate.⁴⁰

Surging Real Estate Values

Real estate markets in many parts of Washington with rich biodiversity heritage can provide disincentives both to conserving land and to working the land. In many areas along suburban boundaries, land values for development uses are significantly higher than values for forestry uses. Washington also experiences real-estate pressures along its state borders. Tax policies in Canada encourage development in the Okanogan region, while job availability in Portland, Oregon, drives development in Clark County.

Expanding Tourism

The growing importance and value of tourism to Washington's economy, if well-managed, can be a great benefit to biodiversity. For example, wildlife-associated recreation (e.g., birding and hunting) was estimated to generate \$2.7 billion in spending in Washington in 2000. Another estimate put the total value of all outdoor recreation in the state at \$4.1 billion.⁴¹ Nature-based tourism dollars can form an economic alternative to resource extraction and development, and these resources may be applied to protect natural systems. It is important to note, however, that the infrastructure for recreational pursuits and the impacts of people in relatively wild areas can also negatively affect habitats.

A Global Economy

Washington depends on international trade more than any other state, with exports of foreign goods averaging 17% of personal income in the state in 2000-2004.⁴²



STOCK

The size of new single-family homes in the U.S. has more than doubled since the 1940s, from 1,100 to 2,340 square feet.*

* A. Wilson and J. Boehland, "Small Is Beautiful: U.S. House Size, Resource Use, and the Environment," *Journal of Industrial Economy* 9, nos. 1-2 (2005): 277-287.



JOAN FISH

38 Office of Financial Management, State of Washington, *Washington State County Growth Management Population Projections: 2000-2025* (2002).

39 Office of Financial Management, State of Washington, *Forecast of the State Population by Age and Sex: 1990 to 2030* (2005).

40 C. Mater, "The New Generation of Private Forest Landowners: Brace for Change," *The Pinchot Letter* 10, no. 2 (2005): 1-4.

41 Washington State Parks and Recreation Commission, *Washington State: Economic Impact of Visitors in National Parks* (2002).

42 Washington State Economic and Revenue Forecasting Council, *Washington State Economic Climate Study* (2005).

In this global economy, Washington's farmers and foresters must compete on a worldwide basis. To compete successfully, many farmers are compelled to use every acre possible to increase their efficiency, thereby increasing pressure on biodiversity. Increased out-of-state or foreign ownership of Washington's lands is another influence of globalization that can adversely affect biodiversity. International trade agreements and systems, such as the General Agreement on Tariffs and Trade and the World Trade Organization, also can limit the ability of state and federal governments to provide support for conservation activities.

Current Efforts to Protect and Conserve Our Biodiversity

In the face of these threats, state, federal, tribal, and local governments as well as nonprofits and private landowners are investing substantial time, energy, and resources to protect and conserve components of biodiversity across Washington State. The Council carefully examined these existing efforts to identify strengths, gaps, and opportunities to move forward. These ongoing activities provide the foundation for this Biodiversity Conservation Strategy. The strategy is intended to enhance these existing efforts by integrating them into a comprehensive, statewide approach to long-term biodiversity conservation.

It is beyond the scope of this report to describe the many ongoing activities related to biodiversity conservation in Washington State. Highlights are presented below. The specific recommendations in Chapter 3 also identify many of the listed public agencies and other organizations as potential partners for implementation of the strategy. While these named entities provide a starting list, many additional parties will also play important roles in implementation.

State Government—Multiple agencies managing natural resources and influencing landscapes throughout Washington

Washington State government is actively engaged in managing and conserving biodiversity as a landowner, regulator, technical assistance provider, and educator. Nearly a dozen state agencies are involved in direct and indirect conservation activities, such as stewardship, restoration, acquisition, assistance, enforcement, and education, as summarized below.

- The **Washington Department of Fish and Wildlife** owns or controls approximately 1 million acres of critical habitats and is charged with preserving, protecting, and perpetuating fish and wildlife. The statewide *Comprehensive Wildlife Conservation Strategy*, approved by the U.S. Fish and Wildlife Service in 2005, guides WDFW's management of these lands and wildlife resources.
- The **Washington State Department of Natural Resources** manages over 5 million acres of state trust lands, including forests and aquatic systems, for all generations and all people of Washington. Key programs include the Natural Heritage Program, the Aquatic Lands Enhancement Account, and resources for small forest landowners. The Department of Natural Resources also administers the Forest Practices Act, which regulates forest practices, including timber harvest, on private lands. DNR's mandate that trust lands be managed "forever" to benefit future generations provides an important basis for departmental policies, programs, and actions to conserve biodiversity.



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- The **Washington State Recreation and Conservation Office** (formerly the Interagency Committee for Outdoor Recreation) administers several key programs designed to acquire and protect critical habitat and open space, protect working lands, and provide opportunities for recreation. In addition to the Recreational and Conservation Funding Board, the Forum on Monitoring Salmon Recovery and Watershed Health, the Biodiversity Council, and the Invasive Species Council, the agency supports the following efforts:
 - The **Washington Wildlife and Recreation Program**, which has received \$550 million since 1990 from the Washington State Legislature for the purchase of land and shorelines for open space, parks, habitat protection, and recreation.
 - The **Salmon Recovery Funding Board**, which provides grant funds to protect and restore salmon habitat.
- The **Washington State Department of Ecology** regulates air and water pollution, manages and enforces water rights and water use, regulates solid waste, and supports local Watershed Planning Units. Department of Ecology is actively engaged in conserving biodiversity through its regulatory role, and the agency recently initiated projects to improve the effectiveness and efficiency of mitigation programs such as wetland banking.
- The **Washington State Conservation Commission** guides and assists the 47 conservation districts across the state, with nearly 500 employees and volunteers assisting private landowners in voluntary conservation. These activities provide a core building block for any future expansion of biodiversity-related incentive programs.
- The **Washington State Parks and Recreation Commission** helps citizens experience and enjoy the outdoors, and the commission has recently undertaken new initiatives to promote stewardship and educate park visitors about biodiversity.

- The **Puget Sound Partnership**, established in 2007, is charged with leading efforts to protect and restore Puget Sound by 2020.
- The **Washington State Department of Community, Trade, and Economic Development** implements the state's Growth Management Act, which provides for protection of rural lands and habitat by concentrating and regulating growth.
- The **Washington State Department of Transportation** is responsible for building and maintaining the state's transportation infrastructure, and thus has a critical role in providing for habitat protection and biodiversity conservation while expanding and rebuilding the state's roads, bridges, ferries, and other public transportation rights-of-way.
- Finally, the **Washington Office of the Superintendent for Public Instruction** is involved with developing new curriculum standards and programs that address environmental education and sustainability, both of which relate directly to biodiversity conservation.

Federal Government—Managing biodiversity on federal lands; regulating and funding species protection, pollution, and conservation on waterways and private lands

The federal government plays a critical role in managing natural resources and protecting biodiversity as both a landowner and regulator. The federal government has many land management responsibilities, including:

- **National Parks**, including Olympic National Park, Mt. Rainier National Park, and North Cascades National Park, which allow visitors to experience protected, intact ecosystems.
- **Wilderness Areas**, such as the Pasayten or Goat Rocks Wilderness, defined as “an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.”⁴³ In Washington State, the U.S. Forest Service, National Park Service, Bureau of Land Management, and U.S. Fish and Wildlife Service manage the state's 30 wilderness areas.
- **Forest Service** lands outside of designated wilderness, which are operated under a multiple-use policy that includes the protection of fish, wildlife, and habitats as well as recreation and commercial uses.
- Other roadless areas managed by the **Bureau of Land Management**.

As a regulator, the federal government is involved in enforcement of several laws that directly affect biodiversity, including:

- The **Endangered Species Act**, which provides for the identification and protection of endangered and threatened species, including the development of Habitat Conservation Plans.
- The **Federal Water Pollution Control Act (Clean Water Act)**, which regulates water pollution, including wetlands protection, and is administered jointly with the Washington State Department of Ecology.

⁴³ 16 U.S. Code, section 1131(c).

The federal government also serves as a source of funds for conservation practices, for example through U.S. Department of Agriculture's Nature Resources Conservation Service programs such as the Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), Grassland Reserve Program (GRP), Wetlands Reserve Program (WRP), and Wildlife Habitat Incentives Program (WHIP).

Local Governments—Responsible for zoning, growth management, shorelines protection, water use, and stormwater management

With responsibility for creating and enforcing local land use policies and zoning, local governments are on the front lines of efforts to conserve biodiversity. Local government decisions directly influence biodiversity every day. Key activities include:

- Responsibility for administering and enforcing many state laws with relevance to biodiversity, including the Growth Management Act, the Shoreline Management Act, and taxation policies such as current use taxation and the Public Benefit Rating System.
- Participation in Watershed Planning Units, which are developing approaches to managing the water quality, flows, and habitats of their local streams.
- Development of innovative strategies to address biodiversity conservation needs, such as the King County Biodiversity Plan, Spokane County's Rural Conservation category in its 2002 Comprehensive Plan update, and Pierce County's Biodiversity Management Areas.

Private and Nonprofit Organizations—Providing leadership and infrastructure to implement conservation programs on the ground

Private and nonprofit entities, as well as local stakeholder groups, play key roles in developing and implementing policies and programs to conserve biodiversity. Over the last two decades, land trusts, trade associations, and other groups have been critically active in stewardship, acquisition, restoration, and education about conservation and biodiversity in Washington State. Key private and nongovernmental entities include:

- Land trusts, ranging in scale and activity from the local Blue Mountain Land Trust and the North Olympic Land Trust, to the Cascade Land Conservancy and the national Trust for Public Lands.
- Nonprofit conservation organizations, including the American Farmland Trust, The Nature Conservancy, Trout Unlimited, the National Wildlife Federation, and Farming and the Environment.
- Associations of private landowners, including the Washington Forest Protection Association and the Washington Farm Forestry Association.
- Local sub-basin planning groups, which conduct salmon recovery and wildlife planning with funding from the Northwest Power and Conservation Council and the Bonneville Power Administration.
- Environmental education organizations, including the Pacific Environmental Institute and E3 Washington.

Tribes—Managing reservation lands and waters, collaborating in land use and resource management decisions in areas adjacent to reservations

The 29 federally recognized tribes in Washington State have a special connection to the landscape and its biodiversity. Although each is an independent sovereignty, the tribes hold many principles in common. Tribal cultures celebrate the full richness of life and the ways it supports tribal families economically and spiritually. This relationship to the ecosystem and stewardship considers the needs of the generations to come:

- Tribes are active managers of fish, wildlife, and plants that are important to their cultures. These efforts include all aspects of salmon management from habitat issues, hatchery management, and domestic and international harvest forums.
- Tribes are leading the salmon recovery efforts in many watersheds, while working closely with other resource managers and landowners toward common goals. Many recovery actions fall under the aegis of the Endangered Species Act, while tribal efforts typically focus more broadly on ecosystem health rather than specific species.
- Tribes actively participate with local governments on land use activities that may affect trust resources and treaty rights. Many tribes have partnered with local jurisdictions on revision of Critical Area Ordinances and Shoreline Master Program updates as well as Urban Growth Areas and domestic water issues.



AARON BARNA

Summary—Washington’s Biodiversity Is in Our Hands

Washington State’s diversity of species, ecosystems, and landscapes represents a vast and precious resource. Yet many of these species are at risk, and ecosystems vital to their survival have been degraded. The threats to biodiversity are many, but today we are well-equipped to refocus and expand our efforts to conserve biodiversity.

Landowners across the state are actively managing their land in ways that foster healthy ecosystems and species, while other Washington residents take part in restoration activities. Conservation districts and land trusts use incentive programs and acquisition programs to conserve lands and waters. Scientists at universities, state and local agencies, and nonprofits are conducting research into land management methods and are improving our understanding of biodiversity. At the same time, teachers and other educators around the state are raising the environmental awareness of Washingtonians, from kindergarteners to retirees.

In light of the many important activities currently underway, the work of the Washington Biodiversity Council represents a significant commitment by the Legislature and the Governor. This strategy establishes a framework for state policy on biodiversity conservation in Washington. The future of Washington’s biodiversity depends on enhancing current efforts as well as strengthening cooperation and coordination among all active players; Chapter 3 presents recommendations designed to bolster these efforts and foster such cooperation.



USDA/NRCS



KITTITAS COUNTY CONSERVATION DISTRICT



PETER DUNWIDDIE

Recommendations for Action

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What Needs to Be Done

This strategy builds on existing efforts and targets areas of greatest need and potential in order to achieve outcomes. It is premised on the belief that public, private, and non-profit entities need to work together to achieve a widely shared vision, and on the assessment that:

- New approaches are needed to engage the private sector in voluntary action to conserve biodiversity, and provide more economic returns for good stewardship.
- Existing efforts must be “knit together” to achieve greater outcomes more efficiently and effectively.
- More integrated approaches to research and data management are needed as well as better information to guide efforts on the ground.
- The organizing principle of biodiversity conservation and a landscape approach to managing resources is the best way to move forward.
- Opportunities to engage citizens and students in learning about and stewarding our biodiversity need to be dramatically increased.

Through this assessment, the Council identified six areas where Washington State has the opportunity to make significant progress to conserve biodiversity, and where stakeholder support to move forward is high. The Council focused on developing solutions in these areas:

1. **Developing a new tool—the Conservation Opportunity Framework and a set of regional maps to guide conservation investments.** This framework provides the basis for identifying areas of high biodiversity significance and risk as well as strategies to conserve those resources at the regional level. This approach is an excellent way to improve the return on investment of scarce resources and to target future conservation efforts.
2. Developing **incentives and market mechanisms** to encourage voluntary actions that conserve biodiversity on private lands. With over 60% of the state’s lands in private ownership, landowners have a crucial role to play in biodiversity conservation. Making conservation affordable and attractive to landowners is thus a central focus of this strategy.
3. Incorporating biodiversity conservation into **land use plans and development practices**, particularly in areas with high biodiversity value. Local governments regularly make land use and development decisions that have significant impacts to biodiversity. Many opportunities exist to pursue “biodiversity-friendly” development and land use practices. Local governments throughout the state need technical assistance and funding to implement these practices in their jurisdictions.
4. Strengthening the available **science and information** on biodiversity, so it is readily accessible for policymaking. Local decision makers and planners, as well as state and federal agency staff, need comprehensive, up-to-date, and action-oriented data to improve their conservation decisions and approaches.
5. **Educating and engaging the public** to provide Washington residents with information about the value of biodiversity and the steps they can take to help conserve it. The need

for enhanced biodiversity education is great. Improving citizens' understanding of the value of biodiversity will yield long-term returns of public support for conservation investments, programs, and active citizen stewardship.

6. **Achieving results** by improving governance through better integration and coordination among state and local governments, providing funding, and monitoring progress to ensure accountability.

In addition, the Council developed recommendations addressing **acquisition and management of public lands**, two areas where Washington is doing a relatively good job of conservation, but where future efforts could be linked more strongly to this Biodiversity Conservation Strategy. These recommendations are incorporated into the six sections identified above.

Finally, the Council addressed the issue of **laws and regulations**, starting with a review of its initial charge from the Legislature and Governor as set forth in legislation and the executive order. This charge was to advance biodiversity conservation through a voluntary and incentive-based strategy. As the Council engaged in its strategy work, it determined that the current public policy environment in Washington State is particularly ripe for innovation in the use of incentives and markets as tools to accomplish conservation goals. In the last three decades, the public policy discussion surrounding conservation goals has included the development of a number of significant regulatory tools. The result is a regulatory baseline that is vital to Washington's quality of life. In light of these considerations, the Council decided that the focus of the next 30 years should be on the development of new, non-regulatory tools for achieving Washington's biodiversity conservation goals.

The Council and this strategy also recognize that improving the effectiveness of the existing regulatory baseline is important. None of Washington's existing regulatory programs is directed specifically at biodiversity conservation, though many in fact contribute to this goal, especially when considered cumulatively. At the same time, some regulatory programs create disincentives to biodiversity conservation or result in unintended consequences that impede the particular program's intended conservation goal. Thus, within this broader context, the Council recommends an evaluation of existing regulatory programs (see Strategy 2.4).

This chapter presents the action recommendations that comprise the 30-year strategy for biodiversity conservation. These recommendations are intended to capitalize on opportunities as well as to address gaps and thus move the state toward achieving the vision of sustaining our natural heritage for future generations. Chapter 4 then presents more information on the Council's Conservation Opportunity Framework, including its methodology, which is intended to be used to identify and act on conservation opportunities on the landscape.



USDA/NRCS



ELLEN BANNER



SHUTTERSTOCK.COM/MICHAEL J. THOMPSON

1. Guiding Investments on the Ground: Using the Conservation Opportunity Framework

Introduction

Resources for biodiversity conservation are finite, so focusing investments in areas that will yield the greatest benefits toward biodiversity conservation goals, based on sound science and a long-term landscape perspective, is desirable. Emphasizing that all citizens can contribute to biodiversity conservation, the Council has invested in the development of a comprehensive set of maps, which assess the distribution of species, plant communities, ecological systems, and human population trends across Washington, to identify regional opportunities for biodiversity conservation.

Current Practices

Several state and federal agencies are responsible for managing Washington's lands and waters, conducting studies, and protecting individual species or resources. For example, the Washington State Department of Natural Resources manages over 5 million acres of state trust lands, including forests and aquatic systems, and the Washington Department of Fish and Wildlife manages approximately 1 million acres for fish and wildlife. The Washington State Parks and Recreation Commission helps citizens to experience and enjoy the outdoors, and the Washington Conservation Commission guides conservation districts in assisting private landowners in voluntary conservation. Each of these entities manages its lands according to specific mandates and directives from the Governor, commissioners, and the Washington State Legislature.

Many cities and counties also identify and protect important natural areas. These efforts tend to be localized but are connected in important ways to the landscape or ecoregional context of biodiversity. In addition, tribes, land trusts, local stewardship efforts, watershed planning groups, individuals, and countless others make stewardship decisions and undertake conservation actions every day on private lands.

Gaps and Opportunities

Washington needs better ways to set priorities and implement strategies based on a comprehensive understanding of regional biodiversity values and threats.

Natural resources are often managed in a fragmented manner. While many agencies and individuals are hard at work stewarding Washington's lands and waters, their efforts are not always coordinated.

Resources for conservation are limited. Stewardship, restoration, protection, and other conservation approaches each require time and money. A geographical approach can help to direct where each type of activity can be implemented most effectively.

The need for a landscape-based approach to conserving biodiversity is critical. Many state and local officials, private landowners, and nonprofit entities have expressed a desire for a common understanding of the highest priority areas for conservation. Support for this approach comes from incentive providers, granting organizations, planners, nongovernmental organizations, state and federal agencies, and tribes. This approach has the potential to enhance synergy, efficiency, and effectiveness among different planning levels.

Recommendations

Objective: State agencies and local governments, along with their nonprofit and federal government partners, will use the Conservation Opportunity Framework as a basis for identifying opportunities, establishing priorities, and implementing strategies for biodiversity conservation throughout Washington State.

The Council developed the Conservation Opportunity Framework as part of this comprehensive planning effort. The framework is designed to provide guidance to land managers, landowners, policymakers, and other decision makers about what conservation actions to take depending upon the level of biodiversity significance and the severity of the threats posed to that biodiversity. A brief summary of the framework follows here; for a full description please refer to Chapter 4.

The Council believes that all landowners, citizens, and institutions in this state have a vital role to play in protecting and conserving Washington's landscape and our biodiversity, regardless of where we live, work, and play. The Council's vision is that this Conservation Opportunity Framework will be revised and improved over time to become an essential tool, along with others, to support conservation planning and management at the regional level.

The Conservation Opportunity Framework

Approaches to assessing relative biodiversity value vary across Washington State. Thus, the Council developed a systematic approach to determine spatially explicit priorities at the regional level, based on existing biodiversity and population trends.

Biodiversity significance and degree of future threats were assessed and mapped in seven of the nine ecoregions found in Washington. Ecoregions were used as the basis for the Council's approach, since they are large enough to encompass landscape-level processes and have shared characteristics of climate, vegetation, geology, and other environmental patterns.

Biodiversity significance ratings are based on ecoregional assessments, a scientific analysis of biodiversity value across the landscape, which incorporates concepts of richness, rarity, and representation (For a full description of these criteria, see Chapter 4).

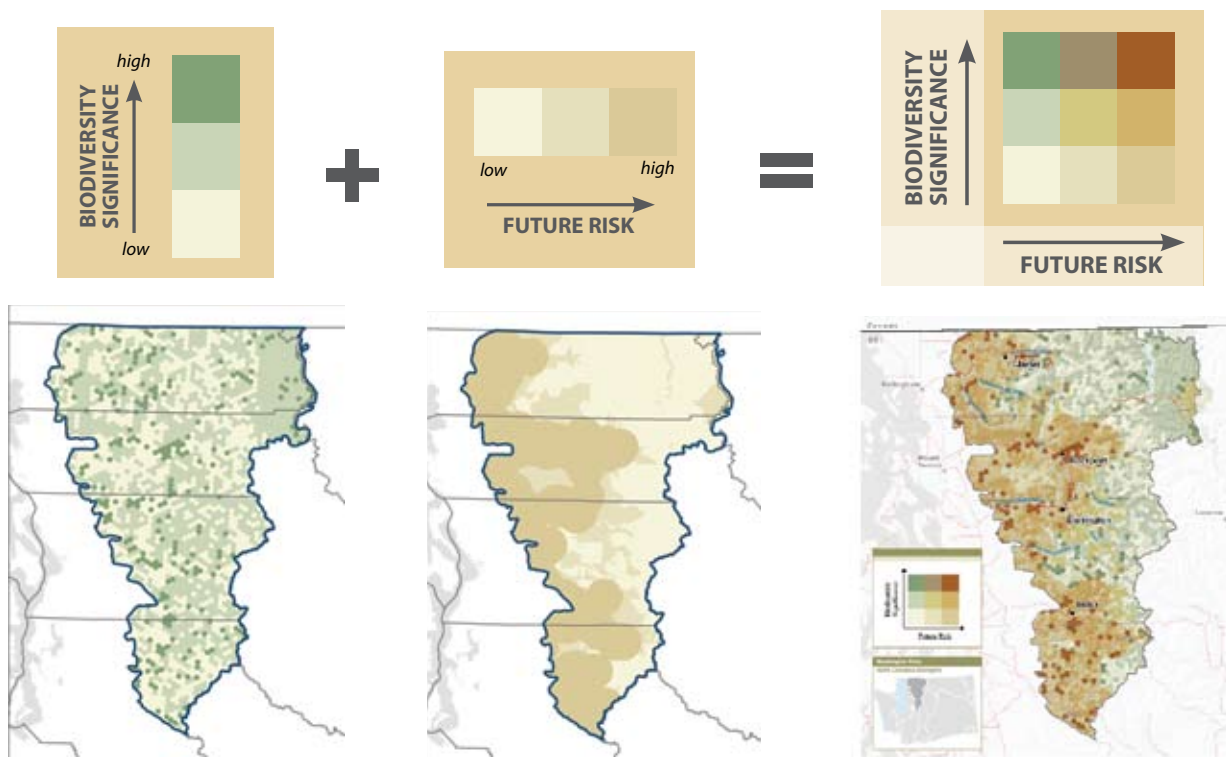


Figure 4. Biodiversity conservation opportunity maps such as the one on the bottom right are created by combining maps of biodiversity significance (left) with maps of future risk (center). This example shows the North Cascades Ecoregion. For a full-scale map of this ecoregion and others, please see Chapter 4.

Future risk is based on projected population density and land use. These criteria consider the distance from projected population centers as a rough, but reasonably reliable, proxy for future ecosystem stresses (For a full description of these criteria, see Chapter 4).

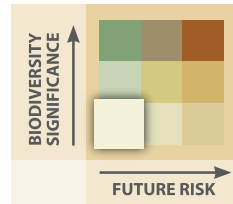
Conservation opportunity maps for seven ecoregions are found in Chapter 4.

The maps are designed to be used in concert with local knowledge. These maps do not replace more detailed or specialized assessments for specific watersheds, counties, or other localities; do not prescribe specific actions or strategies; and do not substitute for local conservation priorities. These maps do show where to find representation of all of Washington's biodiversity, not only the rarest species or the richest habitats. They identify areas that are important to keeping common species and habitats abundant as well as to ensure that we are conserving habitats for rare or imperiled species.

Conservation actions may involve a range of strategies, including incentives for private landowners, acknowledging and encouraging best management practices on working lands, restoring degraded ecosystems, and establishing conservation easements. These actions should be tailored to on-the-ground conditions, with guidance from the conservation opportunity maps. The examples below describe possible actions in areas identified with one of the four corners of the nine-color grid.

Connect and Discover —Conserving biodiversity in areas of low biodiversity significance and low future risk.

Lands that are defined as having lower biodiversity significance and risk—the lower left corner—have, relative to others, fewer rare species, less overall biodiversity, and an expected slower rate of population growth.



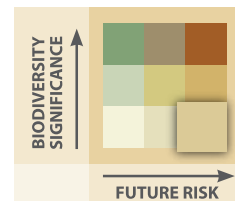
These areas may:

- Be less significant from an ecoregional perspective;
- Be particularly important to biodiversity locally; and/or
- Need more research and study. Known biodiversity may represent a lack of information.

Conservation of common species is especially important in these areas, and voluntary community efforts can help achieve this goal. Ongoing monitoring and management will be needed to understand the effects of climate change, reduce catastrophic fire risk, and prevent degradation of native biodiversity by invasive species. Large-scale state investment generally should not be targeted here to conserve biodiversity as we currently understand it.

Learn and Restore —Conserving biodiversity in areas of low biodiversity significance and high future risk.

Lands that are classified in the lower-right corner are defined as places that, relative to others, have less overall biodiversity but higher likelihood of facing growth pressures.



These areas may:

- Have high residential density;
- Be important places for people to have contact with nature and to learn about the natural world; and
- Have biodiversity which, while not generally significant from an ecoregional perspective, is significant for quality of life.

Education, restoration, and proactive land use planning can be emphasized. Citizen science projects can identify locally important areas and fill gaps in biodiversity data, while backyard and community wildlife habitat enhancement efforts can help ensure that common species remain plentiful. Planners and officials can strive to design green spaces that maximize the public's ability to encounter nature.

EXAMPLE: CITY PARKS

City parks containing natural areas allow people to connect with nature. These places may provide important remnant habitats, though relative isolation from other natural areas may limit the ecoregional importance of city parks. Threats may include invasive species, trampling and overuse, and pressure to develop for high-intensity recreation activities. Conservation strategies could include discovery walks to observe birds and wildflowers, neighborhood work parties to control invasive species, and citizen science efforts to monitor changes over time in the species present.

Columbia Park in Kennewick is one such city park. Near the city center, it contains the eight acre Audubon Natural Area, a riparian woodland that is a haven for resident and migrant birds. For more information, see page 104.

EXAMPLE: COUNTY PLANNING

County planning can play a vital role in biodiversity conservation, giving people the opportunity to learn about and restore nature close to home. Pressures on open space are increasing, especially in areas undergoing rapid conversion to residential use.

When Spokane County updated its Comprehensive Plan in 2002, it adopted a new category, Rural Conservation. This category encourages low-impact uses and uses clustering and other techniques to protect sensitive areas and preserve open space. For more information, see page 106.

EXAMPLE: CONSERVATION EASEMENTS

Conservation easements can be used to manage land for its natural values and to maintain forests and farms as working lands. Easements can prevent development that would change a property's uses.

Holm Farm in Thurston County benefits from a family tradition of stewardship. The owners designed their conservation easement to preserve the farm's wildlife habitats. They will be able to bequeath the farm to their heirs, while saving its natural beauty and ecological role forever. For more information, see page 108.

EXAMPLE: A FULL TOOLBOX

A full toolbox of conservation approaches is needed in rapidly developing communities that encompass exceptional biodiversity. Innovative thinking and collaboration among diverse interests can develop a suite of successful programs and activities.

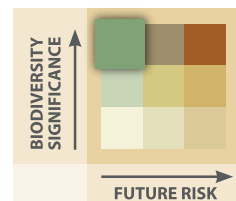
The stretch of the Skagit River between Rockport and Marblemount faces many future risks, while hosting abundant salmon and bald eagles. Skagit County's fast-growing economy and proximity to urban centers puts demands on its communities. A primary threat here is conversion of agriculture and forest lands to residential use, resulting in increased habitat degradation and fragmentation. Collaborative conservation efforts include cost-share habitat improvement programs, citizen involvement programs, easements, and ecotourism. For more information, see page 110.

Manage and maintain—Conserving biodiversity in areas of high biodiversity significance and low future risk.

Lands classified in the upper left corner are defined as places that, relative to others, have higher biodiversity yet face less development pressure. These areas are a relatively high priority for conservation.

They are likely to:

- Have biodiversity that is important in the regional context;
- Be in protected status that is likely to continue in the future (e.g. public land); and/or
- Lack imminent threats to biodiversity.



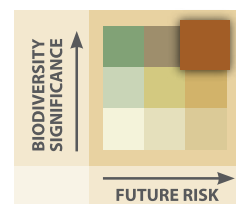
In general, these areas are at low risk, but they need to be managed to prevent damages from invasive species, catastrophic fire, and recreation, grazing and other uses. It may also be useful to identify linkages to connect highly significant areas to one another, conduct ongoing monitoring and research on potential effects of global climate change, and assess the accuracy of our understanding of biodiversity and ecological processes.

Collaborate and innovate—Conserving biodiversity in areas of high biodiversity significance and high future risk.

Lands classified in the upper right corner are essentially the highest priority areas for biodiversity conservation. They are places that have the highest biodiversity significance and face the fastest growth.

These areas may have:

- Significant ecoregional biodiversity values;
- Pressures from human population growth and impact; and
- Urgent conservation concern.



A full toolbox of strategies is needed in these areas. Tools might include strategically targeted incentives such as technical assistance and grants, and collaboration among local residents engaging in conservation activities. Restoration for ecological function may be important and these areas could provide mitigation banks and development of other market tools. Targeting state investment here should be considered.

Existing conservation lands are especially important and should be managed for their special features. Linking conservation areas will be increasingly vital for sustaining healthy populations of some animal species.

Strategy 1.1:

Use the Conservation Opportunity Framework to guide investments and other conservation actions.

Problem Addressed: Guidance is needed to direct a range of voluntary and collaborative strategies, where people and organizations can work together to conserve biodiversity and maintain working landscapes. Increased coordination of conservation actions and investments among different landowners, agencies, and managers can result in better conservation outcomes, potentially at lower costs.

Potential Partners: Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, Washington State Recreation and Conservation Office, Washington State Conservation Commission, universities, Washington Academy of Sciences, the Puget Sound Partnership Science Panel, local land trusts, and tribes.

ACTION 1.1.1

Integrate biodiversity conservation maps and other data with existing agency data and guidance documents used by local governments for planning purposes.

To maximize their utility, the regional conservation opportunity maps need to be translated to the local level and fully integrated with other local planning information, such as zoning, growth boundaries, and type of ownership. An important next step is for the Department of Fish and Wildlife to begin working with local governments to provide them with the maps and supporting data and to create models for applying the opportunity framework at the local level. For example, maps could be created at the watershed, ecosystem, and county levels. Such action would enhance local participation in regional conservation efforts.

ACTION 1.1.2

Use the Conservation Opportunity Framework to facilitate coordination among those responsible for managing lands and waters.

The Conservation Opportunity Framework provides a new tool for agencies, tribes, local governments, nonprofits, and private landowners within a region to work across jurisdictions to coordinate conservation efforts and to target specific approaches where they are likely to be most effective. The maps included in this document may be used as guidance for areas in which to set priorities and focus efforts, including incentive programs and market-based initiatives. Issues of regional concern, such as invasive species, could be incorporated into updates of the ecoregional maps (see Strategy 1.3) to improve applicability.

Strategy 1.2:

Fully incorporate biodiversity conservation into existing state acquisition programs.

Problem Addressed: Many federal, state, and nonprofit programs exist to acquire lands and water rights for conservation and other public purposes, either through direct purchase or

less-than-fee arrangements such as easements. While some of these programs operate under a specific legal mandate, such as salmon recovery, other programs could readily include biodiversity as a consideration. Including biodiversity conservation as a key factor to guide acquisition programs could lead to a more strategic, effective investment of taxpayer dollars to conserve Washington's natural resources and working lands.

Potential Partners: Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, Washington State Department of Transportation, Washington State Parks and Recreation Commission, Washington State Association of Counties, Washington State Conservation Commission's Office of Farmland Preservation, U.S. Department of Agriculture including U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service, National Park Service, and tribes.

ACTION 1.2.1

Update the criteria for selecting projects to fund under the Washington Wildlife and Recreation Program.

The criteria for selecting projects for funding under the Washington Wildlife and Recreation Program should be revised to include biodiversity conservation as an explicit criterion. Biodiversity conservation should be a factor in the appropriate funding categories, although other considerations should remain important as well. The Recreation and Conservation Office could use the Conservation Opportunity Framework approach to screen proposed projects using biodiversity values.

ACTION 1.2.2

Use biodiversity conservation as the basis for coordinating acquisition programs as required by SSB 5236.

Under the guidance of the Recreation and Conservation Office, the Department of Natural Resources, and Department of Fish and Wildlife, biodiversity conservation and an ecoregional landscape approach should effectively become an organizing principle and key tool to coordinate the many different state programs that purchase habitat and recreation lands and waters. The newly created Habitats and Recreation Lands Coordinating Group should use the Conservation Opportunity Framework and maps as guidance for this purpose.

The Biodiversity Council also recommends that nonprofit organizations and land trusts take advantage of the Conservation Opportunity Framework to target their acquisition activities to maximize of biodiversity conservation benefits.

ACTION 1.2.3

Use funding from existing programs to acquire lands and shorelines of high biodiversity significance.

Existing acquisition programs should be used where appropriate to acquire lands and shorelines of high biodiversity significance and high future risk. Specifically, the critical habitats, riparian protection, and natural areas categories of the Washington Wildlife and Recreation Program (almost 33% of the total) should be focused on areas of high biodiversity significance.

In acquiring lands, care must be taken to sustain, rather than undermine, the viability of Washington's agricultural and forestry economies. In addition, adequate resources need to be provided for long-term stewardship of lands.

Strategy 1.3:

Produce high quality data products to assist land managers and decision makers to develop conservation plans and strategies.

Problem Addressed: Not all ecosystems (e.g., freshwater, estuary, marine) or conditions (e.g., climate change, restoration potential, connectivity) are addressed in the current maps, due to lack of data, the large scale of the maps, and some incompatibility issues. The framework could be improved with more sophisticated estimates of risk and significance, informed by factors such as climate change and wildlife corridors. Development patterns, population, and other factors are constantly changing, and conservation priorities will need to be regularly updated and reevaluated.

Potential Partners: Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, Washington State Conservation Commission, tribes, universities, The Nature Conservancy, U.S. Forest Service, U.S. Fish and Wildlife Service, Washington Academy of Sciences, and the Puget Sound Partnership Science Panel.

ACTION 1.3.1

Develop, and periodically update, future editions of the biodiversity conservation opportunity maps.

The future updates should:

- Integrate data on freshwater system priorities and habitat connectivity.
- Indicate biodiversity conservation priorities for marine and estuary waters of Washington State.
- Integrate new data from the Washington Biodiversity Inventory, including data on invasive species presence and extent, rare species, and site-specific species richness.
- Work with local jurisdictions to develop data and maps at a scale that is valuable to local planning and conservation efforts.
- Indicate priority areas for restoration activities.
- Address impact of climate change on biodiversity and potential shifts in conservation priority areas.
- Complete the mapping of biodiversity conservation opportunity areas for two remaining ecoregions, the Blue Mountains and Canadian Rockies.



2. Incentives and Markets

Introduction

More than 60% of the land in Washington State is in private ownership. These lands include many areas important for biodiversity conservation, such as riparian zones, wetlands, and intact plant communities. The ongoing participation of private landowners is thus essential to biodiversity conservation. This section examines how best to support and encourage landowners in undertaking conservation actions, relying primarily on incentive programs and conservation markets.

Current Practices

In the current regulatory framework, private landowners generally receive few economic or regulatory benefits for conserving biodiversity. Accordingly, incentive programs, which provide compensation for managing lands for conservation purposes or for protecting lands, are an important component of an effective conservation strategy.

More than 70 governmental and foundation programs offer some form of incentives to private landowners in Washington to promote conservation activities. These programs include direct financial assistance (e.g., grants, loans, and leases), indirect financial incentives (e.g., property tax relief), technical assistance, and recognition or certification.¹

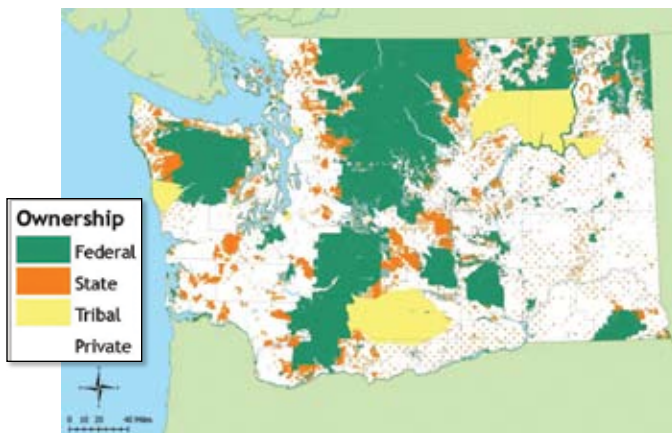


Figure 5: More than 60% of the land in Washington is in private ownership. Map courtesy of the Washington State Department of Natural Resources.

Most of the assistance for landowners is provided through conservation districts, industry associations, Washington State University Cooperative Extension, state agencies, local government, land trusts, and other community organizations. The conservation districts are the state's principal providers of technical assistance for agricultural landowners, and are often a trusted source of advice and assistance.

¹ Office of Governor Chris Gregoire, "Governor Gregoire Announces \$103.5 Million in Grants for Recreation, Protection of Farmland, Wildlife Habitat," news release (June 13, 2007).

They often apply as fiscal agents on behalf of landowners to state and federal financial assistance and grant programs.

Conservation markets are an alternative, newly developing venue to reward private landowners for stewardship and conservation practices. Building on existing examples such as fishing quotas or tradable emissions programs, such markets would be designed to encourage stewardship and conservation by allowing conservation actions to be bought or sold. Emerging markets in Washington State include the pilot “mitigation marketplace” in Clark County and innovations associated with offsite restoration as a means to meet Clean Water Act permitting requirements. In addition, the City of Bainbridge Island is working with the international partnership Business and Biodiversity Offset Program to explore the use of biodiversity “offsets” to compensate for development impacts.²

Gaps and Opportunities

While the current list of incentive programs is substantial, the programs as a whole have several limitations and collectively many opportunities exist to provide a more cohesive and effective suite of services. In addition, accelerating development pressures heighten the need to reassess and improve the current structure of market mechanisms for conservation.

Incentive programs are not always well coordinated or integrated. Many incentive program providers operate independently and have limited opportunity to coordinate on program design and delivery. State government does not collectively track all of the conservation incentive programs operating in Washington, either by dollars expended or by results (e.g., acres restored). Consequently, it is difficult to assess progress systematically, identify overall program improvements, or develop more targeted or strategic approaches.

Incentive programs are often difficult for property owners to join. The sheer number of programs, combined with sometimes cumbersome application processes, can create barriers to landowner participation. Currently, conservation districts serve as the primary source of assistance for landowners in developing and implementing conservation plans as well as locating funding sources. Increased funding for this type of assistance and coordination among such services could encourage broader landowner participation in incentive programs.



AARON BARNIA

Examples of Incentive Programs in Washington

- The federal **Conservation Reserve Program** offers farmers direct financial assistance to establish long-term conservation practices; this program supports conservation actions on more than 1.4 million acres of farmland in Washington.
- The **Public Benefit Rating System** (PBRs) allows counties to provide property tax relief to landowners participating in conservation actions. Of Washington's 39 counties, 16 Washington counties participate in the PBRs program.
- The **Washington Wildlife and Recreation Program** (WWRP) has directed \$544 million in state funds for permanent protection of critical habitat, natural areas, and recreational areas since 1990.
- **Farming and the Environment** annually recognizes Washington farming families employing exceptional stewardship practices with the Vim Wright Stewardship award.

2. See the website: <http://www.forest-trends.org/biodiversityoffsetprogram/>.

Incentive programs tend to be opportunistic rather than strategic. Assistance is generally provided to landowners on a first-come, first-served basis, rather than directed at areas of greatest biodiversity conservation value or landowner need. Because incentive programs are generally targeted toward producers of food and fiber, many other owners of rural land with valuable biodiversity attributes are not eligible for incentive programs.

Many incentive programs are oversubscribed and lack adequate funding. Resources are insufficient to meet current demand for several programs, and many willing property owners are unable to secure funding for projects.³ More funding is needed for programs critical to maintaining habitat and for projects with high biodiversity conservation value. The size of financial assistance packages must keep pace with escalating land values for conservation incentive programs to be an attractive alternative to land conversion.

Leadership for the development of conservation markets is lacking. The Department of Ecology's wetland banking program is designed to offer a coordinated strategy for the developing wetlands mitigation market. No similar statewide lead entity exists for developing conservation markets, however. Such an entity would establish a regulatory framework, coordinate related efforts, and otherwise ensure that the market is created in a manner that benefits both biodiversity and the involved parties.

Current use taxation could be used more effectively to preserve working lands and open space. State current use taxation law enables counties to lower property taxes for open space, timber, forestry, or agricultural uses. This tax provision is underused and under-marketed, however, as many county officials expect current use taxation to lower their tax revenues.

Recommendations

OBJECTIVE: Washington will offer an expanded, integrated suite of incentives and market based programs that are easily accessible to private landowners, and that make voluntary stewardship and conservation a practical and rewarding option. Incentive programs will be structured to especially encourage investment in high priority landscapes.

The Council's long-term vision is that incentives, markets, and other voluntary measures will become well-established, effective, efficient, and widely used mechanisms to conserve and manage biodiversity resources on private lands. For this change to occur, private landowners will need to become more aware of conservation priorities, receive adequate assistance, and be treated as stewardship partners. State and federal programs will need to offer a full range of financial incentives, provide adequate funding for technical assistance, and offer recognition programs and opportunities for landowners to profit from good stewardship.

The recommendations below are intended to ensure that private landowners are treated as stewardship partners and have access to financial incentive programs, technical assistance, recognition

3 The list of oversubscribed incentive programs includes, but is not limited to, Conservation Reserve Enhancement Program (CREP), Environmental Quality Incentives Program (EQIP), Grassland Reserve Program (GRP), Wildlife Habitat Incentives Program (WHIP), and Family Forest Fish Passage Program (FFFP).

programs, and other opportunities to profit from good stewardship. These recommendations are linked with and build on existing efforts, initiatives, reforms, and programs underway throughout the state to strengthen private landowners' contributions to biodiversity conservation.

The impact and viability of these incentive and market based strategies will depend to a significant extent on effective compliance with existing laws and regulations. Incentives and market based programs work best in the context of a fair and efficient regulatory framework, where all parties adhere to the same rules. The result is a level playing field, a baseline for accountability and performance, and the opportunity for incentive based efforts to deliver win-win benefits. Incentives can then be deployed to encourage landowners to go beyond the minimum and markets can be set up to more efficiently achieve conservation outcomes. The recommendations in this section are linked to those in the land use and development section, particularly those related to compliance and capacity of state and local governments to fulfill their statutory requirements.

Strategy 2.1:

Make existing landowner incentive programs more accessible, easier to use, and strategic.

Problem Addressed: Incentive programs are not well-coordinated among providers; application processes are often confusing and burdensome; and some programs are not well marketed.

Potential Partners: Washington State Conservation Commission including its Office of Farmland Preservation, Washington Farm Forestry Association, conservation districts, nonprofit land trusts, conservation organizations, Puget Sound Partnership, Washington State Department of Agriculture, Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, Natural Resources Conservation Service, local government planning and natural resource departments, and other incentive providers.

ACTION 2.1.1

Assign responsibility for coordinating landowner incentive programs to a single state entity.

The state has an immediate, high-priority need to provide overarching coordination of landowner incentive programs. Taking a comprehensive approach to incentive programs would facilitate strategic opportunities, improve efficiency, and better address the needs of landowners. The result should be improved service to landowners and greater return on state and federal investments.

This coordinating entity would likely be located within an existing office, such as the Office of Farmland Preservation or the Washington State Recreation and Conservation Office, and its general responsibilities would include:

- Tracking investments of all programs collectively across the state and identifying opportunities to serve landowners better and to improve efficiency;
- Ensuring that conservation incentive programs achieve desired outcomes across all sectors and landscape types.

ACTION 2.1.2

Establish a clearinghouse to distribute information and provide technical assistance on conservation incentives.

The benefits of a clearinghouse would include increased accessibility and more landowner participation. A single statewide clearinghouse could be established, or regional clearinghouse services could work with conservation districts in providing customized information on the programs available in each region and in delivering hands-on technical assistance.

In either case, the clearinghouse function should be linked to the existing services of conservation districts. Additionally, a partnership should be explored with the Office of Farmland Preservation, which is charged with developing a clearinghouse for agricultural programs.

ACTION 2.1.3

Create a program of regional “brokers” or matchmakers in high-priority areas for biodiversity conservation, beginning with a pilot project.

Regional brokers would develop packages of incentives to make conservation financially viable for owners of land with high conservation significance and either high biodiversity risk or high potential return. High-priority landscapes include those that have high biodiversity significance and face medium to high risk, as discussed in the previous Conservation Opportunity Framework section (Strategies 1.1 to 1.3).

These services could be provided as an additional service by conservation districts, expanding the geographic scope and extent of those already provided. Brokers, in partnership with conservation districts, would link owners of lands with high conservation value to suitable incentive programs. They would focus on education and outreach to landowners about available incentives for conservation. Initial implementation of this action through a pilot project is linked to Recommended Action 3.4.2.

ACTION 2.1.4

Improve and expand public recognition for voluntary private sector stewardship of lands.

It is essential that property owners who are serving as good stewards of their natural resources and biodiversity be recognized for their contributions and encouraged to continue their efforts.

Multiple approaches should be taken to heighten public recognition for services that owners and operators of working lands provide. This effort is largely educational; thus, this recommendation would be developed and delivered in the context of Strategy 4.1 in the Education section. Existing recognition programs, such as those offered by Farming and the Environment or Sustainable Northwest, could be promoted and expanded to raise their visibility and increase their value. Other options would be to produce and distribute a series of fact sheets on the ecosystem services that well-managed forests, agricultural lands, aquaculture, and fisheries provide; a series of newspaper articles heralding environmentally conscious local landowners; and booths recognizing local landowners at events such as fairs and conferences.

Strategy 2.2:

Strategically expand incentive programs to target high-priority conservation areas and meet the needs of underserved landowners.

Problem Addressed: The current incentive program structure is not targeted to meet biodiversity conservation needs, and limited resources are not always directed toward areas of greatest landowner need or greatest conservation value. Programs are applied unevenly across landowner sectors, such that some groups (e.g., small forest landowners) do not have access to the same number of programs and resources as others.

Potential Partners: Washington State Conservation Commission, conservation districts, Governor's Office, Washington Farm Forestry Association, Washington State Department of Natural Resources' Small Forest Landowner Office, Puget Sound Partnership, The Nature Conservancy, Cascade Land Conservancy, incentive program providers, local government planning and natural resource departments, and land trusts.

ACTION 2.2.1

Dedicate incentive funding toward meeting the needs of landowners in high-priority areas for biodiversity conservation.

Targeted funding for conservation activities on private lands in high-priority conservation areas would immediately demonstrate to rural landowners, local government officials, and other key stakeholders the state's commitment to conserving its biodiversity. Targeted funding would also ensure that resources are strategically invested to provide Washington State with the greatest return possible.

The Conservation Opportunity Framework methodology (Strategies 1.1 to 1.3) would inform the identification of priority areas. A regional pilot incentive program could be established for these locations. This effort could build on the work of the North Central Washington Healthy Lands Initiative, which has already begun to identify local priorities for conservation of landscapes and water bodies. An alternative option would be to provide better terms on incentive programs, such as higher cost-share rates or bonus points for funding eligibility ranking, for practices in targeted high-priority areas. (This action is linked to Recommended Action 2.1.3.)

ACTION 2.2.2

Develop new programs for underserved landowners, including small farmers and owners of non-working rural lands.

Small rural landowners in particular face increasing pressures to convert their lands to more developed uses. These pressures are distributed over forested, agricultural, and non-working lands; however, agricultural lands most frequently qualify for the current suite of incentive programs. Additional incentive programs targeted toward landowners underserved by existing programs would help preserve rural lands that offer valuable habitat.

ACTION 2.2.3

Provide additional funding for selected highly effective existing incentive programs.

Many highly effective and extremely popular conservation incentive programs exist, and frequently they have more interested participants than funding will allow. Examples include the Conservation Reserve Program, the Environmental Quality Incentives Program, the Grassland Reserve Program, the Wildlife Habitat Incentives Program, and the Family Forest Fish Passage Program. Providing enhanced funding for key programs will enable greater participation in programs that protect vital habitat.

ACTION 2.2.4

Facilitate the expansion of new or enhanced incentives for landowners to control invasive species.

The Biodiversity Council has been working with the Washington Invasive Species Council to identify needed actions to address the threat that invasive species pose to Washington's biodiversity. As part of this work, the Invasive Species Council will identify incentives for invasive species management, control, and eradication methods that can be linked to biodiversity conservation.

Strategy 2.3:

Accelerate the development of conservation markets to create new income streams for conservation actions.

Problem Addressed: Biodiversity markets, or “conservation banking” services, are only beginning to emerge. They lack coordination with carbon and water markets, and few examples exist of biodiversity markets from which to draw insights. In the development of carbon and water markets, consideration of biodiversity conservation objectives needs to be explicit, and markets must be formulated to enhance conservation. Development of these markets could also be facilitated through enhanced capacity in state government to coordinate response to private-sector interest and to create consistent regulatory approaches.

Potential Partners: Washington State Department of Natural Resources, Washington State Department of Ecology, Washington Department of Fish and Wildlife, Washington State University's Center for Sustaining Agriculture and Natural Resources, Washington State Conservation Commission, conservation districts, Governor's Office, Ecotrust, Defenders of Wildlife, American Farmland Trust, and Cascade Land Conservancy.

ACTION 2.3.1

Provide leadership within state government to develop conservation markets in Washington.

Designation of a lead entity responsible for creating an overall structure for conservation markets would allow coordination of the state's response to emerging markets in carbon, water quality and quantity, and biodiversity.

The lead entity could be either an existing agency or office or a new office. The entity would engage regulators, bankers, agencies, developers, non-profits, and other key stakeholders to facilitate the creation of new markets for biodiversity and ecosystem services. The entity would address issues and concerns related to the development of these markets, including:

- Coordinating carbon, water, and biodiversity markets;
- Ensuring that emerging markets are credible and scientifically-based;
- Identifying ways to “bundle” credits from different programs to maximize benefits;
- Creating an ongoing relationship with landowners and building trust among nongovernmental organizations, agencies, and landowners;
- Addressing the role of a regulatory structure to drive conservation markets;
- Making the case for investing in conservation markets; and
- Enforcing existing laws that drive conservation markets.

ACTION 2.3.2 **Conduct feasibility studies and pilot projects to grow markets for biodiversity conservation.**

Conducting feasibility studies and pilot projects would help build experience and generate data for good design and administration as conservation markets continue to develop. Potential projects and studies include the following efforts:

- A feasibility study for a statewide and regional habitat conservation banking system;
- A feasibility study of funding restoration by combining in-lieu fees and voluntary investment;
- An exploration of the potential for bundling credits for water, carbon, and biodiversity;
- A regional pilot project on ecosystem service payments;
- An exploration of using state bonds to finance acquisition of certain ecosystem services that private landowners provide; and
- An examination of the model that Clark County’s mitigation marketplace offers.

Strategy 2.4: **Improve the effectiveness of existing regulatory programs.**

Problem addressed: We do not fully understand the degree to which existing regulatory programs contribute to biodiversity conservation, individually or cumulatively. Existing regulatory programs can be a disincentive to biodiversity conservation. For example, they may encourage owners of agricultural and commercial forest lands to convert their land to other uses that have a lesser conservation value. Currently, consensus about specific policies to address these issues is lacking, and more study is needed to determine appropriate solutions.

Potential Partners: Washington Forest Protection Association, Washington Farm Forestry Association, Washington Farm Bureau, Ruckelshaus Policy Consensus Center, Washington State Department of Agriculture, Washington State Department of Ecology, Washington State Department of Natural Resources, Washington Department of Fish and Wildlife, Washington State Department of Transportation, Washington State Conservation Commission, tribes, Northwest Environmental Forum at the University of Washington, and environmental interest groups.

ACTION 2.4.1

Commission a study to review the effectiveness of existing regulatory programs.

Charge a working group to analyze and report on the following topics:

- How existing federal, state, and local regulatory programs create disincentives to biodiversity conservation, and how these disincentives might be removed while achieving the regulatory program's conservation goal. This analysis should include an assessment of the capacity of government agencies to pursue voluntary approaches, including determining existing authority, technical knowledge, level of interest, and potential solutions to other institutional barriers.
- How existing federal, state, and local regulatory programs contribute to biodiversity conservation in Washington, both individually and cumulatively, and how these efforts might be improved to make further contributions to biodiversity conservation. This analysis should take into consideration unintended consequences regulatory changes, including encouraging the owners of agricultural and commercial forest lands to convert their land to other uses that have a lesser conservation value.
- How to track the measurable results of existing regulatory programs.

Strategy 2.5:

Maximize the use of current use taxation as a property tax incentive for biodiversity conservation.

Problem Addressed: Not all counties are using their current use taxation authority to the maximum extent possible. Opportunities exist to help local governments develop a better understanding of the costs and benefits of using this tool to preserve working lands and open space. The recommended approach also addresses limitations in the statute that currently restrict its application to conserve biodiversity. This strategy is linked to Recommended Action 2.4.1.

Potential Partners: Local governments, Washington State Conservation Commission's Office of Farmland Preservation, Washington State Association of Counties, Washington Association of County Officials, land trusts, and environmental interest groups.

ACTION 2.5.1

Identify and overcome barriers to using current use taxation to conserve biodiversity.

Current use taxation supports biodiversity conservation by keeping taxes lower on lands that might otherwise be converted to more developed uses. Several barriers hinder its use, however, including the concern of many county officials that current use taxation will lower their tax revenues. Action is needed in the following areas:

- Identifying and assessing barriers at the local level, both for landowners and local officials.
- Providing assistance and outreach on current use taxation to landowners and assessors.
- Assembling data on the economic value, including both costs and benefits, of open space to counties, along with data on impacts of current use taxation policies on biodiversity.
- Providing outreach to local decision makers on the value of biodiversity conservation.
- Providing incentives to counties to adopt current use taxation.

ACTION 2.5.2

Clarify how the Open Space Tax Act can be used to address biodiversity through current use taxation and Public Benefit Rating Systems.

Currently, counties have flexibility in determining open space qualifying criteria for taxation purposes through their current use programs and Public Benefit Rating Systems. Some counties have adopted point systems that address wildlife habitat. In some cases, current use taxation programs address active farmland and forestland, but wildlife and habitat may not qualify. Changes to this statute could include explicitly designating wildlife and habitat as qualifying uses and adopting a model point system that local communities can readily understand and accept as balanced and fair.



CAROLE RICHMOND



KIRSTEN MORSE



PETER DUNWIDDIE

3. Land Use and Development

Introduction

Population growth trends and accompanying increases in land conversion rates in Washington make changes in land use and development approaches central to the Biodiversity Conservation Strategy. Development in many parts of Washington State is occurring in a sprawling fashion, which can rapidly

consume habitat. As development occurs, it puts more pressure on both private and public lands. Achieving the vision of a future where communities grow and thrive in ways that conserve open space and important biodiversity resources will require substantial changes in current practices and patterns of growth over both the short and long terms.

Current Practices

Existing state and federal laws and regulations can help manage development in ways that conserve biodiversity. The state Growth Management Act contains specific conservation goals that local jurisdictions must address when planning growth, while the Shoreline Management Act places preference on shoreline uses that protect water quality and the natural environment. Local governments administer both of these laws. Other key laws affecting land use and development include the State Environmental Policy Act (SEPA), the federal Endangered Species Act (ESA), and the Federal Water Pollution Control Act (Clean Water Act).

Using these existing laws, local governments have many opportunities to incorporate biodiversity considerations into land use and development practices. The sidebar provides examples of local jurisdictions and organizations that have begun incorporating conservation goals into land use planning and development strategies.

Examples of land use planning and development in Washington that foster conservation:

- Spokane and Pierce Counties each created “biodiversity networks” in their open space and comprehensive plans.
- The Cascade Land Conservancy has worked to channel growth and development in the Puget Sound region in ways that protect open space and natural systems.
- King County and the Trust for Public Land developed a smart-growth strategy for the County that emphasizes land conservation.*
- Stewardship Partners and the Nisqually River Council developed a set of low-impact development and architectural guidelines for the watershed, and they are working to encourage its adoption.
- Kitsap County and the Washington Department of Fish and Wildlife worked together on a local habitat assessment that is being used in developing watershed plans.

* Trust for Public Land, “King County and TPL: A Partnership in Conservation,” http://www.tpl.org/tier3_cd.cfm?content_item_id=18178&folder_id=262, last accessed July 2007.

Gaps and Opportunities

Opportunities exist to integrate biodiversity conservation into land use and development plans in a comprehensive way and to address gaps in the current system.

Local jurisdictions often lack capacity to apply and integrate scientific information about conservation into land use and development plans. Biodiversity conservation is rarely explicitly integrated into land use and development plans in a comprehensive way. Local planners often lack both the political support and the necessary resources to address biodiversity conservation needs in their planning processes. More training, technical assistance, and financial support is needed to ensure that landowners, local officials, planners, and developers are aware of, and have the tools and strategies to address, issues such as wildlife corridors.

Compliance with and enforcement of existing laws is inconsistent. A strong regulatory framework exists to address many of the key threats to biodiversity related to growth and land conversion. However, compliance and enforcement problems include a lack of capacity, particularly at the local level; the need for technical assistance to achieve compliance; distrust between government and property owners; the complexity of many laws; and the lack of political support or a clear set of priorities.

Mitigation could be employed more effectively. Mitigation processes offer the potential for important restoration or protection to occur concurrently with development. Many environmentalists and scientists have questioned the conservation value of such programs, however, and some mitigation bankers and developers view the regulatory environment surrounding these programs as difficult and cumbersome.

Innovative approaches to development could be adopted. A host of emerging approaches to development offer promise, including green building programs, such as Built Green or the Leadership in Energy and Environmental Design (LEED) green building rating system; low impact development strategies; incentives directed toward developers; and transfer of development rights (TDR) programs. Individuals and entities from the public, private, and nonprofit sectors are providing leadership on these changes throughout Washington.

Biodiversity concepts could be better integrated into management of public lands. State and federal agencies often manage their lands with goals that have a positive impact on biodiversity conservation, but biodiversity conservation goals could be made more comprehensive, explicit, and congruent among adjacent landowners.

Recommendations

OBJECTIVE: Biodiversity conservation priorities and tools are incorporated into land use planning processes, development actions, and management activities.

Achieving the vision of a future where communities grow and thrive in ways that conserve open space and important biodiversity resources will require substantial changes in current practices and patterns of growth over both the short and long terms.

In local jurisdictions, regional biodiversity conservation priorities will need to be incorporated into long-range comprehensive planning, program implementation, specific development projects, and funding programs. Local planners will need both political support and the resources, including budgets, maps, and best management practices. Other changes might include tools and incentives for directing development toward existing urban areas as well as increased support for landowners to maintain their properties as working land or native habitat.

The five strategies presented below include recommended actions that can provide local governments as well as state agencies with the resources and capacity needed to incorporate biodiversity conservation into today's planning and development activities. These actions also address how the state can encourage the adoption of innovative new tools and practices. Actions here can take place in the near term – through pilots, studies, and proof-of-concept feasibility analyses as well as policy changes – with the payoff realized over the long term.

Strategy 3.1:

Provide direct assistance to local governments through funding and technical assistance.

Problem Addressed: Local governments play a key role in managing growth and development. Smaller jurisdictions that are experiencing rapid growth and are in areas of high biodiversity in particular often have limited capacity to procure and integrate biodiversity maps and assessments into their planning processes. Opportunities exist to work collaboratively with local governments and provide them with the tools and resources needed to address biodiversity conservation in their plans and development practices.

Potential Partners: Washington State Department of Community, Trade, and Economic Development, Washington Department of Fish and Wildlife, Washington State Conservation Commission, conservation districts, Puget Sound Partnership, Washington State Association of Counties, Association of Washington Cities, American Planning Association, and the Planning Association of Washington.

ACTION 3.1.1

Provide funding to improve the ability of local governments to plan and manage for biodiversity and to integrate biodiversity assessments into comprehensive plans.

Specific needs include mapping, conducting local assessments, incorporating existing assessments into planning processes, and updating plans. Direct funding to local governments to build capacity could be offered through either a competitive or need-based grant program that enables such jurisdictions to have dedicated staff to address conservation issues. Additional resources are particularly important for smaller jurisdictions facing rapid growth, such as the Okanogan, parts of central Washington, and Lewis County.

ACTION 3.1.2

Expand technical assistance to support the efforts of local governments to plan and manage for biodiversity conservation.

Additional investment in staff resources at state natural resource agencies is needed to ensure sufficient support and guidance to local governments. For example, the Washington Department of Fish and Wildlife already provides this function, often in partnership with other state agencies, but it requires additional resources to meet the needs of local governments for high-quality and timely technical assistance geared toward biodiversity protection. Assistance areas include training; use of modeling tools; mapping and assessment; and workshops to help planners and developers understand critical biodiversity features, such as wildlife corridors, and how to accommodate those features in planning and permitting processes. Additionally, technical resources could be provided to local governments to describe the economic value of ecosystem services that areas rich in biological diversity provide as well as to quantify the potential economic losses associated with land conversion.

ACTION 3.1.3

Increase funding to local governments to accelerate the adoption of low impact development and other green building practices.

Existing grant programs available in some parts of the state have proved effective at helping local jurisdictions conduct feasibility studies, rewrite codes, and provide outreach to encourage low impact development and green building. These programs should be expanded and made statewide, to allow for more rapid adoption of these “win-win” building and development practices. Providing developers with access to grant funds and expanded technical assistance could also increase the market share of green building. These programs should apply to retrofits of existing buildings as well as new construction.

Strategy 3.2:

Ensure consistency and compliance with existing laws, plans, and regulations.

Problem Addressed: A long-term approach is needed to ensure accountability and to realize durable support for a regulatory framework that effectively protects biodiversity, supports market approaches to conservation, and is sensitive to the constraints on landowners.

Potential Partners: Local governments, Washington State Department of Natural Resources, Washington Department of Fish and Wildlife, Washington State Department of Ecology, Washington State Conservation Commission, conservation districts, Ruckelshaus Policy Consensus Center, Office of Farmland Preservation, environmental interest groups, and landowner interest groups.

ACTION 3.2.1

Provide funding to local governments to ensure consistency and compliance with existing laws, plans, and regulations.

Directed funding to local governments would facilitate enforcement of existing ordinances, policies, and plans that can protect biodiversity. Such funding would enable many jurisdictions to hire staff to provide the assistance and oversight needed to increase voluntary compliance as well as to enforce regulations when necessary.

ACTION 3.2.2

Enhance consistency and enforcement of invasive species regulations for effective control of invasive species.

The Biodiversity Council has been working with the Washington Invasive Species Council to identify needed actions to address the threat invasive species pose to Washington's biodiversity. The Washington Invasive Species Council will review existing statutes and regulations to look for gaps and overlaps, and will propose prioritized legislative or regulatory solutions to address these gaps and barriers.

Strategy 3.3:

Make mitigation more efficient for developers and effective for conservation.

Problem Addressed: Mitigation programs need reform to conserve biodiversity more effectively and to make mitigation more efficient.

Potential Partners: Washington State Department of Ecology, Washington Department of Fish and Wildlife, Governor's Office of Regulatory Assistance, Washington State Conservation Commission, wetland bankers, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Cascade Land Conservancy, Puget Sound Partnership, and Washington State Department of Transportation.

ACTION 3.3.1

Improve the process for developing innovative mitigation alternatives including, but not limited to, mitigation banks, advance mitigation, and fee-in-lieu programs for aquatic, marine, and terrestrial habitats.

ACTION 3.3.2

Develop and provide guidance on appropriate mitigation for terrestrial habitats.

ACTION 3.3.3

Establish pilot projects to explore opportunities for valuing ecosystem components and services in offsite mitigation activities.

Mitigation measures offer means for development activities that impair biodiversity to fund conservation efforts in nearby areas or other locations of comparable value. While they do not necessarily result in a net increase in biodiversity, offset, mitigation, and conservation "banking" structures may include enough flexibility to encourage or require net biodiversity improvements.

Under federal and state regulations, environmental impacts of construction on wetlands must be mitigated by contributing to an offsite restoration project. The same concept could be applied more broadly (beyond wetlands) to include other biodiversity values, including habitat for particular species.

Washington State already has several existing wetlands banks, and new momentum may be underway for expanded conservation banking in Washington. Both the Department of Ecology and the Department of Transportation are working on changes to improve both the ecological

benefits and efficiency of these programs. Issues to be addressed in the implementation of these recommendations include assignment of long-term responsibility for newly established banks as well as ensuring proper application of in-lieu mitigation. This strategy is linked to Strategy 2.3.

Strategy 3.4:

Further the development and widespread adoption of innovative approaches to development that promote biodiversity conservation.

Problem Addressed: Development in many parts of Washington is occurring in a sprawling fashion that rapidly consumes habitat, increases impervious surfaces, and raises stormwater runoff. To conserve biodiversity resources over the long term, Washingtonians will need to change these development practices substantially. Development and testing of alternative low impact development practices should be expanded, and proven new approaches should be adopted throughout the state.

Potential Partners: Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, Washington State Department of Ecology, Washington State Association of Counties, Association of Washington Cities, Washington Invasive Species Council, Office of Farmland Preservation, environmental interest groups, tribes, Washington Forest Protection Association, Washington Farm Bureau, Cascade Land Conservancy, Washington Farm Forestry Association, Puget Sound Partnership, and universities.

ACTION 3.4.1

Conduct pilot projects with local governments to explore and test programs such as tiered building permits and reduced fees for conservation-oriented development projects.

Incentive strategies can also be applied to land use and permitting to encourage conservation-oriented development, such as green building programs and low impact development strategies. Pilot projects to learn more about the types of incentives that are most cost-effective for government, attractive for developers, and beneficial for conservation can help achieve this goal.

ACTION 3.4.2

Test models for regional coordination on biodiversity issues and priorities.

Many biodiversity conservation priorities affect more than one jurisdiction or may require action by multiple government agencies. Currently, few effective ways exist to coordinate the efforts of these jurisdictions and agencies related to biodiversity at the landscape level.

This recommendation involves testing alternative approaches to regional coordination to determine which ones work best. The pilot Healthy Lands Initiative and Pierce County Biodiversity Alliance offer several ideas, including establishing regional biodiversity councils or habitat-based stewardship councils, funding a regional biodiversity council coordinator, and developing regional websites. This action is linked to Recommended Action 2.1.3.

ACTION 3.4.3

Conduct research to document costs of development and the impact of patterns of development on biodiversity.

Local government officials and planners need better information on the cumulative costs and benefits associated with development – in terms of both finances and impacts on natural resources – to make informed decisions about growth. The American Farmland Trust and Methow Conservancy recently completed a Cost of Community Services Study for Okanogan County that could serve as a model for such efforts.⁴

ACTION 3.4.4

Expand use of transfer of development rights in areas facing rapid development.

Transfer of development rights (TDR) programs are market-based mechanisms to sever development rights from one parcel and sell them for use on another parcel. TDR programs have been used effectively in several instances to direct greater densities into existing urban development and achieve conservation goals. The development of regional markets would increase the significance of TDR programs. Such markets would also help foster incentives for cities to accept increased densities. Smaller jurisdictions may need increased staffing and capacity to conduct transfers of development rights. The Biodiversity Council supports ongoing efforts, including legislative initiatives and the work of conservation organizations such as the Cascade Land Conservancy, that enable and expand TDRs in a manner that is consistent with the conservation of biodiversity.

Strategy 3.5:

Fully incorporate biodiversity conservation strategies into the management of public lands.

Problem Addressed: State and federal agencies manage public lands in Washington for multiple purposes including for recreation (e.g., hunting, birding, fishing, hiking, wildlife viewing), commercial forestry, agriculture, and habitat protection. Biodiversity conservation is an important consideration for management decisions such as in the Department of Natural Resources' Natural Areas program. However, often public land managers lack the mandate, resources, and tools to consider biodiversity effectively in decision making and operating practices. This issue may become more significant in the future, as more private lands are developed, increasing the importance of biodiversity on public lands.

Potential Partners: Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, Washington State Department of Transportation, Washington State Parks and Recreation Commission, Washington State Association of Counties, tribes, Bureau of Land Management, U.S. Forest Service, U.S. Fish and Wildlife Service, and National Park Service.

ACTION 3.5.1

Improve knowledge of biodiversity on public lands.

In conjunction with Strategy 4.2, the state Department of Natural Resources, Department of Fish and Wildlife, Parks and Recreation Commission, local governments and relevant federal agencies should

assess the current state of knowledge about biodiversity on their respective lands, identify data gaps, and subsequently conduct an inventory of biodiversity resources on those lands. In conjunction with Recommended Action 6.2.1, state agencies should contribute to the Biodiversity Scorecard, reporting on the status of biodiversity in Washington.

ACTION 3.5.2

Explicitly integrate the ecoregional Conservation Opportunity Framework into existing planning and conservation programs for public lands and waters.

The Conservation Opportunity Framework presented in Strategies 1.1 to 1.3 and detailed in Chapter 4 identifies biodiversity conservation priorities and strategies for each ecoregion, considering significance and future risks. This framework should be considered and used as appropriate by the Department of Fish and Wildlife, Parks and Recreation Commission, and Department of Natural Resources in their respective land management plans and programs.

At the federal level, the Conservation Opportunity Framework could be used as a resource for the management of National Parks, wilderness areas, and Forest Service lands. In addition, the framework could assist with the development and implementation of Habitat Conservation Plans associated with implementation of the Endangered Species Act.

Finally, land managers from different state and local government agencies can use the Conservation Opportunity Framework as the basis for coordinating with each other to adopt a landscape-based approach to land management and conservation, with biodiversity as the common denominator. Such coordination would parallel the 2007 directive from the Washington State Legislature in SSB 5236 that has led to a land acquisition task force in the Recreation and Conservation Office.

ACTION 3.5.3

Manage public lands in a manner that conserves biodiversity.

With better information and an integrated planning framework, public land managers will be in a strong position to take action on public lands to conserve biodiversity. Such actions could include the following efforts:

- Focusing restoration actions on public lands with high biodiversity significance;
- Funding for programs to manage landscapes for biodiversity conservation purposes;
- Adopting a consistent set of land management practices on adjacent public lands that different agencies manage;
- Coordinating across public agencies to allow for recreation and commercial use of public lands, while protecting habitats with high biodiversity significance; and
- Managing the maintenance of roads, forestry practices, and fire regimes on forest lands to ensure forest health in the context of biodiversity conservation.



AARON BARNA



HARLEY SOLTES



AARON BARNA

4. Science and Information

Introduction

Decades of scientific inquiry and study contribute to our understanding of biodiversity in Washington State. We need to learn more, however, and develop a more integrated approach to research and management of data. A need also exists for improved information to assist land managers, government officials, and others in decision making.

Statewide resources for biodiversity include:

- The Washington State Department of Natural Resources, through its Natural Heritage Program, collects and distributes information on native ecosystems and rare species for use in prioritizing conservation actions as part of the national natural heritage information system.
- The Washington Department of Fish and Wildlife manages the following:
 - A database of priority habitats and species;
 - The Comprehensive Wildlife Conservation Strategy, a management framework for the protection of species and habitats; and
- The Gap Analysis Program, a nationwide program designed to identify elements of biodiversity that are inadequately represented in the nation's network of protected areas.

For more information visit
www.biodiversity.wa.gov

Current Practices

A number of institutions in Washington State inventory, assess, research, manage, and monitor lands and waters of the state. Many of these institutions, including state agencies, universities, and nongovernmental organizations, are involved in statewide efforts to assemble data related to the status of species and habitats. These assessments informed the development of the ecoregional assessments described in Chapter 4, Conservation Opportunity Framework, which are essential building blocks for implementation of the Biodiversity Conservation Strategy.

Gaps and Opportunities

New leadership and partnerships are needed to build a biodiversity science foundation to inform policy and land management decisions. Landowners, land managers, planners, and policymakers need access to specific conservation-related information to inform policymaking and priority-setting. Information relevant to these decision makers could be made more accessible and user-friendly.

Critical gaps exist in our understanding of Washington's biodiversity. The existing scientific base can be both strengthened and better applied to inform effective biodiversity conservation. Many groups of species (e.g., lichens, microorganisms, and invertebrates) are poorly studied, and we know little about their occurrence in the state. Comprehensive information on the status and trends in

species and ecosystem health and function needs to be collected and managed in a cost-effective manner.

Regularly updated, high-quality data products are needed. Ecosystem and population assessments are rarely coordinated or standardized in either design or implementation. As a result, the assessment products often cover different geographic and time scales, and they are difficult to integrate or use comprehensively. Furthermore, the status and quality of ecosystem processes are rarely included in such assessments, and threats such as land conversion are usually identified only in terms of impacts on particular high-risk species or locations. Updates are necessary to keep pace with changes on the landscape and to ensure that the information is useful and applicable to planning and permitting decisions.

Recommendations

OBJECTIVE: Establish a comprehensive scientific understanding of Washington's biodiversity and effective conservation practices and make available information readily accessible and useful for land managers and decision makers.

The three strategies presented below are designed to achieve this two-part objective of improving our scientific knowledge of biodiversity and enhancing the ability of planners, developers, and landowners to incorporate biodiversity considerations into land use and development decisions on a real-time basis. Building our scientific knowledge will take time. Continued research at our universities as well as studies and inventories commissioned by government and nonprofits can help achieve this goal, and the efforts of citizen scientists can also contribute to these efforts. Improving the accessibility and utility of existing information can begin immediately with concerted effort and leadership from state agencies and help from nonprofit organizations and universities. It is important to coordinate these efforts with those of neighboring states, as well as the province of British Columbia, to inform regional biodiversity conservation efforts.

Strategy 4.1:

Through new leadership and partnerships, create a strong science foundation to inform policy and action on biodiversity conservation.

Problem Addressed: Significant gaps exist in our understanding of the state's biodiversity and how best to conserve it. Responsibilities and expertise in this field are scattered among institutions around the state. Data are not systematically collected, organized, or shared in ways that allow for a comprehensive understanding of the state's biodiversity status and relevant priorities for action. Leadership is needed to coordinate efforts in Washington related to the science of biodiversity and to implement significant components of the strategy.

Potential Partners: Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, Washington State Department of Ecology, the Washington State Recreation and Conservation Office, Washington State Conservation Commission, universities, The Nature

Conservancy, Washington Academy of Sciences, Defenders of Wildlife, U.S. Forest Service's Pacific Northwest Research Lab, Puget Sound Partnership, tribes, and educators.

ACTION 4.1.1

Establish a Biodiversity Science Panel and affiliated Center to address science questions in implementing the Biodiversity Conservation Strategy.

A Biodiversity Science Panel and an affiliated Biodiversity Science Center would provide the leadership and resources to advance our understanding of the science needed to conserve the state's biodiversity effectively in the face of growth and climate change.

The core members of the Biodiversity Science Panel would include experts from the major organizations involved in biodiversity conservation, natural resource management agencies, and academia. The Panel's responsibility would be to lead the development of science-related products associated with the strategy, including the Biodiversity Scorecard, the Biodiversity Data Partnership, and the Washington Biodiversity Inventory. Areas of expertise represented on the team should include conservation biology, ecology, biological taxonomy, economics, political science, and communication of science concepts to the public and policymakers.

The Biodiversity Science Center should be affiliated with the newly established Washington Academy of Sciences, but it should be a distinct entity, with a clear and focused charge for research and collaboration focused on biodiversity. In contrast, the Washington Academy of Sciences is charged with addressing the breadth of science-related issues facing the state, and so it is composed of members whose expertise goes far beyond biology and the science of biological diversity. The Center should have a strong association with the higher education system, and perhaps it could be housed at one of the state's universities. The Center should also be linked to the state's lead agencies for natural resource management.

ACTION 4.1.2

Create a Biodiversity Data Partnership to address the needs for improved integration of biodiversity data systems and better information for decision makers.

The Biodiversity Data Partnership will address existing barriers to collecting and sharing biodiversity-related data effectively and efficiently within state government as well as with federal agencies, tribes, and nongovernmental organizations.

The partnership is to consist of members from all the state agencies that collect and manage such data as well as representatives of nonprofit groups, tribes, and the federal government. The partnership should report to the Biodiversity Science Panel. It should complete the initial phase of its work within three years, formulating recommendations for how to improve integration, efficiency, and data products. The Biodiversity Data Partnership should specifically address the following issues:

- Development of stronger links among groups that collect data, with an emphasis on collection of policy- and management-relevant data;

- Standardization of data collection methods;
- The value and feasibility of building a central hub for biodiversity information that state government collects and manages; and
- The benefits of developing a web-based state Biodiversity Clearinghouse, for non-technical audiences outside of state government.

Strategy 4.2:

Fill critical gaps in our knowledge of Washington’s biodiversity and how best to conserve it.

Problem Addressed: Significant gaps exist in our understanding of the state’s biodiversity and how best to conserve it. Importantly, the state lacks a thorough and rigorous inventory of the distribution of species in Washington, particularly less studied organisms. Also, little knowledge exists on how to respond to climate change in the context of conservation. The data collected through implementing these recommendations will be used to develop strategic priorities and assess the success of conservation actions. The research and inventory efforts outlined in the actions below should be conducted in collaboration with those efforts undertaken in neighboring states and British Columbia as well as broader regional or international projects.

Potential Partners: Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, Washington State Conservation Commission, University of Washington, The Nature Conservancy, Pacific Biodiversity Institute, Puget Sound Partnership, Washington Invasive Species Council, participants in citizen science programs, and natural resource agencies and organizations in Oregon, Idaho, and British Columbia.

ACTION 4.2.1

Initiate the Washington Biodiversity Inventory, a long-term project to survey and inventory all species in the state.

This inventory is intended to provide, over time, a comprehensive understanding of Washington’s biodiversity and to foster an increased public awareness of and connection with that biodiversity. The inventory would be developed through collaboration among state agencies, academics, public schools, and citizen volunteers. These connections would enable the inventory to serve as a low-cost, powerful vehicle to galvanize interest, support, and resources for biodiversity monitoring and conservation. The citizen science network [Strategy 5.3] would be an essential resource to implement this recommendation. Linkages would also be created with the kindergarten through graduate school (K-20) educational efforts outlined in Strategy 5.2.

E.O. Wilson has spearheaded an Encyclopedia of Life—an online effort to “make all key information about life on Earth accessible to anyone, anywhere in the world” (see <http://www.eol.org/>). The Washington Biodiversity Inventory would be similar to this effort, on a smaller scale.

ACTION 4.2.2

Develop a statewide Biodiversity Monitoring Plan in close coordination with the Governor's Monitoring Forum and other state and regional monitoring efforts.

This monitoring plan is needed to ensure that the full range of species, habitats, and ecological functions are represented in state monitoring programs. This plan would include the following elements:

- Identify key biodiversity monitoring targets and opportunities to fill gaps;
- Define strategies to conduct biodiversity monitoring on public lands and to encourage biodiversity monitoring on private lands [Strategy 3.5];
- Develop or adopt protocols to ensure data quality;
- Ensure that the monitoring framework will provide scientifically credible and management-relevant data to decision makers as well as data on indicators for the Biodiversity Scorecard [Strategy 6.2]; and
- Include a commitment to participate in regional and national biodiversity monitoring efforts.

ACTION 4.2.3

Develop conservation strategies to address the impact of climate change on biodiversity and Washington's natural resource base.

Further research is needed on the likely impacts of climate change on biodiversity, the vulnerability and resilience of ecological systems and species, and ways to alleviate those impacts by, for example, improving habitat connectivity. This information should be incorporated into the setting of conservation priorities as soon as possible. Biodiversity inventory and monitoring projects should consider climate change, and research efforts should collect data to help understand the effects of climate change on biological systems.

ACTION 4.2.4

Develop a research program to quantify the economic value of ecosystem services.

Throughout the Council's research and study, stakeholders mentioned the importance of being able to quantify the value of biodiversity and to consider such values in management decisions. Existing resources on the economic value of ecosystem services in Washington are not well developed. Similarly, data on the mechanisms behind the relationship between biodiversity and ecosystem services are not well understood, nor are they available in a way that facilitates informed management decisions.

ACTION 4.2.5

Conduct a baseline assessment to develop and review current invasive species data.

The Washington Biodiversity Council has been working with the Washington Invasive Species Council to identify needed actions to address the threat that invasive species pose to Washington's biodiversity. A statewide, comprehensive baseline assessment could determine the extent of the

invasive species threats to Washington State. The assessment would bring together, for the first time, the multitude of invasive species data that county, state, federal, tribal, and nongovernmental organizations have compiled, including geographic information system (GIS) data and maps created by local noxious weed management boards. Assessing the conditions of invasive species would allow for prioritized action and would help to establish a baseline to monitor the success of current control and management activities. The assessment would provide valuable information about the number and location of invasive species present in the state and the severity of infestations. It would also help identify current management programs and future threats to the state.

ACTION 4.2.6

Develop and refine management prescriptions designed to conserve biodiversity.

Currently, land managers have an array of possible prescriptions, or operational practices, to address conservation needs. The effectiveness of many of these prescriptions is variable and uncertain, owing to the complexity of factors affecting the health of lands and waters. A need exists for additional, applied research to refine these management prescriptions and provide improved guidance for land managers. This effort would be coordinated by the Science Panel [Strategy 4.1].



CLAYTON J. ANTIEAU



CLAYTON J. ANTIEAU



THE NATURE CONSERVANCY



AARON BARNA



SHUTTERSTOCK.COM/DANA E. FRY



NANCY WARNER



WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

5. Education and Public Engagement

Introduction

Current Practices

Washington State has a number of institutions and programs that provide opportunities for students of all ages to learn about biodiversity. These educational opportunities include informal learning centers, such as nature centers; national and state parks; environmental education organizations, such as the Pacific Education Institute; and consumer education campaigns, such as Salmon Safe and the Food Alliance; elementary, middle, and high schools; and colleges and universities.

The Pacific Education Institute develops and implements experiential, outdoor learning programs to help students understand the relationships between our natural and social worlds.

Gaps and Opportunities

The 2004 report card on the *Status of Environmental Education in Washington State*, requested by the Washington State Legislature, rates general awareness of environmental education in Washington as average and state support of environmental education as below average.⁵

Biodiversity components are included in some curricula for K-20 (kindergarten through graduate school) education. Institutional support is lacking, however, for nature-centered learning, field investigation, and curricula focused on Washington's unique biodiversity. Expanded support for these new and innovative biodiversity curricula efforts within individual school districts would further the state's environmental education goals and increase student understanding of the science and importance of biodiversity.

Rich opportunities exist to focus on understanding natural systems and the role they play in our lives and to enhance the ability for citizens to have meaningful contact with the natural world. The value of outdoor education and learning could be emphasized and encouraged to a far greater extent than it is today. Citizen science pro-

⁵ Environmental Education Association of Washington, *Report Card on the Status of Environmental Education in Washington State*.(2004).

grams, a tested methodology for both engaging adults in learning about their environment and in collecting data to help scientists fill gaps, offer one such opportunity for environmental education.

Recommendations

OBJECTIVE: Inform, educate, and engage Washingtonians—decision makers, students, adult learners, and the general public—to create an understanding of biodiversity’s importance to our quality of life and to build capacity to take action to conserve, care for, and restore ecosystems.

Education is a crucial component of this Biodiversity Conservation Strategy. The Council’s vision is that, within 10 years, the educational system will provide students with a comprehensive understanding of the science and value of biodiversity. Over the next two to four years, building on existing efforts, new messages need to be developed and communicated to the public and key decision makers about the value of biodiversity. These two sets of activities will increase citizens’ active support of conservation efforts.

The four strategies presented below are designed to achieve this objective, by enhancing and strengthening the existing programs and through close collaboration with the organizations and institutions currently involved in environmental education. These strategies are also linked to the approaches described in Strategies 1.1 to 1.3, as an important part of the toolbox of conservation measures.

Strategy 5.1:

Develop effective messages and conduct outreach.

Problem Addressed: Consistent and well-designed messages are needed to increase awareness of the importance of biodiversity and the actions that citizens can take to help conserve biodiversity. Funding for development of such messages is limited, and a great number of organizations could collaborate on delivering them. The recommendations below are put forth with the purpose of building stronger networks, developing partnerships, and leveraging and supporting existing programs and initiatives.

Potential Partners: Environmental interest groups, Environmental Education Association of Washington, Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, Washington State Department of Ecology, Washington State Department of Tourism, Washington State Parks and Recreation Commission, Puget Sound Partnership, Washington State Conservation Commission, conservation districts, tribes, The Nature Conservancy, Conservation Northwest, People for Puget Sound, Initiative for Rural Innovation and Stewardship, and existing nature centers and nature-based education programs.

ACTION 5.1.1

Invest in the development and delivery of effective messages and materials about biodiversity value and conservation opportunities.

Achieving delivery of consistent messages from a range of organizations that reach out to students, adult learners, and the general public would help citizens gain a better understanding of the importance of biodiversity and stimulate behavior change to conserve biodiversity.

A high-powered biodiversity messaging team would be created in cooperation with local, regional, and statewide groups conducting education and outreach on topics related to biodiversity. The team would identify specific needs for educational pieces, such as recognition of landowner stewardship efforts [Recommended Action 2.1.4], and it would work to incorporate the biodiversity messages into key documents produced by the Puget Sound Partnership, the Governor's Ocean Policy workgroup, E3 Initiative, and other related organizations.

ACTION 5.1.2

Facilitate ongoing communication and collaboration among organizations that engage in nature-based learning.

Creating vibrant networks among those entities specifically working in nature-based education is essential to fostering communication, consistent messaging, and useful sharing of resources.

Workshops and other outreach events would be held to convene these organizations. Among other objectives, these events would be an opportunity for collaboration on and adoption of the biodiversity messages discussed in Recommended Action 5.1.1. Additional actions would include creating a list-serve and greater support and investment in the Washington Biodiversity Project website as a hub for sharing information.

ACTION 5.1.3

Develop and provide decision-making tools related to biodiversity conservation for local officials and leaders.

Educational materials would be developed that specifically target the needs of local officials and the issues they face in their jurisdictions. These needs and issues include quantifying and describing the benefits of healthy ecosystems to citizens and communities as well as fostering a general understanding of the range of tools and services available for education and conservation.

ACTION 5.1.4

Coordinate state, local, and federal government programs conducting education on invasive species; facilitate the sharing of materials.

The Washington Biodiversity Council has been working with the Washington Invasive Species Council to identify needed actions to address the threat that invasive species pose to Washington's biodiversity. The Invasive Species Council will develop a coordinated outreach campaign closely linked to the efforts of the Biodiversity Council to enhance and develop methods for more involvement in invasive species programs, including the following elements:

- Use the outreach campaign to educate the public on the threats of invasive species with tools for volunteer and citizen activists;
- Develop a comprehensive and consistent media plan for the Invasive Species Council that encourages shared resources and management of information; and
- Use the web to display information and to allow access to key invasive species information for a “one-stop shop” resource.

Strategy 5.2:

Significantly enhance learning opportunities about biodiversity for K-20 students.

Problem Addressed: The curriculum for kindergarten through graduate school (K-20) in Washington increasingly emphasizes environmental education, thanks in large part to the work of those organizations listed below as potential partners. Biodiversity is not consistently integrated into K-20 curricula, however. Continued collaboration with and leverage of existing organizations and efforts would expand teachers’ and students’ understanding of and concern for biodiversity. Such efforts would help existing statewide environmental education efforts to complement one another.

Potential Partners: Pacific Education Institute, Washington Office of the Superintendent of Public Instruction, Environmental Education Association of Washington, Governor’s Council for Environmental Education, E3 Washington and the E3 Initiative’s Comprehensive Plan for Environmental Education, University of Washington’s NatureMapping Program, Facing the Future, IslandWood, Woodland Park Zoo, Puget Sound Partnership, Washington Forest Protection Association, Washington State Department of Fish and Wildlife, Washington State Parks and Recreation Commission, Washington State Conservation Commission, regional learning centers, and nature centers across the state.

ACTION 5.2.1

Create a biodiversity education component as part of the Washington Learns innovations for math and science.

Biodiversity education should be incorporated within the science emphasis of Washington Learns, the Governor’s plan for statewide education. Biodiversity could be linked to several of the math and science strategies. Conservation science conducted in conjunction with the owners of working lands would be an excellent example of the public-private learning partnerships envisioned in Washington Learns. Understanding of biodiversity and conservation science would be increasingly valuable in the future, both for tackling our own local environmental challenges as well as a marketable skill in a national and global marketplace.

ACTION 5.2.2

Work with the Washington Academy of Sciences to create a Washington Academy of Sciences for Youth.

The Washington Academy of Sciences has authority to conduct public education, science fairs, and similar programs that promote science for the public, in addition to its research duties. A Washington Academy of Sciences for Youth would connect to the public school curriculum and provide opportunities for students to conduct meaningful research in biodiversity conservation and other issues. Programs that demonstrate the ability of students to generate credible data on conservation would encourage and validate other youth- and community-based scientific studies. This recommendation may be implemented in partnership with the Pacific Education Institute, which has the capacity to create K-20 programs with the Office of the Superintendent of Public Instruction, and school districts, to conduct research in biodiversity conservation that informs the Biodiversity Scorecard and other field study needs.

ACTION 5.2.3

Create a Washington Outdoor Academy to produce tomorrow's leaders in natural resources management.

Direct experience with the natural world is key to inspiring students of all ages to learn more about biodiversity conservation. Programs are needed that encourage young people to enter the professions of natural resources management, environmental science, agriculture, and forestry. The Washington Outdoor Academy would enable students to gain meaningful hands-on experience and understanding of natural resource management in concert with the public school system. For example, high school students could conduct biodiversity stewardship projects in their communities through collaboration between the Academy, the Pacific Education Institute, the Association of Washington School Principals, and the Office of the Superintendent of Public Instruction.

ACTION 5.2.4

Further the development and widespread adoption of innovative approaches to biodiversity education.

Many experts have suggested ideas to build on existing programs or develop new approaches to fostering enhanced biodiversity education. The Council supports either using existing networks of environmental educators or convening a working group to develop options in this rich area, including the following efforts:

- Ensure that all Washington students participate in field-based investigations. This goal may be tied with the citizen science network [Strategy 5.3] or with the Washington Outdoor Academy [Recommended Action 5.2.3].
- Tailor existing state programs to biodiversity, such as the Washington State Leadership and Assistance for Science Education Reform (LASER) program's provision of science inquiry kits to classrooms.
- Work in concert with House Bill 1495 to invite tribes to bring tribal histories of interactions with the natural world and current biodiversity management practices into public schools.

- Encourage changes in teacher education and continuing education programs to increase opportunities for biodiversity conservation training.
- Enhance existing biodiversity research and education at the university level. For example, the University of Washington's College of Forest Resources and The Evergreen State College have important research and offerings related to biodiversity. These efforts could be expanded and linked to other recommendations in this report, including establishing a Biodiversity Science Center [Recommended Action 4.1.1] and initiating a Washington Biodiversity inventory [Recommended Action 4.2.1].

Strategy 5.3:

Use expanded citizen science networks to engage people in conservation and to inventory and monitor biodiversity.

Problem Addressed : Citizen science programs have a dual purpose of engaging and educating the public, while providing an efficient opportunity for the collection of scientific data related to biodiversity. A well-designed and well-implemented system will use trained volunteers in efficient collection of data. Building a robust science network of citizens will support many other recommendations found in this report, notably in gathering data for the Biodiversity Scorecard [Strategy 6.2].

Potential Partners: Washington Department of Fish and Wildlife, universities, museums, environmental and science volunteer programs, Environmental Education Association of Washington, Puget Sound Partnership, University of Washington's NatureMapping Program, Pacific Education Institute, conservation districts and regional learning centers.

ACTION 5.3.1

Bring together existing programs to create a collaborative statewide citizen science initiative for biodiversity monitoring.

Universities could provide valuable input and coordination in implementing these recommendations, with expertise in data management, monitoring, and training citizens and K-12 teachers in data-gathering and information management methods. Actions would include the following efforts:

- Establish an action-oriented steering committee to launch the statewide initiative.
- Focus efforts on collecting data for biodiversity indicators, which would contribute to the production of the Biodiversity Scorecard.
- Hire a coordinator for the project and ensure adequate funding for information technology support.
- Ensure that professionals and natural resource agencies are involved in design of the protocols and database.
- Ensure that the data collected are stored at a scale that is of benefit to the widest possible range of users, including local jurisdictions.

- Create a grant program for local centers to develop capacity to participate in the project. Grants should cover staffing, technology, training, and other aspects of participation.
- Ensure that monitoring for invasive species occurs.

ACTION 5.3.2

Organize a conference for participants in the citizen science initiative to share knowledge and improve capacity.

Strategy 5.4:

Support community stewardship programs in conserving biodiversity and restoring and caring for ecosystems.

Problem Addressed: Washington's numerous community stewardship programs provide biodiversity conservation benefits both locally and statewide. These citizen-led programs, which are locally based around specific geographies and school districts, typically lack sustained funding. Program leaders and sponsors often are not well-connected to other similar programs. Increased investment in and communication among volunteers, landowners, and organizations would result in a sharing of ideas and build capacity to benefit collaborative conservation efforts.

Potential Partners: Local governments, existing community stewardship programs, land trusts and conservancy organizations, environmental education organizations, Puget Sound Partnership, Environmental Education Association of Washington, Pacific Environmental Institute, Washington State Department of Natural Resources' Small Forest Landowner Office, grange organizations, conservation districts, and cooperative extension services.

ACTION 5.4.1 Provide training and recognition to community stewardship programs.

Elements of this action would include the following efforts:

- Build a component into the Biodiversity Project website targeted specifically toward the needs of community stewardship groups;
- Host workshops to provide opportunities for networking and synergy among groups;
- Initiate a recognition program through publication of a set of success stories or case studies and through profiles on the Biodiversity Project website;
- Link community stewardship programs to the citizen science initiative where appropriate; and
- Assist community stewardship programs in quantifying and demonstrating the ecosystem services provided by the resources they work to conserve.



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WASHINGTON DEPARTMENT OF FISH AND WILDLIFE



DAVID PERRY

6. Achieving Results

The Biodiversity Conservation Strategy offers many benefits to Washington citizens. By implementing the recommendations described in this document, we will make progress toward restoring and protecting functioning and intact ecosystems, conserving and restoring viable populations of native species, and ensuring that healthy ecosystems sustain and support a high quality of life for humans.

The work of the Biodiversity Council has already fostered progress toward these goals. For example, the Healthy Lands Initiative in north central Washington and the Pierce County Biodiversity Alliance have leveraged small grants from the Council toward regional conservation efforts (see Appendix B). It is important to build on these early successes and move forward to achieve the Council's vision.

This section presents strategies to take immediate action and achieve results. Strategy 6.1 is designed to provide leadership to implement the Biodiversity Conservation Strategy, through extension of the Biodiversity Council and establishment of biodiversity as an organizing principle to guide the state's natural resource investments and programs. Strategy 6.2 is designed to provide information and accountability to the public and decision makers, primarily through development of a Biodiversity Scorecard and enhancement of the existing Biodiversity Project website. Strategy 6.3 provides for identification and recommendation of funding sources, including for regional pilot projects.

Pilot projects have begun achieving the goals of the Biodiversity Conservation Strategy.

The **Pierce County Biodiversity Alliance** organized a BioBlitz, or rapid biological inventory, in the lower White River Biodiversity Management Area (BMA). Landowners in Pierce County BMAs are eligible for reduced property taxes. The BioBlitz ground-truthed species diversity, engaged citizen scientists, and served as a kick-off for community planning.

The **Healthy Lands Initiative** brought together the agriculture, land conservation, planning, and economic development communities to learn about the biodiversity in north central Washington and to explore conservation tools and resources, both existing and potential.

Recommendations

OBJECTIVE: Provide leadership, accountability, and funding to ensure successful implementation of the Biodiversity Conservation Strategy.

Strategy 6.1:

Provide leadership to implement the Biodiversity Conservation Strategy.

Problem Addressed: Coordinated, focused leadership will be essential to achieve the goals of the Biodiversity Conservation Strategy and initiate implementation of key recommendations. Responsibilities for implementation will be spread among several different agencies and organizations and will involve extensive engagement of local governments. Leadership on the goals of the strategy will be needed at the highest levels of government to integrate the work of different agencies and deliver results to the Governor and Legislature.

However, providing such leadership by either creating a new entity or charging an existing entity with the lead responsibility for implementation requires a high level of consensus and political support. This support will take time and effort to achieve and will need extensive engagement of the state's senior leadership on natural resource issues.

Potential Partners: Office of the Governor, Washington State Recreation and Conservation Office, Washington State Department of Natural Resources, Washington Department of Fish and Wildlife, Washington State Conservation Commission, Washington Invasive Species Council, Governor's Climate Working Group, Legislature, and tribes.

ACTION 6.1.1

Extend the tenure of the Washington Biodiversity Council with the charge of guiding initial implementation of the Biodiversity Conservation Strategy

Key actions to be undertaken in 2008 and 2009 include the following steps:

- Providing leadership to implement the early action recommendations.
- Developing and implementing regional pilot programs [Recommended Action 6.3.1]
- Convening senior leaders and key staff in natural resource agencies to develop consensus on an approach to provide ongoing leadership and accountability for biodiversity conservation.
- Working with the Governor's office, legislators, and natural resource agencies to prepare a Biodiversity Conservation Strategy legislative package for 2009.
- Creating the Biodiversity Science Panel, which will in turn help develop the Biodiversity Scorecard.
- Directing the creation of the state's first Biodiversity Scorecard to provide a baseline status of the health of Washington's biodiversity resources and the effectiveness of current actions to conserve those resources [Recommended Action 6.2.1].

ACTION 6.1.2

Through legislation, establish biodiversity conservation as an organizing principle to guide the state's natural resource investments and programs.

Support among the stakeholders and agency officials who provided input on this strategy was strong for making biodiversity conservation an organizing principle to guide those state agencies involved in managing and regulating natural resources. Most agree that taking a bigger picture ecosystem or ecoregional approach, determining the biodiversity values at that system or regional level, and then coordinating on actions and strategies to conserve biodiversity is smart policy. Such an approach will lead to better natural resource policies, programs, and investments. Stakeholders also agree on the challenge of coordinating the work of different agencies, not to mention local and federal governments, to achieve shared objectives.

Accordingly, this recommendation intends to enshrine, through state law, biodiversity conservation as an organizing principle for natural resource management. Legislation recognizing the importance of biodiversity would spur greater integration and coordination of efforts toward common ends, covering all state agencies. This recommendation would be similar to SSB 5236, which directed state agencies to coordinate on land acquisition programs.

Manifestations of this recommendation could include incorporation of biodiversity goals into public land management activities and procedures for agencies such as transportation, parks, schools, and prisons. It could also involve changes to the legislative mandates of natural resource agencies to recognize their stewardship responsibilities. For example, Washington Department of Fish and Wildlife's Comprehensive Wildlife Conservation Strategy recognized biodiversity as a guiding principle for the agency, one that will be implemented through regional wildlife action plans.

Strategy 6.2:

Provide information on the status of biodiversity and accountability for the effectiveness of conservation programs.

Problem Addressed: Accountability for results begins with having accurate and timely information on the status of the state's biodiversity and the effectiveness of state and local actions to conserve that biodiversity. A Biodiversity Scorecard can help to ensure that investments by the state, private sector, and nonprofits in biodiversity conservation deliver the expected benefits.

An effective website can serve multiple objectives, including providing information, ensuring accountability, educating the public, and helping to coordinate government, private, and non-profit conservation actions.

Potential Partners: Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, Washington State Conservation Commission, Washington State Recreation and Conservation Office, Washington Invasive Species Council, The Nature Conservancy, and conservation organizations.

ACTION 6.2.1

Prepare, and regularly update, a Biodiversity Scorecard that illustrates trends in the health of our state's biodiversity and reports on the effectiveness of our actions to conserve that biodiversity.

The Biodiversity Scorecard will be designed for communication with decision makers, leaders, the Legislature, and the public. It will contain a status report on the health of Washington's biodiversity; an accountability report on the performance of government, nonprofits, and the

private sector in taking action to conserve biodiversity; and indicators of quality of life for Washingtonians.

The Biodiversity Council, working in conjunction with the Biodiversity Science Panel [Recommended Action 4.1.1], should take the lead on producing this scorecard, with a prototype developed in 2008. The Biodiversity Scorecard would be updated every two years, with a more comprehensive report on biodiversity status and trends developed every six years to review progress as well as to update priorities and strategies to preserve biodiversity.

Government accountability indicators could include the following items:

- Scope and effectiveness of incentive programs, including land owner participation, funds used for incentives, and acres in conservation programs,
- Availability of market-based programs, including number of programs and participation levels.
- Extent to which the Conservation Opportunity Framework is being used by state and local officials.
- Percent of high-priority lands in conservation status.
- Number and level of participation of citizens involved in citizen science networks.

Biodiversity Scorecard indicators could include the following topics:

Goal: Restore and care for ecosystems.

Sample Indicators

- Ecological status of public lands
- Normality of variability of disturbance regimes (e.g., fire, flood, insects)

Goal: Conserve species diversity.

Sample Indicators

- Number of threatened or endangered species
- Number of non-native, invasive species

Goal: Protect quality of life for people.

Sample Indicators

- Access to natural areas
- Number of schools that have hands-on experiential nature programs

Appendix C includes a more detailed list of potential indicators. Relevant agencies and the citizen science network [Strategy 5.3] would collect data on these indicators.

ACTION 6.2.2 Invest in the Biodiversity Project website.

A robust biodiversity website has the potential to be a state hub for biodiversity information, resources, and data, fostering networking among agencies and individuals interested in conserving biodiversity in their region. The current Biodiversity Project website is a start toward achieving this vision. With a modest investment of resources, an expanded and upgraded website can offer the following services:

- Provide ready access to maps and data about biodiversity significance and risk to interested parties;
- Share up-to-date information on the status of Washington's biodiversity at the local, regional, and state levels;
- Provide a platform for the development of regional biodiversity websites;
- Foster networking among agencies and individuals interested in conserving biodiversity in the region;
- Be a portal for biodiversity data;
- Host a biodiversity library; and
- Provide educational resources for teachers and students.

The Biodiversity Council [Recommended Action 6.1.1] with adequate staff and funding can take the lead on building this website. For the educational component, the Council staff should work with the Environmental Education Association of Washington and others to establish a steering committee representing a range of institutions involved in nature-based education. These advisors should help guide the development of the website to ensure that it effectively serves the needs of nature educators throughout the state.

Strategy 6.3:

Identify and recommend funding options to implement the strategy.

Problem Addressed: Resources will be needed to implement this strategy and so conserve the state's biodiversity resources. Some funds are likely to be available through the state's general fund, the capital budget, and the federal government, but not enough to move forcefully to implement many of the key recommendations, particularly those related to incentives and support for local governments. Fortunately, many opportunities exist to find new ways to fund biodiversity conservation, and many entities are hard at work developing alternative funding strategies. Gaining the political consensus needed to move forward also poses a challenge, and competition is high for the limited funds available from existing sources.

Potential Partners: Washington State Legislature, Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, Washington State Department of Ecology, Washington State Conservation Commission, Trust for Public Lands, The Nature Conservancy, Cascade Land Conservancy, Association of Realtors, Washington State Association of Counties, Washington Farm Bureau, Ruckelshaus Policy Consensus Center, Office of Farmland Preservation, Puget Sound Partnership, Washington Invasive Species Council, U.S. Department of Agriculture, and Washington's U.S. Congressional delegation.

ACTION 6.3.1

Provide funding from the supplemental budget to initiate one or more regional pilot programs and develop the Biodiversity Scorecard.

The Biodiversity Council is requesting funding for Fiscal Year 2008-2009 to implement a regional pilot program and develop a Biodiversity Scorecard and accountability measures for biodiversity conservation.

The Council is proposing to establish several regional pilot programs in areas identified as a high priority in the Council's conservation opportunity mapping process. These projects would fund regional coordinators to work with landowners, local officials, conservation districts, community members, and others to direct resources to critical conservation needs. The Healthy Lands Initiative and the Pierce County Biodiversity Alliance are examples of existing biodiversity pilot projects that could be further leveraged with continued funding. Such an effort would include refining the regional maps to a local scale, directing technical assistance and outreach about incentives to key landowners in the area, and working in partnerships to secure resources to support and fund education and conservation work.

ACTION 6.3.2

Convene a working group to identify and recommend innovative funding to generate income from and for conservation.

Over the long term, a substantial injection of new resources will be required to achieve the state's biodiversity conservation objectives. Expanding incentive programs as recommended in Strategy 2.2 will cost money, as will providing additional resources for local governments to incorporate biodiversity conservation into planning and to provide increased assistance to landowners to achieve compliance. Accordingly, Washington State will need to develop new funding sources which will require creative thinking and political support for implementation. Many new initiatives to finance conservation are being developed in Washington and elsewhere, including expanded use of tax incentives, public-private investment instruments, mitigation banking, establishment of a conservation investment bank, and financing habitat banking using state bonds. For more detail, see Appendix A, "Options for Financing Biodiversity Conservation in Washington."

It was beyond the scope of the Biodiversity Council to evaluate fully the feasibility of these options and other related efforts or to build political support for a preferred alternative. The Council recommends that a working group consisting of stakeholders from representatives of government, conservation organizations, trade associations, and the private sector be convened to address this issue and to recommend a long-term strategy to the Governor and Legislature. This working group should be supported by experts and conduct a study of options. This effort can be linked to similar initiatives underway for the Puget Sound Partnership.

ACTION 6.3.3 Review funding mechanisms for efforts to control invasive species.

The Washington Biodiversity Council has been working with the Washington Invasive Species Council to identify needed actions to address the threat that invasive species pose to Washington's biodiversity. The Invasive Species Council will review budgeting and funding allocations on invasive species projects with an emphasis on state agencies. This review will focus on determining whether current allocations are adequate for effective invasive species management, research, and eradication efforts. The effort will result in a compilation of funding tools with which to make recommendations for the Washington Invasive Species Strategic Plan.

Invasive Species in Washington



WASHINGTON DEPARTMENT OF FISH AND WILDLIFE



JANNA NICHOLS



ART WAGNER



RICHARD OLD



BEN LEGLER

Summary of Recommendations

■ Guiding Investments on the Ground: Using the Conservation Opportunity Framework

Objective: State agencies and local governments, along with their nonprofit and federal government partners, will use the Conservation Opportunity Framework as a basis for identifying opportunities, establishing priorities, and implementing strategies for biodiversity conservation throughout Washington State.

Strategy 1.1:

Use the Conservation Opportunity Framework to guide investments and other conservation activities.

- 1.1.1 Integrate biodiversity conservation maps and other data with existing agency data and guidance documents used by local governments for planning purposes.
- 1.1.2 Use the Conservation Opportunity Framework to facilitate coordination among those responsible for managing lands and waters.

Strategy 1.2:

Fully incorporate biodiversity conservation into existing state acquisition programs.

- 1.1.1 Update the criteria for selecting projects to fund under the Washington Wildlife and Recreation Program.
- 1.1.2 Use biodiversity conservation as the basis for coordinating acquisition programs as required by SSB 5236.
- 1.2.3 Use funding from existing programs to acquire lands and shorelines of high biodiversity significance.

Strategy 1.3:

Produce high quality data products to assist land managers and decision makers to develop conservation plans and strategies.

- 1.3.1 Develop, and periodically update, future editions of the biodiversity conservation opportunity maps.

■ Incentives and Markets

OBJECTIVE: Washington will offer an expanded, integrated suite of incentives and market based programs that are easily accessible to private landowners, and that make voluntary stewardship and conservation a practical and rewarding option. Incentive programs will be structured to especially encourage investment in high priority landscapes.

Strategy 2.1:

Make existing landowner incentive programs more accessible, easier to use, and strategic.

- 2.1.1 Assign responsibility for coordinating landowner incentive programs to a single state entity.
- 2.1.2 Establish a clearinghouse to distribute information and provide technical assistance on conservation incentives.
- 2.1.3 Create a program of regional “brokers” or matchmakers in high-priority areas for biodiversity conservation, beginning with a pilot project.
- 2.1.4 Improve and expand public recognition for voluntary private sector stewardship of lands.

Strategy 2.2:

Strategically expand incentive programs to target high-priority conservation areas and meet needs of underserved landowners.

- 2.2.1 Dedicate incentive funding toward meeting the needs of landowners in high-priority areas for biodiversity conservation.
- 2.2.2 Develop new programs for underserved landowners, including small farmers and owners of non-working rural lands.
- 2.2.3 Provide additional funding for selected highly effective existing incentive programs.
- 2.2.4 Facilitate the expansion of new or enhanced incentives for landowners to control invasive species.

Strategy 2.3:

Accelerate the development of conservation markets to create new income streams for conservation actions.

- 2.3.1 Provide leadership within state government to develop conservation markets in Washington.
- 2.3.2 Conduct feasibility studies and pilot projects to grow markets for biodiversity conservation.

Strategy 2.4:

Improve the effectiveness of existing regulatory programs.

- 2.4.1 Commission a study to review the effectiveness of existing regulatory programs.

Strategy 2.5:

Maximize the use of current use taxation as a property tax incentive for biodiversity conservation.

- 2.5.1 Identify and overcome barriers to using current use taxation to conserve biodiversity.
- 2.5.2 Clarify how the Open Space Tax Act can be used to address biodiversity through current use taxation and Public Benefit Rating Systems.

■ Land Use and Development

OBJECTIVE: Biodiversity conservation priorities and tools are incorporated into land use planning processes, development actions, and management activities.

Strategy 3.1:

Provide direct assistance to local governments through funding and technical assistance.

- 3.1.1 Provide funding to improve the ability of local governments to plan and manage for biodiversity and to integrate biodiversity assessments into comprehensive plans.
- 3.1.2 Expand technical assistance to support the efforts of local governments to plan and manage for biodiversity conservation.
- 3.1.3 Increase funding to local governments to accelerate the adoption of low impact development and other green building practices.

Strategy 3.2:

Ensure consistency and compliance with existing laws, plans, and regulations.

- 3.2.1 Provide funding to local governments to ensure consistency and compliance with existing laws, plans, and regulations.
- 3.2.2 Enhance consistency and enforcement of invasive species regulations for effective control of invasive species.

Strategy 3.3:

Make mitigation more efficient for developers and effective for conservation.

- 3.3.1 Improve the process for developing innovative mitigation alternatives including mitigation banks, advance mitigation, and fee-in-lieu programs.
- 3.3.2 Develop and provide guidance on appropriate mitigation for terrestrial habitats.
- 3.3.3 Establish pilot projects to explore opportunities for valuing ecosystem components and services in offsite mitigation activities.

Strategy 3.4:

Further the development and widespread adoption of innovative approaches to development that promote biodiversity conservation.

- 3.4.1 Conduct pilot projects with local governments to explore and test programs such as tiered building permits and reduced fees for conservation-oriented development projects.
- 3.4.2 Test models for regional coordination on biodiversity issues and priorities.
- 3.4.3 Conduct research to document the impact of patterns of development on biodiversity.
- 3.4.4 Expand use of transfer of development rights in areas facing rapid development.

Strategy 3.5:

Fully incorporate biodiversity conservation strategies into the management of public lands.

- 3.5.1 Improve knowledge of biodiversity on public lands.
- 3.5.2 Explicitly integrate the ecoregional Conservation Opportunity Framework into existing planning and conservation programs for public lands and waters.
- 3.5.3 Manage public lands in a manner that conserves biodiversity.

■ Science and Information

OBJECTIVE: Establish a comprehensive scientific understanding of Washington’s biodiversity and effective conservation practices and make available information readily accessible and useful for land managers and decision makers.

Strategy 4.1:

Through new leadership and partnerships, create a strong science foundation to inform policy and action on biodiversity conservation.

- 4.1.1 Establish a Biodiversity Science Panel and affiliated Center to address science questions in implementing the Biodiversity Conservation Strategy.
- 4.1.2 Create a Biodiversity Data Partnership to address the needs for improved integration of biodiversity data systems and better information for decision makers.

Strategy 4.2:

Fill critical gaps in our knowledge of Washington’s biodiversity and how best to conserve it.

- 4.2.1 Initiate the Washington Biodiversity Inventory, a long-term project to survey and inventory all species in the state.
- 4.2.2 Develop a statewide Biodiversity Monitoring Plan in close coordination with the Governor’s Monitoring Forum and other state and regional monitoring efforts.
- 4.2.3 Develop conservation strategies to address the impact of climate change on biodiversity and Washington’s natural resource base.
- 4.2.4 Develop a research program to quantify the economic value of ecosystem services.
- 4.2.5 Conduct a baseline assessment to develop and review current invasive species data.
- 4.2.6 Develop and refine management prescriptions designed to conserve biodiversity.

■ Education

OBJECTIVE: Inform, educate, and engage Washingtonians—decision makers, students, adult learners, and the general public—to create an understanding of biodiversity’s importance to our quality of life and to build capacity to take action to conserve, care for, and restore ecosystems.

Strategy 5.1:

Develop effective messages and conduct outreach.

- 5.1.1 Invest in the development and delivery of effective messages and materials about biodiversity value and conservation opportunities.
- 5.1.2 Facilitate ongoing communication and collaboration among organizations that engage in nature-based learning.
- 5.1.3 Develop and provide decision-making tools related to biodiversity conservation for local officials and leaders.
- 5.1.4 Coordinate state, local, and federal government programs conducting education on invasive species; facilitate the sharing of materials.

Strategy 5.2:

Significantly enhance learning opportunities about biodiversity for K-20 students.

- 5.2.1 Create a biodiversity education component as part of Washington Learns innovations for math and science.
- 5.2.2 Work with the Washington Academy of Sciences to create a Washington Academy of Sciences for youth.
- 5.2.3 Create a Washington Outdoor Academy to produce tomorrow’s leaders in natural resources management.
- 5.2.4 Further the development and widespread adoption of innovative approaches to biodiversity education.

Strategy 5.3:

Use expanded citizen-science networks to engage people in conservation and to inventory and monitor biodiversity.

- 5.3.1 Bring together existing programs to create a collaborative statewide citizen science initiative for biodiversity monitoring.
- 5.3.2 Organize a conference for participants in the citizen science initiative to share knowledge and improve capacity.

Strategy 5.4:

Support community stewardship programs in conserving biodiversity and restoring and caring for ecosystems.

- 5.4.1 Provide training and recognition to community stewardship programs.

■ Achieving Results

OBJECTIVE: Provide leadership, accountability, and funding to ensure successful implementation of the Biodiversity Conservation Strategy.

Strategy 6.1:

Provide leadership to implement the Biodiversity Strategy.

- 6.1.1 Extend the tenure of the Washington Biodiversity Council with the charge of guiding initial implementation of the Biodiversity Conservation Strategy.
- 6.1.2 Through legislation, establish biodiversity conservation as an organizing principle to guide the state's natural resource investments and programs.

Strategy 6.2:

Provide information on the status of biodiversity and accountability for the effectiveness of conservation programs.

- 6.2.1 Prepare, and regularly update, a Biodiversity Scorecard that illustrates trends in the health of our state's biodiversity and reports on the effectiveness of our actions to conserve that biodiversity.
- 6.2.2 Invest in the Biodiversity Project website.

Strategy 6.3:

Identify and recommend funding options to implement the Biodiversity Conservation Strategy.

- 6.3.1 Provide funding from the supplemental budget to initiate one or more regional pilot programs and develop the Biodiversity Scorecard.
- 6.3.2 Convene a working group to identify and recommend innovative funding to generate income from and for conservation.
- 6.3.3 Review funding mechanisms for efforts to control invasive species.

Native Species in Washington



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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION



AARON BARNA



UNIVERSITY OF WASHINGTON HERBARIUM

Conservation Opportunity Framework

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Seven Ecoregions in Washington 114

Introduction

This chapter provides additional information about the development and intended use of the Conservation Opportunity Framework introduced in Chapter 3, Strategies 1.1 – 1.3. This framework establishes criteria for assessing both conservation value and risk, from a regional perspective, and for developing maps to display these criteria graphically across the landscape. The maps are intended to be used together with other information sources to guide investments in acquisition, management, and stewardship activities on the land.

Maps provide guidance on where to invest

The maps that the Biodiversity Council generated under this framework are intended to provide guidance on where to invest in conservation activities. They are based on ecoregional assessments, the best and most recent statewide analysis of Washington’s biodiversity as it is currently understood¹, and on projections of future population growth and land use.

Conservation Approaches

Conservation efforts can involve many different activities, including but not limited to:

- Best management practices
- Adaptive management
- Scientific inquiry and research
- Citizen science efforts
- Monitoring
- Invasive species control
- Restoration
- Mitigation
- Acquisition
- Conservation easements
- Education and technical assistance
- Land use planning
- Landowner incentives
- Recognition
- Transfer or purchase of development rights
- Conservation markets

The maps are best viewed as illustrating a range of *opportunities* for voluntary and collaborative approaches, where people and organizations can work together to conserve biodiversity and maintain working lands and other important cultural attributes of a landscape. It is important to recognize that “conserve” is a multi-faceted verb, not limited to land acquisition. Conservation activities can range from individual actions, such as creating a backyard wildlife habitat or making informed shopping decisions, to system-wide changes, such as a community employing biodiversity-conscious land use planning measures or building innovative conservation markets. Please see the sidebar for a list of other types of possible approaches.

The maps show opportunities to conserve not only the rarest species or the richest habitats, but also to maintain common species and ecosystems. The methodology and criteria were designed in part to identify a full range of important habitats, and to help avoid future conservation crises.

Considerations in using the maps

While these maps do a good job of identifying areas of priority from an ecoregional perspective, they are not designed to replace more detailed or specialized assessments, and they do not prescribe specific actions or strategies. They are not intended to be used as the sole source for planning conservation initiatives.

For example, the recently completed assessment of freshwater systems (see p. 112) in the state is a tool that could be used to enhance the level of detail of these maps.² Similarly, information from the Washington Natural Heritage Program, Washington Department of Fish and Wildlife, and other agencies can help provide context and nuance to these maps.

The conservation opportunity maps also do not substitute for local conservation priorities. Some areas may have features important to local residents or communities, but the areas would not necessarily be indicated as high priorities from an ecoregional perspective. Such an area might be smaller than the landscape units measured on the map.

Conditions in Washington are changing rapidly, and these maps will need to be periodically updated. They rely on our current knowledge about biodiversity and about projected population growth. Rather than being static, the maps should be viewed as a dynamic tool, responsive to increased knowledge.

The Council emphasizes that all areas of the state can contribute to biodiversity conservation, no matter how an area ranks on these maps. The maps provide a high-level comprehensive look at a wide range of species, plant communities, and ecological systems in seven of Washington's nine ecoregions.

Methodology for Developing the Conservation Opportunity Maps

Ecoregions as the landscape unit for the Framework

The Council chose ecoregions as the basis for the Conservation Opportunity Framework, and it developed criteria for biodiversity significance and risk to construct the Conservation Opportunity maps. Maps have been developed for seven of the nine ecoregions in Washington State. The Blue Mountains and Canadian Rockies ecoregions' Conservation Opportunity Maps have yet to be completed.

Ecoregions represent a practical unit to use for this framework because they are large enough to encompass populations of species and can help address habitat fragmentation, i.e., the breaking up of a habitat into unconnected patches, which is one of the major causes of biodiversity decline. An ecoregional focus also provides a means for planners to consider conservation on a scale larger than a single watershed or locality. Such a focus enables planners to address regional needs such as connectivity, which is important for wildlife corridors and is a key component of future biotic responses to climate change. Looking at regionally important areas also allows local conservation efforts to understand where and how their efforts contribute to conservation in the larger landscape.

Ecoregions are relatively large geographic areas of land and water, with shared characteristics of climate, vegetation, geology and other ecological and environmental patterns.

Washington's ecoregional assessments are part of a national and international effort. Geographic information systems (GIS) are supplemented with expert local and regional knowledge.

² Skidmore, P.B. 2006. Assessment of Freshwater Systems in Washington State. The Nature Conservancy, Seattle, WA

The Council has analyzed biodiversity significance, future risks, and conservation opportunities for seven of the state's nine ecoregions. As detailed below, the **biodiversity significance** analysis reveals low, medium, and high values for native biodiversity from an ecoregional perspective. The **future risk** analysis indicates low, medium, and high likelihood of increased development pressure in the next 30 years. The overlay of data from these two analyses constructs a map of **conservation opportunities**.

Biodiversity Significance

Data Source: Ecoregional Assessments

The maps of biodiversity significance are based on products from ecoregional assessments that have been completed for seven of Washington's nine ecoregions. The Washington ecoregional assessments are part of a national and international effort, and they were developed in a multi-year collaboration among the Washington Department of Fish and Wildlife, Washington State Department of Natural Resources, The Nature Conservancy, and The Nature Conservancy of Canada.³

Washington's ecoregional assessments were developed over a 10-year period. The methodology evolved during this time and the landscape units differ.

Watersheds are used in these ecoregional assessments:

- Northwest Coast
- West Cascades
- East Cascades

Hexagons are used in these ecoregional assessments:

- Puget Trough
- North Cascades
- Okanogan
- Columbia Plateau

The ecoregional assessments use geographical information systems (GIS) analyses supplemented with expert local and regional knowledge. The participating specialists represented a diverse array of organizations, agencies, and institutions.

The Washington ecoregional assessments were developed over a 10-year period. The methodology evolved during this time and as a result the landscape units used for the assessments differ. Watersheds were used in three of the ecoregions (Pacific Northwest Coast, West Cascades, East Cascades), and hexagon-shaped units were used in the Puget Trough, North Cascades, Okanogan, and Columbia Plateau assessments. The Puget Trough land and nearshore hexagons are a little over one square mile (741 acres or 300 hectares), and the North Cascades, Okanogan, and Columbia Plateau hexagons

are a little less than two square miles (1235 acres or 500 hectares).⁴ Grid cells (988 acres or 400 acres) were used for the nearshore areas of the Pacific Northwest Coast.

The Canadian Rockies and the Blue Mountains ecoregions extend only a small way into Washington. Conservation opportunity maps have not yet been completed.

The areas that were analyzed, whether they are watersheds or hexagons, do not represent ownership, nor do they reflect actual parcels of land.

Measures of Biodiversity Significance

Three commonly accepted measures of biodiversity significance are richness, rarity, and representation.⁵

Richness is the number of target species, plant communities, or ecological systems present in a given area. Common species are captured with this measure.⁶

³ Washington Science and Planning Web Portal, <http://www.waconservation.org>, last accessed August 2007.

⁴ Jesse Langdon and Molly Ingraham, The Nature Conservancy, personal communication (August–November 2007)

⁵ G. F. Wilhere and H. Wang, *CVI: Conservation Value Indices – User's Manual and ArcGIS Script* (Olympia, Wash.: Washington Department of Fish and Wildlife, 2006).

⁶ The data sets used for these maps looked for richness of common ecological systems in a watershed or hexagon. These ecological systems serve as an umbrella for common species and plant communities. Molly Ingraham, The Nature Conservancy, 8/07, personal communication.



THE NATURE CONSERVANCY

Richness

The Olympic Peninsula is one example of Washington's biodiversity richness. It has a high number of organisms and varied ecosystems that range from ocean beaches to alpine meadows.

Rarity can refer to rare or imperiled species, plant communities, or ecological systems. Factors that characterize rarity are population size, geographic range, and habitat specificity.⁷ If rare species, plant communities, or ecological systems occur in a watershed or hexagon, that will increase its score for biodiversity significance.



SHARON DAVIS

Rarity in a Species

The Greater sage-grouse has been declining in Washington primarily due to loss of habitat through conversion to cropland and degradation of habitat by the invasion of cheat grass and other weeds. The population is estimated to have declined 62% from 1970 to 2003. Sage-grouse currently occur on about 8% of their historical range in the state.

Washington Department of Fish and Wildlife, 2003. Final Sage-grouse Recovery Plan: Executive Summary. http://wdfw.wa.gov/wlm/diversity/soc/recovery/sage_grouse/index.htm, last accessed August 2007.



THE NATURE CONSERVANCY

Rarity in a Plant Community

Oak woodlands are a rare plant community in Washington State. Prior to the 1850s, Native Americans regularly set fire to the prairies. This maintained the special flora; the lack of this treatment contributes to the plant community's rarity by allowing trees like Douglas-fir to crowd out the oak communities. Oak woodlands are also rare because they have been converted to housing and farms, and they are susceptible to invasive species such as Scotch broom.

Chappell, C.B. 2006. Upland plant associations of the Puget Trough ecoregion, Washington. Natural Heritage Rep. 2006-01. Washington Department of Natural Resources, Natural Heritage Program, Olympia, Wash. <http://www.dnr.wa.gov/nhp/refdesk/communities/pdf/quga-cain-caqu.pdf>, last accessed August 2007.



DEPARTMENT OF NATURAL RESOURCES

Rarity in an Ecological System

Intact estuaries are an example of a rare ecological system in Washington. Many estuaries are threatened by changes in land cover of uplands, storm-water runoff, and shoreline development, such as armoring or bulkheading. These alterations can change nearshore processes and ultimately lead to declines in ecosystem function of the estuary.

Sarah Brace, Puget Sound Partnership, 8/07, personal communication.

Representation is the amount of a species, plant community, or ecological system that occurs in a local area (watershed or hexagon), expressed as a percentage of the total amount known to exist in an ecoregion. Areas with greater numbers of a species or habitat rank higher than those areas with only a single occurrence. Representation can point out largely intact landscapes, including managed or working landscapes, where ecological processes may be maintained.⁸

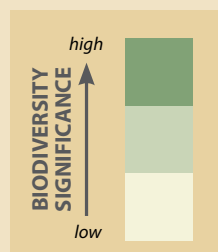
7 Rabinowitz, D., 1981. 'Seven forms of rarity' in *The Biological Aspects of Rare Plant Conservation*, edited by H. Synge. Wiley; Hartley, S. and W.Kunin, 2003. 'Scale dependency of rarity, extinction risk, and conservation priority.' *Conservation Biology* 3: 149-158.

8 G.F. Wilhere and H. Wang.'CVI: Conservation Value Indices. User's manual and ArcGIS script.' Washington Dept. of Fish and Wildlife, Olympia, Washington (2006); John Pierce, Washington Department of Fish and Wildlife, personal communication (July 2007); Molly Ingraham, The Nature Conservancy, personal communication (July 2007)

Scale for Biodiversity Significance⁹

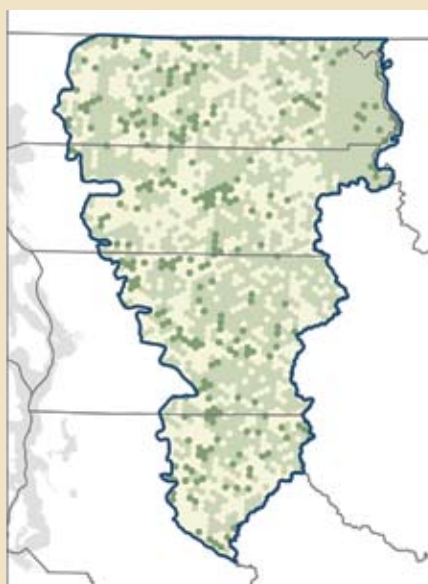
High biodiversity significance

- Significant numbers of rare species, plant communities, and/or ecosystems are known to be present, and they may not be present elsewhere.
- Biodiversity appears healthy; the area ranks high for richness.
- Ecosystems, plant communities, and populations of species are well-represented, more so than elsewhere in ecoregion.



Low biodiversity significance

- Common species or habitats may be abundant here. Biodiversity values found here can typically be found elsewhere in ecoregion.
- Biodiversity may have been affected by current or past disturbances that have lowered richness or representation.
- Ecosystems, plant communities, and/or populations of species may be fragmented compared to others in that region.
- Data or knowledge may be lacking; the analysis gives lower significance scores where data are sparse.



**Sample Map of Biodiversity Significance
(North Cascades Ecoregion)**

⁹ Low biodiversity significance means that a small amount (less than or equal to 25%) of each target (species, plant community, or ecological system) is captured in the analysis. Medium biodiversity significance means that 25-50% is captured and high biodiversity significance means that 50% or greater known occurrences are captured. The underlying analysis is made through a computer program (e.g., the MARXAN), which runs fine- and coarse-filter targets 25 times at 10 different target representation levels. Fine-filter targets (species of concern) require conservation actions or strategies because they are at risk in some way. Coarse-filter targets (plant communities or ecological systems), if present in sufficient quantity, should conserve the vast majority of species. Coarse-filter targets act as a surrogate for habitats, common species, and data gaps. *Okanagan Ecoregional Assessment* (October 2006) available at Washington Science and Planning Web Portal, <http://www.waconservation.org>; John Pierce, Washington Department of Fish and Wildlife, personal communication (October 2007)

Future Risk to Biodiversity

Data Source: Population Projections

The Council based future risk on the likelihood of increased land conversion and development and a corresponding increase in human impact on the natural environment. Areas ranked high are at risk of significant degradation to existing native biodiversity in the next 30 years if directed conservation actions do not take place.

Most major risks to biodiversity are linked to human impact, and most risks intensify as that impact increases. Population growth is a rough but reasonably reliable proxy for future ecosystem stresses, and projected land use is also a reasonable determinant of risk.¹⁰

As discussed in Chapter 2, key threats are population growth and land conversion, invasive species, pollution, and interruption of natural processes. Increasing human densities can be expected to exacerbate these threats. Certain risks are not as directly linked to population density, such as climate change, catastrophic fire, and some infestations of insects or fungi.

Measures of Future Risk to Biodiversity

Projected population density and land use were employed to estimate where the most pressure on native biodiversity will occur. The Western Futures Growth Model, which is based on data from the 2000 U.S. Census, provided these projections.¹¹ The model projects future housing density by applying population estimates and a set of spatial rules to distribute future housing across the landscape. The criteria applied to the maps are current land use (protected lands) and projected population densities for 2040 (dwellings per acre). Due to the coarse nature of this methodology, buffers surrounding areas with relatively high population density may extend over some protected areas (such as Moran State Park in the San Juan Islands). These maps should be used in conjunction with finer scale ownership maps.

The Council has selected the following categories of future risk:

- At *low risk* are all lands regardless of ownership that are currently managed primarily as “protected lands.” Protected lands as defined here are national parks, wilderness areas, wildlife areas and refuges, natural area preserves, and other lands designated as conservation areas.
- At *medium risk* are all lands where the projected population density is < 1 dwelling per 40 acres in year 2040, excluding those captured in the low- and high-risk areas.¹²
- At *high risk* are all lands where the projected population density is > 1 dwelling per 40 acres in year 2040, and all lands and all densities that occur within 5 miles of lands where the projected population density is > 1 dwelling per 10 acres in year 2040.¹³

10 Washington Biodiversity Council, “Washington’s Biodiversity: Status and Threats.” (2007)

11 Travis, W.R., D.M. Theobald, G.W. Mixon, T.W. Dickinson, 2005. “Western Futures: A look into the patterns of land use and development in the American West. Report #6 from the Center of the American West, University of Colorado at Boulder; <http://www.centerwest.org/futures/>

12 The density threshold of 1 dwelling per 40 acres was selected because as human density increases above this level, wildlife species that are mostly intolerant to human development (e.g. large wide-ranging mammals) begin to drop out of the landscape. J.P. Schuett-Hames, J.M. Azerrad, M.J. Tirhi, J.L. Hayes, J.E. Jacobson, C.L. Sato, J.P. Carleton, and G.F. Wilhere. Draft: Landscape Planning for Washington’s Fish and Wildlife: Managing for Biodiversity in Developing Areas. Washington Department of Fish and Wildlife. Olympia, WA (2007); P. Beier. Dispersal of juvenile cougars in fragmented habitat. *Journal of Wildlife Management* 59:228-237. (1995)

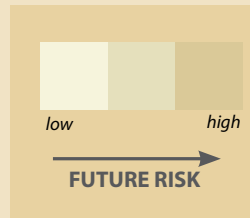
13 A large number of species will be excluded from fragmented landscapes where human densities are greater than 1 dwelling per 10 acres. Using a buffer distance from projected human development also recognizes uncertainty in the projections of human density for 2040. High risk includes lands with human densities below 1 dwelling per 40 acres, but because they are near exurban areas (1 dwelling per 10 acres) the biodiversity values are more at risk than areas further away. J.P. Schuett-Hames, J.M. Azerrad, M.J. Tirhi, J.L. Hayes, J.E. Jacobson, C.L. Sato, J.P. Carleton, and G.F. Wilhere. Draft: Landscape Planning for Washington’s Fish and Wildlife: Managing for Biodiversity in Developing Areas. Washington Department of Fish and Wildlife. Olympia, WA. (2007)

Scale for Future Risk to Biodiversity

Low future risk

All lands regardless of ownership that are currently managed as “protected.”

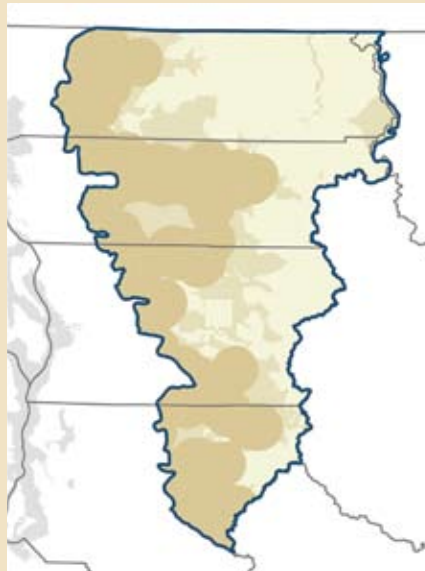
- Low risk of impacts from development or conversion exists here.
- Other threats may still be in play, such as climate change, invasive species, catastrophic fire.
- More flexibility here; time is available for conservation actions, but monitoring is needed.



High future risk

All lands where the projected population density is > 1 dwelling per 40 acres and all lands within 5 miles of those lands where projected population density is expected to be > 1 dwelling per 10 acres in 2040.

- Present and future impacts will probably be highest here.
- Future development and fragmentation are likely in addition to other threats such as climate change, invasive species, or severe fires.
- Urgency and less flexibility here. Pressures are expected to increase; conservation options are urgent and will probably become more costly.



**Sample Map of Future Risk to Biodiversity
(North Cascades Ecoregion)**

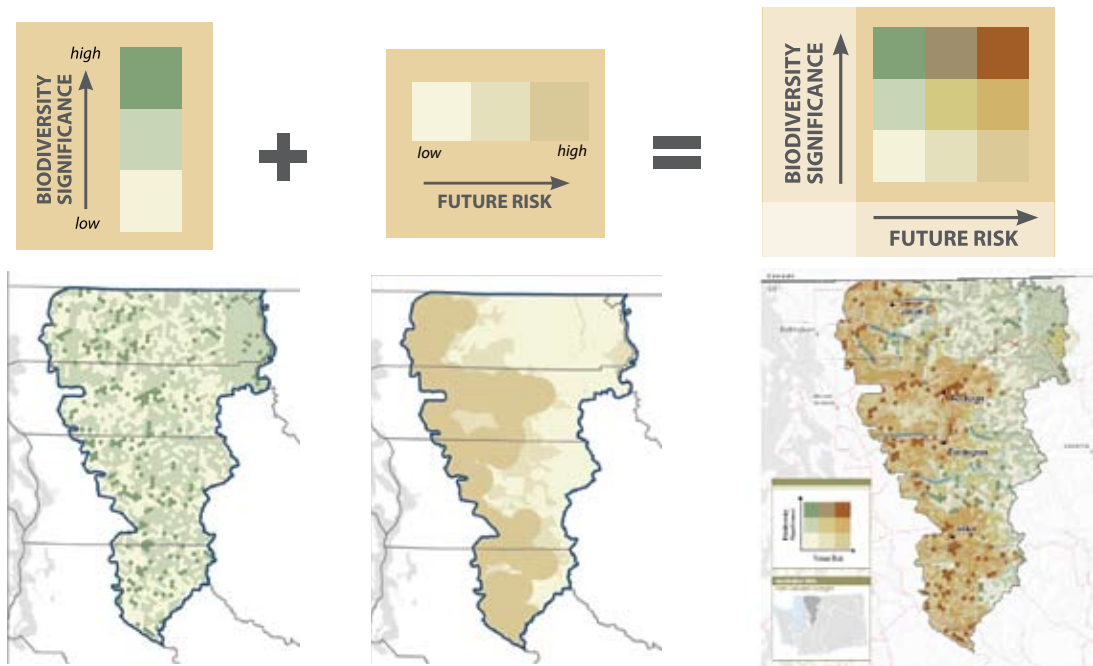


Figure 6. Biodiversity Conservation Opportunity maps. The one at the right is created by combining maps of biodiversity significance (left) with maps of future risk (center). This example shows the North Cascades ecoregion.

Conservation Opportunity and Approaches

The maps of conservation opportunities result from overlaying biodiversity significance and future risk, (Figure 6). These maps show places to target conservation approaches and actions, from an ecoregional perspective. Note that in the overlay, the “conservation opportunity map,” up to nine different colors are present. Each of these colors represents a different level of biodiversity significance and degree of future risk caused by increasing growth and development. Different approaches will be appropriate and effective for each color.

Some of the questions that will help determine appropriate conservation approaches include:

- What is the ownership and use of the land?
- Is the land use compatible with biodiversity conservation?
If so, what resources are available to assist landowners with conservation or stewardship practices?
- What stressors and threats face the land?
- What elements of biodiversity are most abundant or most at risk here?
- What conditions are on the land? Does it need restoration?
- What scale is necessary to meet conservation objectives?

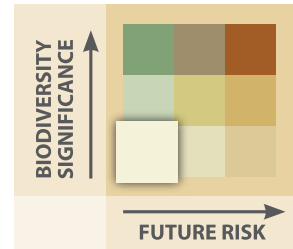
As noted previously, the different ecoregion maps were completed at different times, with slightly different methodologies. Thus, they set opportunities only within a given ecoregion and are not designed to compare opportunities between ecoregions. These maps do not replace detailed local knowledge, nor do they substitute for local priorities. Every place can contribute to the conservation of biodiversity in Washington.

The following sections provide general descriptions for areas classified in the corners of the nine color grid, as well as sample approaches and examples of how conservation tools can work on the ground.

Connect and Discover

Areas ranking Low in Biodiversity Significance and Low in Future Risk

- Known biodiversity not generally significant from an ecoregional perspective, but may be important locally and for human quality of life.
- Protected status likely to continue in the future; lack of imminent threat from land use conversion.
- Low biodiversity score may represent lack of information.
- Conservation concern generally less pressing.



Approaches

- Conservation of common species and habitats is especially important.
- Inexpensive, voluntary, local efforts will help, such as community wildlife habitat programs.
- Ongoing monitoring and management will be needed to understand the effects of climate change, to prevent degradation of native biodiversity by invasive species, and in some areas to reduce catastrophic fire risk.
- Large-scale state investment generally should not be targeted here to conserve biodiversity as we currently know it.
- Our knowledge is incomplete, however, and the ranking of these places may change with greater understanding of biodiversity.
- Increased survey and data collection will help fill knowledge gaps.

Example

Audubon Natural Area, Columbia Park, Kennewick, Columbia Plateau ecoregion

Columbia Park in Kennewick is 400 acres lying between a highway and the Columbia River.¹⁴ The park houses a golf course, boat launches, picnic shelters, play areas, and a band shell. Eight acres make up the Audubon Natural Area, a wooded and well-loved corner of the park.

This small woodland is isolated from other natural areas, which decreases its significance in an ecoregional context. However, it offers an important opportunity for people to interact with natural elements of the ecoregion and provides critical habitat for the many plant and animal species found there.

14 City of Kennewick website: http://www.ci.kennewick.wa.us/recreational_services/parks/columbia.asp (accessed October 2007)
Lower Columbia Basin Audubon Society website: <http://lowercolumbiabasinaudubon.org/history4.htm> (accessed October 2007)

Thickets and groves of willow, cottonwood, and non-native Russian olive are typical for riverside areas of the Columbia Plateau ecoregion. Birdwatchers enjoy the variety of ducks and other birds that reside here or migrate through, including great blue herons, grebes, wrens, vireos, and warblers. Beaver, muskrat, painted turtles, and non-native bullfrogs find a home in marshy Redwing Pond.

As part of the Kennewick parks system, the natural area is protected. Four decades of community involvement, including Eagle Scout projects, service club donations, contributions of time, money, and materials from local businesses, volunteer work parties from the Lower Columbia Basin Audubon Society and other groups, and elementary school field trips indicate the value of this place. Even with these protections, the woodland faces threats such as invasive species, overuse and trampling, and pressure to develop for high intensity recreation uses.

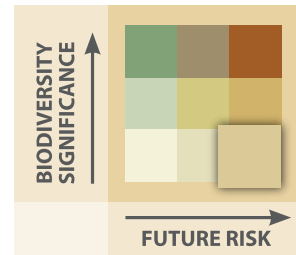
The local community is well-versed in strategies for biodiversity conservation here. These include site management to control trampling, control of invasive species, and use of the park for education and awareness—clearly its proximity to the city center is a big plus. The community and the parks department could engage in a citizen science effort to monitor for species assemblage changes over time.



Learn and Restore

Areas Ranking Low in Biodiversity Significance and High in Future Risk

- Known biodiversity is not generally significant from an ecoregional perspective, though it may be important locally and for human quality of life.
- Areas likely face many pressures and threats from human impact.
- Often close to population centers and thus are important for quality of life (contact with nature and learning about the natural world).
- Conservation concern may be locally urgent.



Approaches

- Conservation of common species and habitats is important.
- Education, restoration, and proactive land use planning can be emphasized.
 - Restoration efforts could emphasize high levels of public engagement.
 - Citizen science projects can identify locally important areas and fill gaps in biodiversity data.
 - Residents could participate in backyard and community wildlife habitat enhancements.
 - Planners and officials can strive to design green spaces that maximize the public's ability to encounter nature in and around urban growth areas.
- Local conservation opportunities can be urgent. Future development and fragmentation are likely, and conversion pressures are expected to increase.
 - Conservation options will probably become costlier and less flexible in the future.
 - Habitat connectivity and wildlife corridors should be integral to decision-making process.

Example:

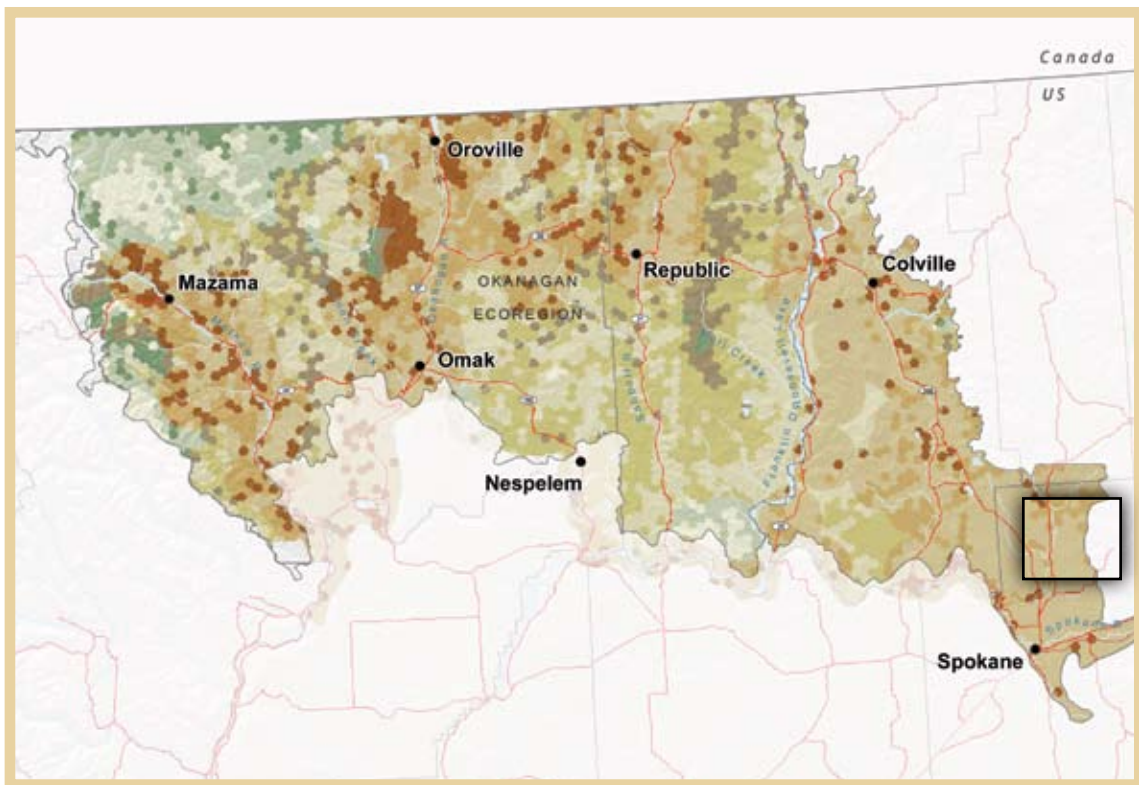
Spokane County Biodiversity Planning, Okanogan Ecoregion

Spokane County is growing rapidly. In the next 20 years, its population is expected to grow approximately 30%, and this growth is likely to put pressure on existing open space. Most of the ecosystems and plant communities in Spokane County are well-represented elsewhere in the ecoregion, which lessens much of the county's biodiversity significance in that larger context.

When the county updated its Comprehensive Plan in 2002, it adopted a new category, *Rural Conservation*, which encourages low impact development and uses clustering and other techniques to protect sensitive areas and preserve open space.¹⁵ The Rural Conservation category is based on wildlife corridor and landscape linkage data that the University of Washington analyzed in a study.¹⁶

The Apple Tree Meadows development in Chattaroy, southeast of Deer Park, exhibits this type of open space planning. The developers have clustered 12 two-acre lots on 133 acres, leaving 82% of the land as open space. The open space includes forest, cliffs, and ponds, with their associated mix of habitats and species. Residents might choose to landscape with native plants or to participate in stewardship of the neighboring landscape.

By maintaining the open space now, present and future county residents will benefit from the ecosystem services that nearby forest and native vegetation provide. The natural area will also provide educational and recreational opportunities and possibilities for citizen science involvement in inventory and monitoring.



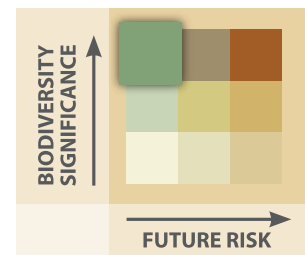
¹⁵ Steve Davenport, Department of Building and Planning, Spokane County, 5/29/07, personal communication; Spokane County Department of Building and Planning, 2006. 'Comprehensive Plan Summary and 5 Year Update.' <http://www.spokanecounty.org/bp>, last accessed 7/07.

¹⁶ University of Washington Department of Urban Design and Planning. Remote Sensing Applications Laboratory. 1998. Wildlife corridors and landscape linkages: An approach to biodiversity planning for Spokane County, Washington; Stephenson, M.R., 1998. 'Protecting Biodiversity: Applying GAP analysis in Spokane County, Washington.' Master's Thesis, University of Washington, Seattle.

Manage and Maintain

Areas Ranking High in Biodiversity Significance and Low in Future Risk

- Significant ecoregional biodiversity values occur in these areas.
- Protected status is likely to continue in the future; no imminent threat from land use conversion.
- Conservation concern generally less pressing.



Approaches

- Conservation of regionally important species and habitats is important. While these areas are at low risk, management needs include the following efforts:
 - Preventing degradation of native biodiversity by invasive species;
 - Reducing risk of catastrophic fire;
 - Minimizing adverse effects of recreation, grazing and other uses; and
 - Restoring ecosystem processes, such as natural fire regimes through prescribed burns, for example.
- Linkages to connect highly significant areas to one another need to be identified and conserved.
- Ongoing monitoring and research will be needed on the following topics:
 - To understand how climate change affects species and plant communities present in these areas; and
 - To assess the accuracy of our understanding of biodiversity and ecological processes.
- Existing conservation lands are valuable and stewardship efforts should be supported.

Example

Holm Farm Conservation Easement, Thurston County, Puget Trough Ecoregion

The owners of Holm Farm have embraced a family tradition of stewardship on their farm in southwestern Thurston County.¹⁷ The farm includes nearly 100 acres bounded by an oxbow of the Black River. Two of the owners were raised on the farm when their parents ran it as a dairy. Their grandparents bought the land in the 1920s. The owners now manage the farm for hay production, grazing, and wildlife habitat.

Much of the local wildlife depends on the health of the free-flowing Black River. River otters, muskrats, beaver, and mink live in the river corridor. A gravel bar nearby serves as a spawning area for salmon. Kingfishers, great blue herons, and wood ducks are among the birds foraging on the river. Raptors are also common, including eagles, osprey, red-tailed hawks, Cooper's hawks, kestrels, and northern harriers.

17 This area does not show up as dark green on the map for two reasons. 1) It is smaller than the landscape unit of 741 acres (300 hectares) measured on the map, and 2) areas protected with privately held conservation easements are not included in the database of protected lands used for this project. Functionally, however, they can be assumed to be of the same risk level as publicly held protected lands.

As in many rural parts of the Puget Trough ecoregion, southwestern Thurston County is increasingly seeing its working farmlands change to primarily residential use. The owners of Holm Farm decided to arrange a conservation easement to maintain the farm for conservation and open space. They designed their conservation easement, held by the Capitol Land Trust, so that development that might harm the farm's conservation values will not be permitted. The easement provides a way to bequeath the farm to their heirs, while saving its natural beauty and its role in protecting the Black River forever.

They worked with the Thurston Conservation District to enroll their land in the federal Conservation Reserve Enhancement Program. This incentive program helped them enhance the buffer along the Black River. These private landowners chose to be involved with local stewardship organizations such as the Chehalis River Council, and in 2005 the Thurston Conservation District recognized them as Wildlife Stewards of the Year.¹⁸

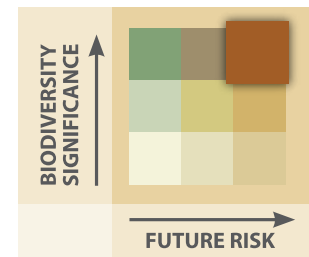


¹⁸ Stewardship Matters: Holm Farm <http://www.biodiversity.wa.gov/ourbiodiversity/holmfarm.html> (last accessed November 2007).

Collaborate and Innovate

Areas Ranking High in Biodiversity Significance and High in Future Risk

- Significant ecoregional biodiversity values occur in these areas.
- These areas likely face many pressures and threats from human impact, and they may be under imminent threat from land conversion.
- These areas are often close to population centers and thus are important for quality of life (contact with nature and learning about the natural world).
- Conservation concern most urgent.



Approaches

- Conservation of regionally important species and habitats is especially important.
- A full toolbox of strategies is needed and collaboration is critical. Tools can include the following efforts:
 - Targeting incentives, such as technical assistance, cost shares, and grant programs.
 - Engaging people in conservation activities, such as restoration, monitoring to understand the threats to biodiversity, and citizen science and stewardship efforts.
 - Restoration for ecological function, as well as public engagement, should be prioritized in these areas. These areas could be good places for mitigation banks and for developing other conservation market tools.
- State investment should be targeted here, where it is suitable, as conversion pressures are expected to increase.
 - Conservation options are urgent and will probably become more costly.
 - Existing conservation lands are especially important and should be managed for their special features.
- Linking conservation areas will be increasingly vital to sustaining healthy populations of some wildlife species.
 - Maintaining ecological processes may be especially challenging.

Example

Upper Skagit River near Rockport, North Cascades ecoregion

The Skagit River drains Washington's second largest watershed, and it is considered the healthiest of the rivers flowing into Puget Sound. Federally designated as a Wild and Scenic River, the Skagit hosts a robust population of at-risk bull trout as well as all five species of wild Pacific salmon. The winter salmon run attracts one of the largest concentrations of bald eagles in the lower 48 states.

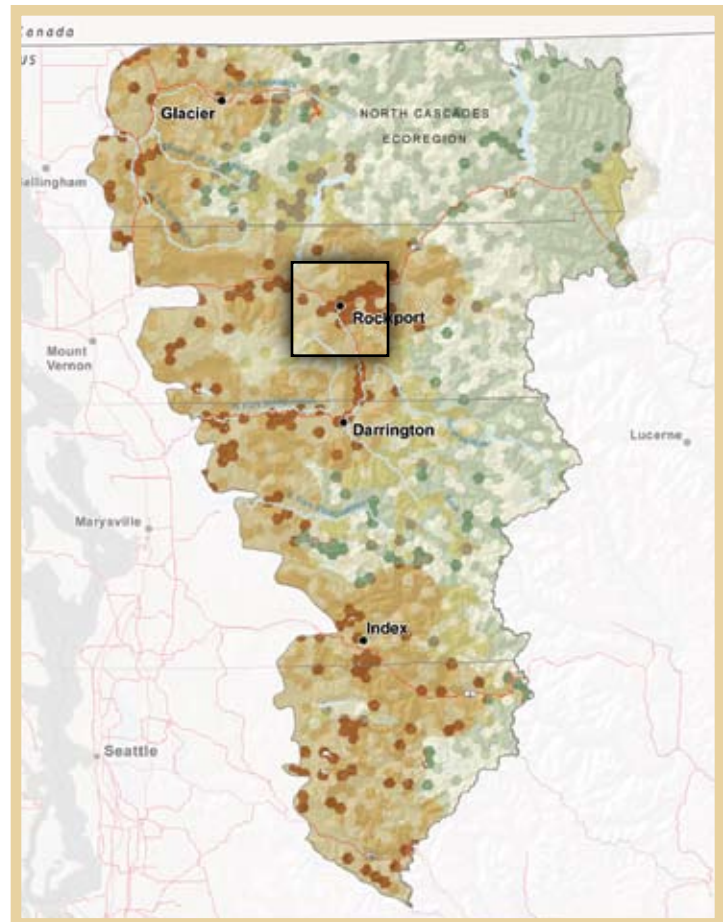
The stretch of river between Rockport and Marblemount faces many future risks. Skagit County has a fast-growing economy, which puts demands on its communities, as does the county's location between

the population centers of greater Seattle (including Everett) to the south and Bellingham to the north.

With the human population rising and the growth rate expected to increase, the Skagit valley faces a primary threat from conversion of agriculture and forest lands to residential use, resulting in increased habitat degradation and fragmentation. Real estate development is becoming more profitable for private landowners than other uses, even as residential land use may have a negative net fiscal impact on the county. As elsewhere, invasive species are present and likely to increase.

Community engagement and landowner incentives are two of the primary strategies here, incorporating stewardship, education, and conservation or agricultural easements.

The following groups and programs are examples of the types of strategies currently being employed along the Upper Skagit:



- **The Skagit County Farmland Legacy Program** is a county initiative that purchases agricultural easements and works to support policies, programs, and plans that enhance the local agricultural industries. It administers the **Skagit County Conservation Futures Program**, which purchases permanent conservation easements on strategically significant lands.
- **The Skagit Conservation District** administers diverse offerings, including technical assistance, Stream Team, Watershed Masters, and a Backyard Conservation program. In addition, the conservation district administers the Natural Resource Conservation Service and Farm Services Administration programs for landowners. An example is the **Conservation Reserve Enhancement Program (CREP)**. CREP provides cost shares and technical assistance to improve wildlife habitat along rivers and streams.
- **Skagit Land Trust.** This land trust works in collaboration with more than 20 local and regional organizations. It focuses on permanently protecting all types of natural and resource lands through conservation easements.
- The **Upper Skagit Bald Eagle Fest** is an annual event that celebrates the eagles on the Skagit River, while educating tourists and building community among residents. It also generates economic activity, which translates biodiversity value directly into local financial returns.

- **The Nature Conservancy** works in cooperation with eight partner agencies and manages the Skagit River Bald Eagle Natural Area. The natural area's 7,800 acres lie along the river between Marblemount and Rockport.
- The **Skagit Fisheries Enhancement Group** is a nonprofit organization formed in 1990 to engage communities in habitat restoration and watershed stewardship to enhance salmon populations. They have cooperative relationships with local landowners, conservation groups, government agencies, and tribes.

Additional Resources and Research Needs

As noted above, these conservation opportunity maps are intended to be used in conjunction with other resources. Local knowledge and priorities, as well as more specialized evaluations of conditions and risks, will provide needed context and details to guide biodiversity conservation activities on the ground.

Existing Information Resources

The Nature Conservancy's recent assessment of freshwater systems in Washington State offers an example of one such specialized evaluation.¹⁹ This assessment received extensive expert review. The tool provides a unique statewide look at watersheds, rivers, lakes, and wetlands. It examines several relevant factors, including the distribution of freshwater species at risk, current conditions, and expected threats to Washington's freshwater systems.

The freshwater assessment can be used in conjunction with the terrestrial and nearshore conservation opportunity maps presented in this document. While differences in methodology make merging the two assessments impractical, the freshwater assessment can add important information to guide conservation efforts.

Considerations for Future Research

Through the process of developing these maps, the Biodiversity Council has recognized the need to incorporate additional data sources. In particular, the Council identified a need for maps that consider restoration potential, wildlife corridors and habitat connectivity, effects of climate change, and deep-water marine areas.

The science of predicting potential impacts from climate change is in its early stages.²⁰ As these tools become more sophisticated, map products illustrating how conservation opportunities might shift should be developed.

Biodiversity conservation opportunities in deep-water marine areas are not indicated on the maps because adequate data are not yet available. The Puget Sound Partnership and The Nature Conservancy are working together to address this issue.

Enhancements to Future Maps

- Restoration potential
- Wildlife corridors and habitat connectivity
- Effects of climate change
- Deep-water marine areas

¹⁹ Skidmore, P.B. 2006. Assessment of Freshwater Systems in Washington State. The Nature Conservancy, Seattle, WA

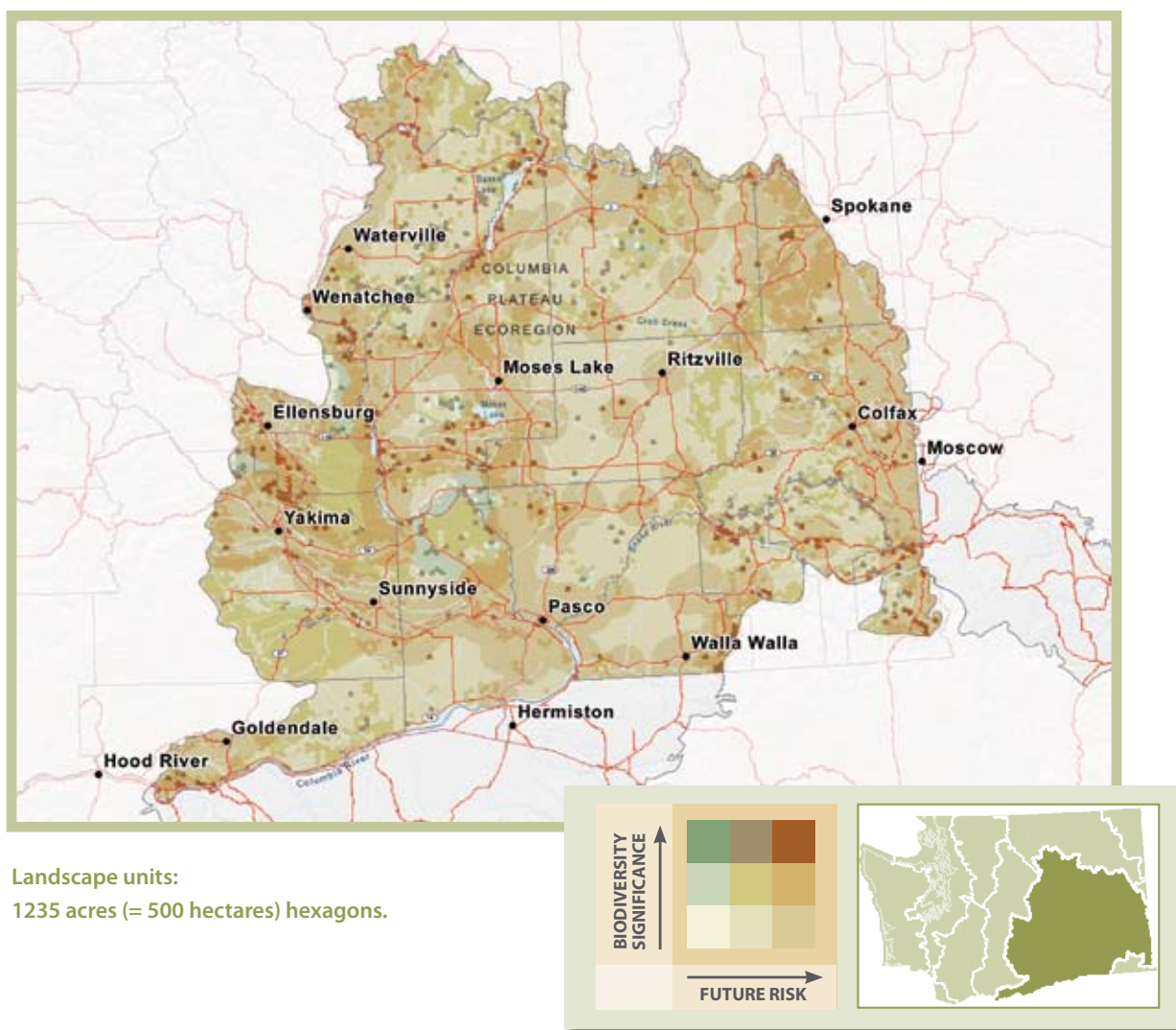
²⁰ Lawler J. J. and M. Mathias, 2007. 'Report on Climate Change and the Future of Biodiversity in Washington' Report prepared for the Washington Biodiversity Council.



Figure 7. The river basins and lake areas shaded in gray provide the best opportunities for freshwater conservation activities. Rivers highlighted in yellow represent important systems with greater conservation challenges.

Conservation Opportunity Maps for Seven Ecoregions in Washington

Columbia Plateau Ecoregion



A range of opportunities for voluntary and collaborative approaches exist in each area of this map (see pp 103-112). This map does not replace more detailed or specialized assessments or prescribe specific actions or strategies, and it is not intended to be used as the sole source for planning conservation initiatives. The Council recommends that this map be updated periodically.

About the Columbia Plateau Ecoregion

Two great rivers, the Columbia and the Snake, dominate the dramatic dry landscape of Washington's largest ecoregion—home to an inland sea of sagebrush and the state's fertile agricultural heartland.

Location

The semi-arid Columbia Plateau occupies nearly 33% of the state. It is a region bordered by the Cascades, the Okanogan Highlands, the Rockies, and the Blue Mountains. In Washington, the ecoregion is bisected by the Columbia River itself. The plateau tilts upward and southward into the Great Basin.

Outstanding Biodiversity Features

- **Dramatic geological history led to diverse habitats.** Millions of years ago, vast lava flows covered the region in basalt. In more recent millennia, epic glacial floods carved away the deep rock, leaving the coulees and Channeled Scablands of today.
- **Shrub-steppe and grasslands: home to unique plants and iconic birds.** The Columbia Plateau supports 18 endemic plant species and numerous at-risk birds, among them the sharp-tailed grouse and the sandhill crane.
- **The Palouse Hills: Washington's breadbasket.** The region's dryland grain and legume farming is vital to our food security. However, the native grasslands that once carpeted the Palouse have shrunk to just 1% of their original expanse.
- **Powerful rivers: shaping—and shaped by—regional economic development.** Hydropower development helped build the Northwest's economy. A cost has been the inundation and alteration of riparian habitats. Salmon, sturgeon, and lampreys—once abundant—struggle with the changed waterways.

People in the Ecoregion

Human history in the Columbia Plateau dates back 13,000 years, possibly earlier. For at least 5,000 years, native peoples lived in villages along the rivers, fishing for salmon, harvesting plant foods, and hunting. They burned large areas to promote productive habitats and improve grazing.

Lewis and Clark encountered numerous peoples, including the Cayuse, Nez Perce, Palouse, Tenino, Umatilla, Walla Walla, Wanapum, and Yakama. The Yakama Nation remains a large landholder.

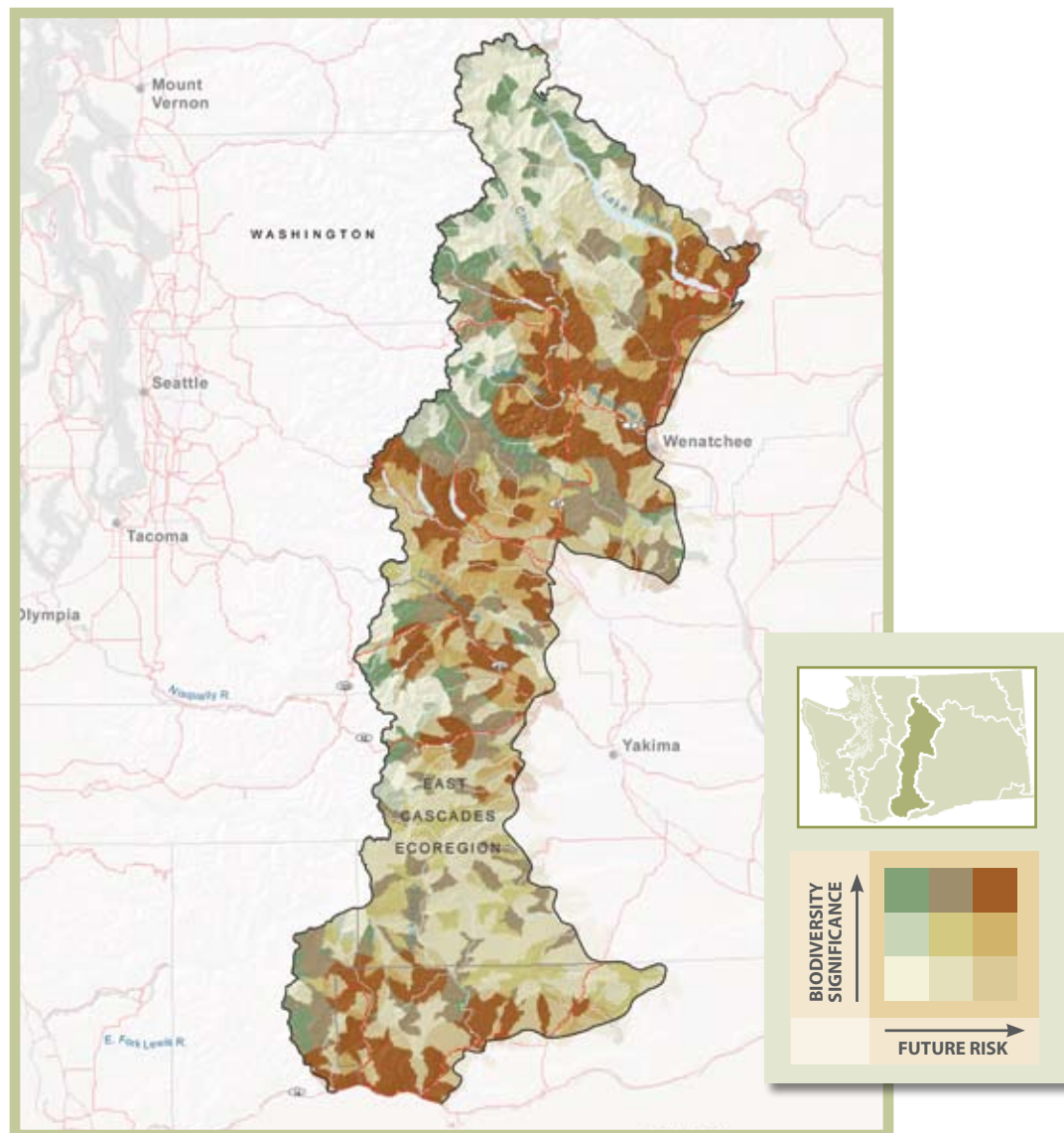
Euro-American settlers put the abundance of the Columbia Plateau to use by harvesting timber, growing crops, and grazing cattle and sheep. The mid-twentieth century brought tremendous changes. Grand Coulee Dam, among others, altered the basin's hydrology. The Hanford Nuclear Site, once central to the nation's atomic weapons program, introduced radioactive waste to the region.

More than 50% of the ecoregion has been converted to agriculture and urban development, with considerable impact on biodiversity. Despite the numerous changes, sizable pieces of the Columbia Plateau's shrub-steppe remain, much of it on lands managed by the Departments of Defense and Energy.

Many partnerships have emerged to tackle the ecoregion's challenges. Programs work to monitor priority species, implement weed control, and encourage rural vitality and stewardship.

For more about this ecoregion visit www.biodiversity.wa.gov

East Cascades Ecoregion



Landscape units: watersheds.

A range of opportunities for voluntary and collaborative approaches exist in each area of this map (see pp 103-112). This map does not replace more detailed or specialized assessments or prescribe specific actions or strategies, and it is not intended to be used as the sole source for planning conservation initiatives. The Council recommends that this map be updated periodically.

About the East Cascades Ecoregion

On the dry side of the Cascades lies one of Washington's most diverse ecoregions, rich in biological wealth from its montane crest down through open stands of ponderosa pine and Garry oak to the edge of the shrub-steppe.

Location

The East Cascades ecoregion includes the mountains that lie east of the Cascade crest and the foothills descending into the Columbia Plateau. In Washington it stretches from roughly Lake Chelan to the Columbia River Gorge, encompassing about 10% of the state. The mountainous ecoregion continues south through Oregon.

Outstanding Biodiversity Features

- **High number of rare and endemic plants.** This ecoregion is home to at least 20 endemic plant species, including the Kittitas larkspur and Thompson's clover.
- **Diverse coniferous forests.** These forests include a range of dominant species, from high elevation whitebark pine to ponderosa pine.
- **Mardon skipper butterflies.** Carpets of fescue grass offer prime habitat for the endangered mardon skipper butterfly.

People in the Ecoregion

The ecoregion has long been inhabited by the Wenatchee, the Chelan, the Kittitas, and the Yakama. The East Cascades provide hunting, fishing, and plant foods, such as camas bulbs and biscuitroot—key ingredients for a traditional bread.

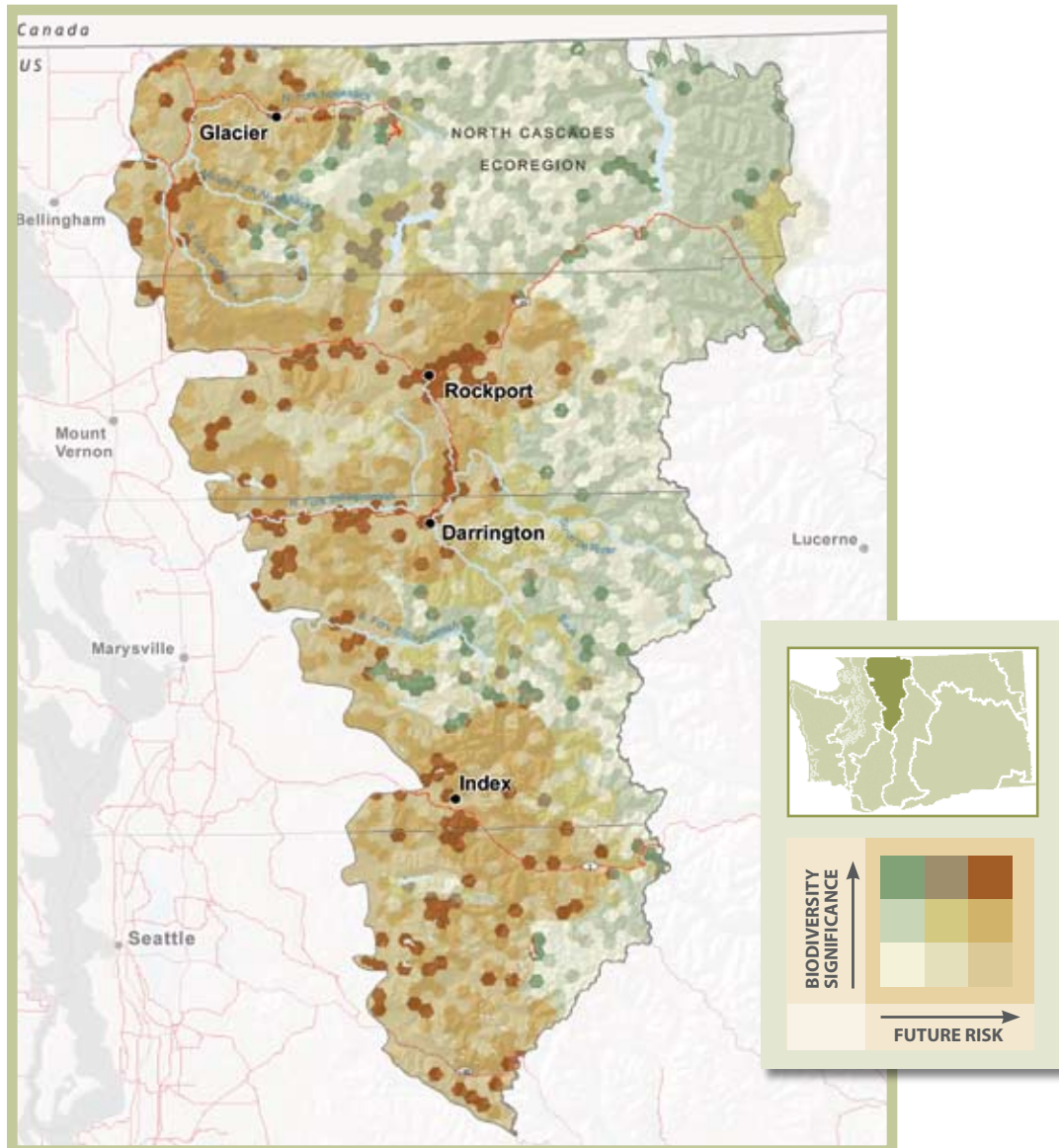
Settlement began about 1875. Farmers in the semi-arid valleys irrigated the land, and the area became well known for its bountiful fruit orchards as well as grazing and ranching. The climate also suits vineyards, an industry that has grown in recent years.

Logging in East Cascades' forests began more than a century ago and remains an important livelihood. A mining boom from the 1880s through the 1930s brought miners representing 20 different nationalities, who scoured the mountains for gold, copper, and coal.

Roughly three quarters of the East Cascades ecoregion is federally owned. Several wilderness areas, including Alpine Lakes and Mount Adams, offer protected high elevation habitats. Other major landholders are the Yakama Nation, with lands on the eastern slopes of Mount Adams, and Washington State, which manages more than 113,000 acres.

For more about this ecoregion visit www.biodiversity.wa.gov

North Cascades Ecoregion



Landscape units: 1235 acres (= 500 hectares) hexagons.

A range of opportunities for voluntary and collaborative approaches exist in each area of this map (see pp 103-112). This map does not replace more detailed or specialized assessments or prescribe specific actions or strategies, and it is not intended to be used as the sole source for planning conservation initiatives. The Council recommends that this map be updated periodically.

About the North Cascades Ecoregion

Home to lynx and mountain goats, rare alpine daisies and thousand-year old cedars, the North Cascades ecoregion contains some of the largest expanses of wilderness in the lower forty-eight.

Location

The ecoregion (about 10% of Washington) includes the Cascade Mountains north of Snoqualmie Pass and west of the Cascade crest northward into British Columbia. Only a small part of this ecoregion lies in Washington; in British Columbia, it encompasses the entire mainland coast.

Outstanding Biodiversity Features

- **Important habitats for wide-ranging carnivores.** The North Cascades is one of the few ecoregions in Washington with a variety of large carnivores, including lynx, gray wolf, grizzly bear, and wolverine.
- **Semi-natural or natural vegetation is prevalent.** The North Cascades ecoregion contains large stretches of relatively intact vegetation, including low elevation western hemlock–Douglas-fir–western red cedar forests.
- **Home to several boreal species.** These species, including several rare plants, are at the southern edge of their geographic ranges.
- **Major concentration of over-wintering bald eagles** along the Skagit River. The eagles, feeding on salmon, are perhaps the largest concentration in the U.S. outside of Alaska

People in the North Cascades

People have inhabited the North Cascades for at least 8,400 years, perhaps 10,000 years. The ancestors of Salish-speaking peoples lived in the area, and archaeological evidence shows that they hunted, gathered, and processed plant foods here.

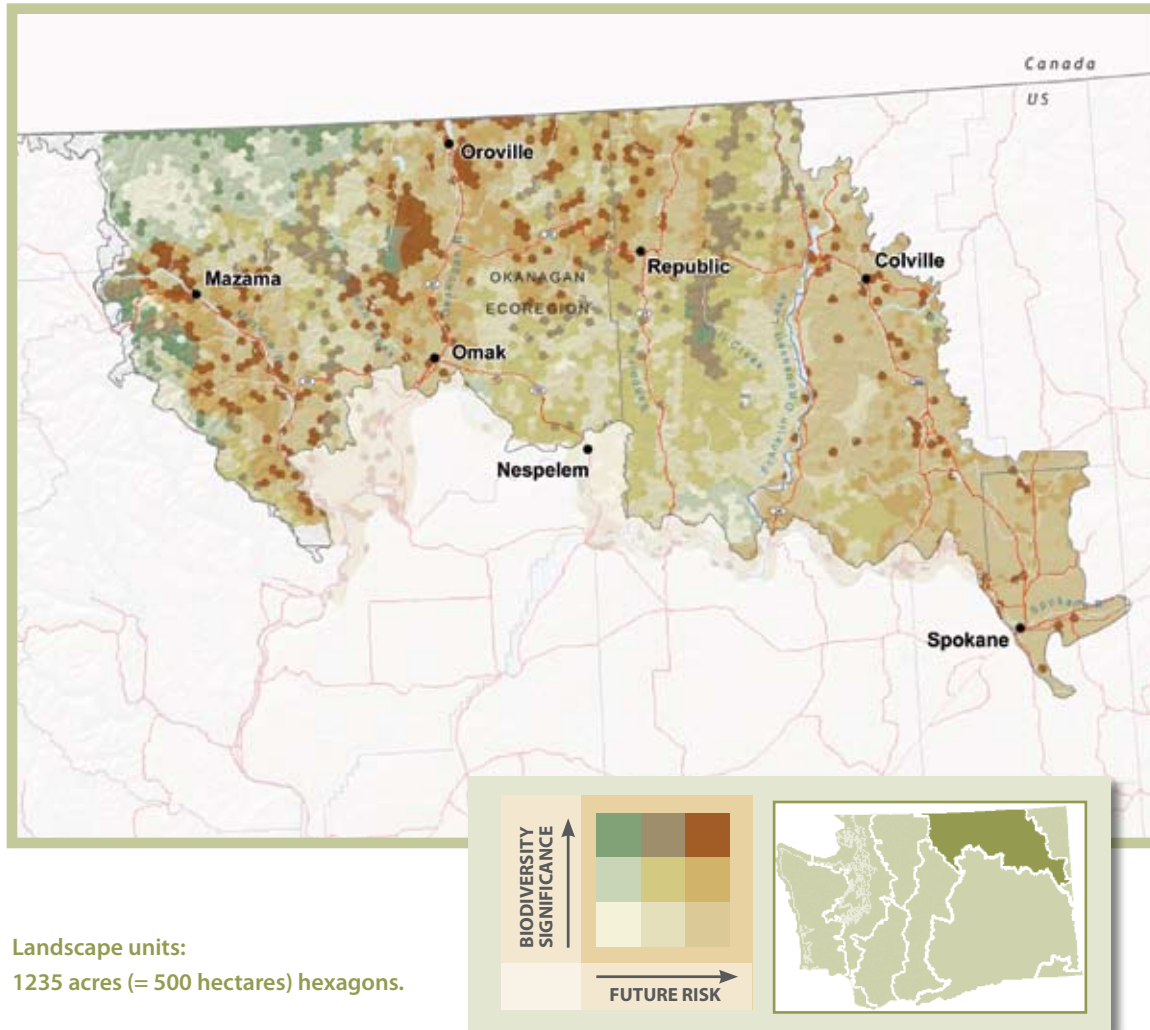
Euro-American settlement within the remote and rugged North Cascades occurred slowly. Access was difficult and good farmland was scarce. Much of the North Cascades ecoregion belongs to the public. It is administered by the National Park Service, the USDA Forest Service (Mt. Baker-Snoqualmie National Forest), and the Washington Department of Natural Resources. Much of the federal land is designated wilderness.

The Upper Skagit River Hydroelectric Project supplies about 20% of the electrical power used in the city of Seattle. It has three dams on the Skagit River. Planning for the dams began in 1905, and construction finished in 1961.

Private land in the ecoregion is a legacy of the 1864 Northern Pacific Land Grant, which bestowed vast amounts of land on the railroad that built a trans-continental link to the Pacific Northwest. Many towns in the region got their start by housing and feeding railroad construction workers. Now the economic activities for people in the North Cascades ecoregion are primarily forestry and tourism.

For more about this ecoregion visit www.biodiversity.wa.gov

Okanogan Ecoregion



A range of opportunities for voluntary and collaborative approaches exist in each area of this map (see pp 103-112). This map does not replace more detailed or specialized assessments or prescribe specific actions or strategies, and it is not intended to be used as the sole source for planning conservation initiatives. The Council recommends that this map be updated periodically.

About the Okanogan Ecoregion: Biodiversity

In north-central Washington, the Cascades, the Rockies, and the Columbia Plateau converge to form the Okanogan ecoregion, which boasts highland landscapes and lowland waterways, grizzly bears and sage grouse.

Location

The Okanogan ecoregion could be called the mountains between mountains—the broad highland area separating the North Cascades and the Canadian Rockies. Scenic river valleys, like the Methow, the Okanogan, and the Colville, run roughly north-south. The ecoregion covers about 14% of Washington, and it extends significantly into the shrub-steppe country of British Columbia.

Outstanding Biodiversity Features

- **Large tracts of little disturbed land.** Much of the Okanogan ecoregion's vegetation remains in a natural or semi-natural state, hosting 100 wildlife habitat types, from alpine grasslands and upland aspen forests to shrub-steppe.
- **North meets south in a diverse landscape.** Boreal species like snowshoe hares and northern flying squirrels share the ecoregion with Great Basin species like pallid bats and burrowing owls.
- **Park-like stands of ponderosa pine and Douglas-fir.** The Okanogan's dry climate results in open grassy stands of ponderosa pine and Douglas-fir.
- **Wide-roaming carnivores still find a home.** Though diminished in numbers, grizzly bears, wolves, and wolverines all range through large areas of Okanogan wild lands.

People in the Ecoregion

Numerous Interior Salish tribes have made their homes in the Okanogan for millennia. Okanogan tribes wintered in longhouses made of tules (hardstem bulrush), bark, and hides. They harvested scores of types of berries, nuts, and roots. Traveling seasonally, they hunted game and gathered at Kettle Falls to fish for salmon and to trade.

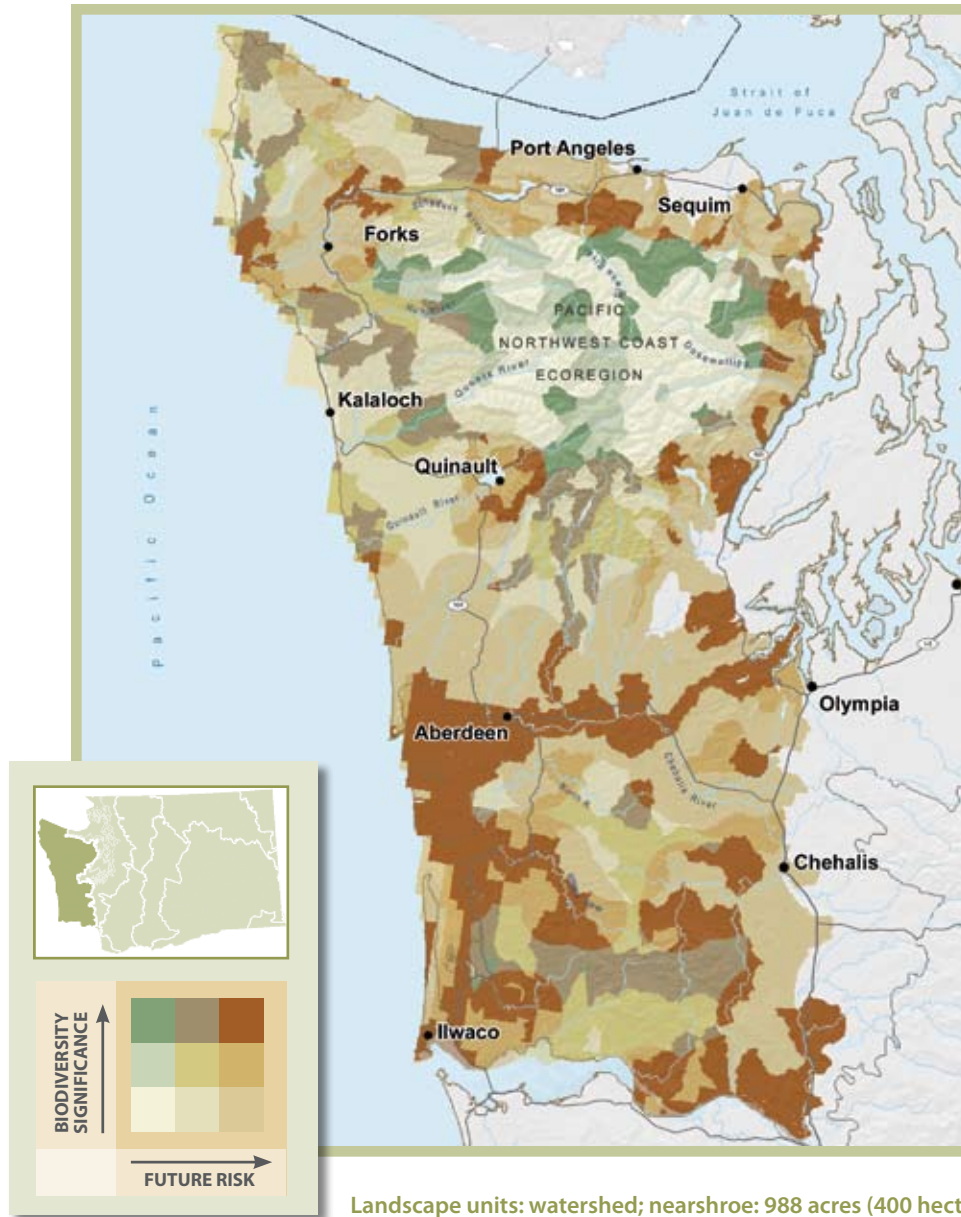
The Hudson Bay Company established a post at Kettle Falls in 1825, which speaks to the abundance of fur-bearing animals available. Gold was discovered near Republic in the 1890s and a mining boom followed. The timber industry developed about the same time.

Current land use varies and depends largely on elevation. The high country sees mostly recreational uses, though mineral exploration and development continue. At mid-elevations, logging and grazing occur. In the valleys, milder temperatures support agriculture (especially hay, alfalfa, and tree fruit) and ranching.

Grand Coulee Dam and boating opportunities in Franklin D. Roosevelt Lake draw people to the ecoregion. The sunny climate makes it popular for vacation homes. Roughly two-thirds of the Okanogan ecoregion is held by the state or federal governments, or by the Colville and Spokane tribes.

For more about this ecoregion visit www.biodiversity.wa.gov

Pacific Northwest Coast Ecoregion



A range of opportunities for voluntary and collaborative approaches exist in each area of this map (see pp 103-112). This map does not replace more detailed or specialized assessments or prescribe specific actions or strategies, and it is not intended to be used as the sole source for planning conservation initiatives. The Council recommends that this map be updated periodically.

About the Pacific Northwest Coast Ecoregion

Washington's westernmost and wettest ecoregion extends from ocean depths to the Olympic Mountains' glaciated peaks. Steller sea lions swim among the greatest number of kelp species in the world, and the Olympic marmot burrows in alpine meadows.

Location

The Pacific Northwest Coast ecoregion fronts about 150 miles of shoreline and encompasses roughly 11% of Washington State. It runs from Cape Flattery in the north and to the mouth of the Columbia River in the south, extending into British Columbia and along the Oregon coast. Inland is a band of coastal plain, the Olympic Mountains, and the gentler Willapa Hills.

Outstanding Biodiversity Features

- **Geographic separation and unique species.** Isolated by ocean, strait, and Sound, a host of flora and fauna have evolved in the Olympic Mountains. These mountains offer the only home in the world to endemic rodents, trout, and rare plants, such as Piper's bellflower.
- **Tracts of verdant temperate rainforests.** In Olympic National Park, the world's largest remaining stands of temperate rainforest hold more living biomass than any tropical forest. The forest drips with ferns, mosses, and lichens.
- **Three vital estuaries for waterfowl, shorebirds, and fish.** The Columbia River Estuary is critical for waterfowl, fish, and the endangered Columbia white-tailed deer. The marshes and mudflats of Willapa Bay and Grays Harbor are vital nurseries for salmon and stopovers for tens of thousands of migrating shorebirds.
- **Iconic marine species facing threats.** Some of the most remarkable animals of the Northwest Coast— Orcas, Steller sea lions, sea otters, snowy plovers, and marbled murrelets—are species at risk.

People in the Ecoregion

Indigenous peoples have long made their home on the Pacific Northwest Coast. The Makah, Quileute, Quinault, Queets, Humpulips, Satsop, Wynoochee, Copalis, Chinook, and Lower Chehalis are among those whose ancestors lived on the rainy coast. These peoples ate well: salmon, shellfish, game, whales, seals, berries, and many other plant foods.

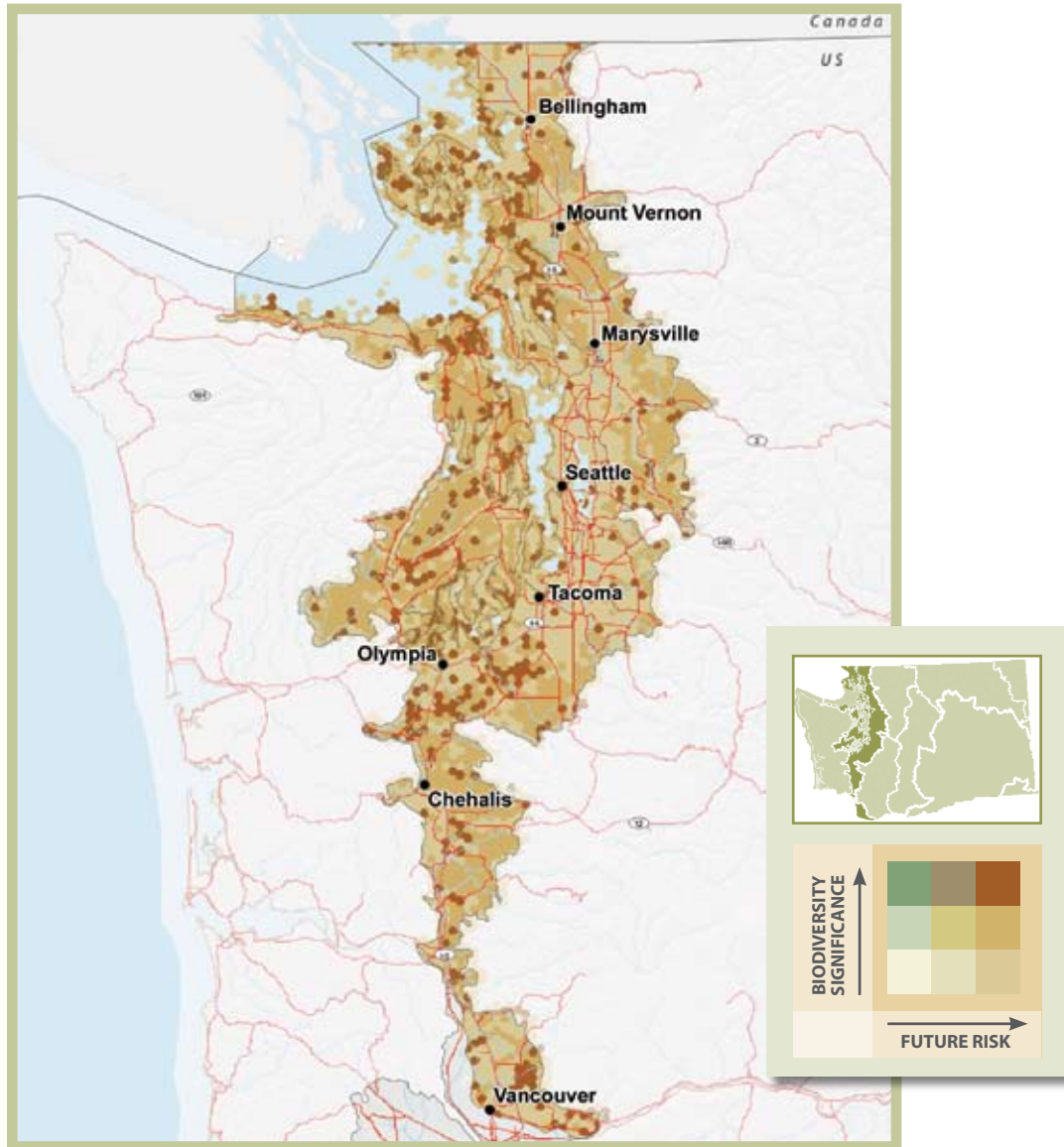
The rich timber resource of Douglas-fir, western red cedar, western hemlock, and Sitka spruce provided livelihoods for generations. While timber remains an economic powerhouse, non-timber forest products such as mushrooms, ferns, mosses, and salal are increasingly important.

The marine environment sustains commercial and sport fishing, crabbing, clamming, and oyster growing. On land, agriculture includes dairies and cranberry bogs. Tourism and recreation increase yearly.

More than 50% of the land is privately held—much of it by timber companies. Another 30% is federally owned, with Olympic National Park recognized as a global treasure. Biodiversity conservation in the Pacific Northwest Coast ecoregion, with its wealth of ecosystem diversity, holds both promise and challenge.

For more about this ecoregion visit www.biodiversity.wa.gov

Puget Trough Ecoregion



Landscape units: 741 acres (300 hectares) hexagons.

A range of opportunities for voluntary and collaborative approaches exist in each area of this map (see pp 103-112). This map does not replace more detailed or specialized assessments or prescribe specific actions or strategies, and it is not intended to be used as the sole source for planning conservation initiatives. The Council recommends that this map be updated periodically.

About the Puget Trough Ecoregion

A great inland arm of the sea—Puget Sound—flanked by forested foothills and freshened by many rivers. The Puget Trough ecoregion is home to over 75% of Washington’s people.

Location

The Puget Trough ecoregion runs the length of Washington, rising to about 1000 feet elevation between the Cascade Mountains on the east and the Olympic Peninsula on the west. Encompassing about 8% of the state, it is densely populated. The larger Willamette Valley-Puget Trough-Georgia Basin ecoregion extends into Oregon and British Columbia.

Outstanding Biodiversity Features

- **Puget Sound—a globally important estuary.** Home to orcas, porpoises, and harbor seals, with rich nearshore and deepwater habitats. Puget Sound’s distinctive underwater topography makes it vulnerable to activities onshore and upstream.
- **Salmon, linking freshwater and saltwater habitats.** Several species of salmon—icons of the region—are at risk due to habitat degradation.
- **Grasslands and oak woodlands that support rare species.** Many grassland species are declining because their available habitat has dwindled. Fire suppression and invasive species are significant problems.
- **Accessibility, rich natural resources, and economic potential.** These factors have encouraged over 75% of Washingtonians to live here. The result is a mosaic of land uses that fragment high quality native habitats.

People in the Puget Trough ecoregion

The earliest archaeological evidence of people in the Puget Trough ecoregion in Washington dates back about 8,000 years. The ancestors of Salishan-speaking peoples flourished and developed eighteen or more linguistic traditions.

These peoples created prosperous maritime cultures. They employed the region’s rich biodiversity, including salmon, shellfish, and western red cedar. Plants such as nettle, berries, bracken, and camas supplied food and fiber.

Euro-Americans also utilized the marine and forest resources. Land use patterns were established early, and by 1991 more than 50% of the Puget Trough had been converted to urban and agricultural uses, including intensive forestry, pasture, and cropland.

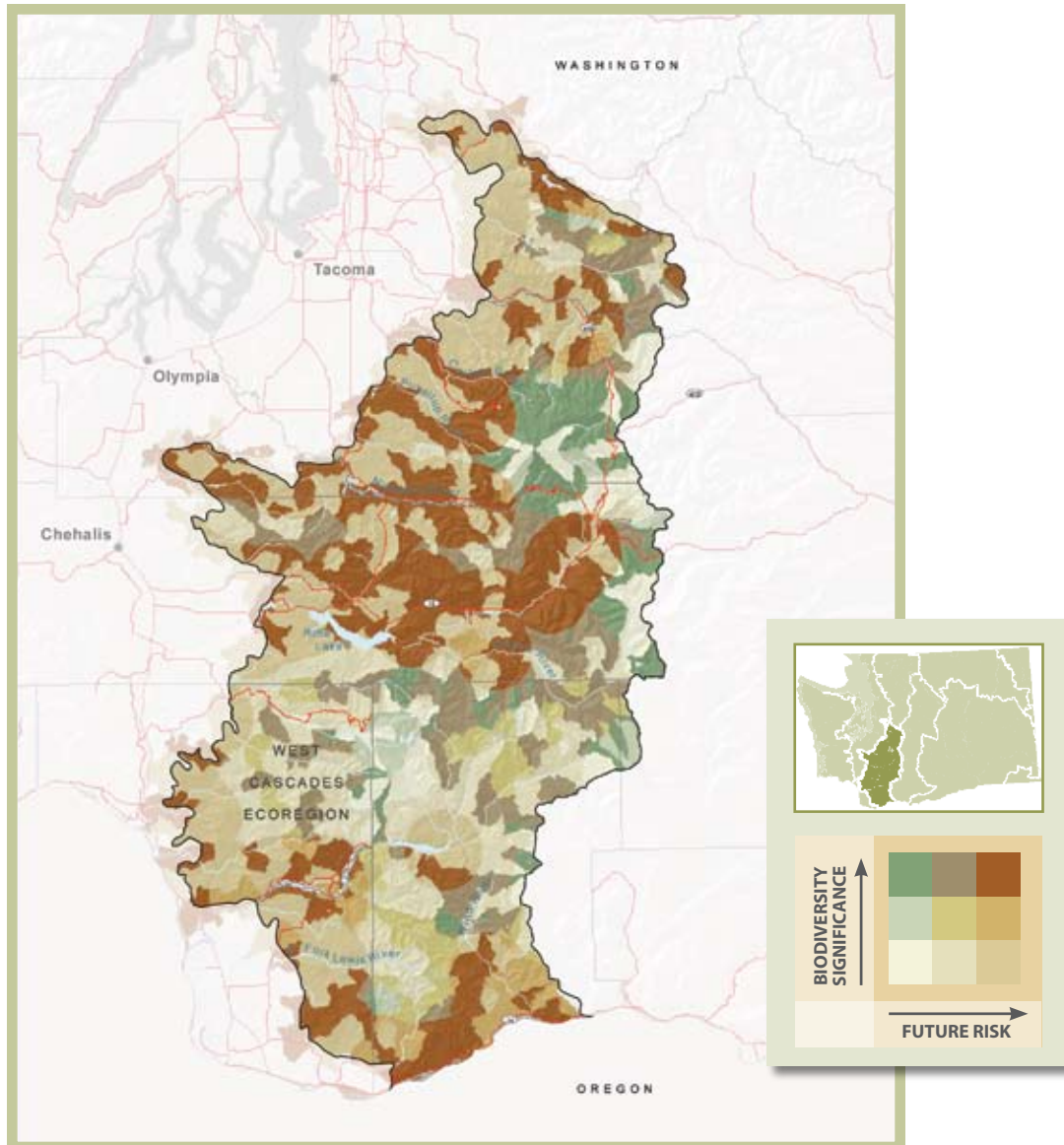
In 1999, the ecoregion’s population was nearly 3.9 million—double that of the 1960s. It is expected to grow to 5 million by 2020. The remaining natural areas and working lands are under pressure.

Puget Sound itself suffers from pollution and other ills, including multiple Superfund sites. The Endangered Species Act listing of wild Chinook salmon was the first to affect such an urban area. The southern resident orca population has also been listed as endangered.

Although altered and under stress, both the terrestrial and marine environments of the Puget Trough ecoregion are still extremely productive. Partnerships, political will, and creativity will be key to biodiversity conservation in the face of rapid growth.

For more about this ecoregion visit www.biodiversity.wa.gov

West Cascades Ecoregion



Landscape units: watersheds.

A range of opportunities for voluntary and collaborative approaches exist in each area of this map (see pp 103-112). This map does not replace more detailed or specialized assessments or prescribe specific actions or strategies, and it is not intended to be used as the sole source for planning conservation initiatives. The Council recommends that this map be updated periodically.

About the West Cascades Ecoregion

Rumbling volcanoes and ancient forests distinguish Washington's West Cascades ecoregion.

Location

The West Cascades ecoregion encompasses the west-side midsection of the great Cascades cordillera. In Washington, the ecoregion runs southward from Snoqualmie Pass to the Columbia Gorge, the only lowland divide in the range. Across the Columbia, it extends south into Oregon. The crest of the Cascades marks the ecoregion's eastern edge. The western boundary dips to meet the foothills of the Puget Trough at about 1,000 feet. The ecoregion covers about 8% of state.

Outstanding Biodiversity Features

- **A great forested mountain range.** The West Cascades still retain significant tracts of natural, or at least semi-natural, forest, although management practices have altered forest structure at lower elevations.
- **Spectacular—and active—volcanoes host lowland to alpine species.** Mount Rainier is home to 723 native plants, amounting to 30% of the flora found in Washington. Mount Rainier and Mount Saint Helens are natural laboratories for studying how ecosystems respond to eruptions.
- **Columbia Gorge: a mountain range divided.** The Columbia Gorge, the ecoregion's low point at roughly 50 feet above sea level, splits the Cascades. It is notable as a place where coastal and inland species converge.

People in the Ecoregion

The West Cascades ecoregion is sparsely populated but long utilized. Human history in the West Cascades dates back at least 8,500 years, when the montane glaciers began to recede.

Tribes from both sides of the Cascades gathered huckleberries in the summer and fall. They hunted large and small game, from elk and mountain goats, to pikas and porcupines. The Nisqually, Puyallup, Squaxin Island, Muckleshoot, Yakama, and Cowlitz are among the peoples with long ties to the ecoregion.

The search for a wagon route over the Cascades led to some exploration of the West Cascades near Mount Rainier in the 1860s. That effort eventually resulted in settlement near Packwood in the 1880s. In the generations since, the timber industry has provided many livelihoods. Agriculture, particularly grazing and hay production, continues in the river valleys. Tourism has played an increasingly important role in recent years.

Nearly two-thirds of the ecoregion is public land, most of it federal. The ecoregion features numerous protected areas, including Mount Rainier National Park, Mount Saint Helens National Volcanic Monument, and several Forest Service wilderness areas.

This forested and mountainous ecoregion is near several urban centers, creating challenges to its future ecological integrity. Forward-thinking partnerships are looking for ways to conserve both the vitality of farms and working forests and the biodiversity of this ecoregion.

For more about this ecoregion visit www.biodiversity.wa.gov



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TARA GALUSKA



CLAYTON J. ANTIEAU

Council-Sponsored Research Reports

1. Climate Change and the Future of Biodiversity in Washington

University of Washington researchers prepared this report for the Washington Biodiversity Council. The study concludes that, despite the challenges inherent in addressing climate change in conservation planning, it may not be possible to conserve biodiversity in the coming century unless we do so. (2007)

<http://www.biodiversity.wa.gov/council/docs.html#climate>

2. Washington Forum for Conservation Incentives: Proceedings

Summaries of presentations and discussions from the Forum for Conservation Incentives, held January 5, 2007. The proceedings highlight the role that voluntary approaches play in conservation as well as key issues and opportunities. The summary document considers perspectives from the field, emerging directions, and breakout group discussions on eight topics, including conservation banking, regulatory flexibility, certification programs, and tax incentives. (2007)

<http://www.biodiversity.wa.gov/council/docs.html#forum>

3. Washington's Biodiversity: Status and Threats

Brief yet comprehensive, this report provides a summary assessment of the status of and threats to the biodiversity of Washington State. It includes sections on Washington's unique biodiversity, trends and threats that are affecting it, and the status of conservation assessments and information gaps. (2007)

<http://www.biodiversity.wa.gov/council/docs.html#workingdocs>

4. Toward a Biodiversity Conservation Strategy: Socioeconomic Conditions and Trends in Washington State.

This summary document considers how selected socioeconomic trends in Washington State may affect biodiversity conservation. It covers population growth and demographics, economy and industry, land use patterns and environment, and public attitudes and values. (2006)

<http://www.biodiversity.wa.gov/council/docs.html#socio>

5. Conservation Incentive Programs in Washington State: Trends, Gaps, and Opportunities

An assessment of conservation incentive programs, with appendices on financial and non-financial programs. (2005)

<http://www.biodiversity.wa.gov/council/docs.html#efc>

6. The Scope and Range of Conservation Assessments in Washington State

This report analyzes the range of biodiversity conservation assessments and plans conducted at various geographic scales within Washington State. (2005)

<http://www.biodiversity.wa.gov/council/docs.html#assess>



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AARON BARNA



JULIE BENNETT



BEN LEGLER

Appendices and Acknowledgements

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A. Options for Financing Biodiversity Conservation in Washington

This section presents several possible options for funding biodiversity conservation in Washington State. This summary of options expands on Recommended Action 5.3.2 of the Biodiversity Conservation Strategy, to identify and recommend innovative funding options to generate income from and for conservation. Cascadia Consulting Group assembled the options presented below based on review of existing resources (e.g., memos created by Evergreen Funding Consultants, Biodiversity Partners, and World Wildlife Fund) as well as interviews with selected local stakeholders (e.g., Mark Wolf-Armstrong of Restore America's Estuaries).

The options presented below are grouped under these six headings:

- State Funding;
- Federal Funding;
- Taxes and Fees;
- Trust Funds and Endowments;
- Offsets and Mitigation; and
- Ecosystem Service Payments.

State Funding

Washington's state government currently supports biodiversity conservation directly through programs such as the Washington Wildlife and Recreation Program (WWRP) and the Salmon Recovery Funding Board. It also indirectly supports biodiversity conservation through other agencies and through the activities of the Biodiversity Council. As previously discussed by the Council, and included in its Biodiversity Conservation Strategy, the state could increase the focus on biodiversity within existing programs such as WWRP. These options are not strictly revenue-generating, as they could necessitate cuts in other services. They are included here because, with sufficient political support, these options could bring new funds to biodiversity conservation efforts.

In addition to expanding the biodiversity focus of the WWRP, two options are discussed below.

1. Additional State Appropriations

Additional requests for state funding could be made to the Washington State Legislature to cover the costs of new biodiversity conservation initiatives. In particular, several of the financial incentives under discussion may require supplemental funding to make up the difference in lost revenues. For example, expanding the implementation of current use taxation, as autho-

rized under the Washington Open Space Taxation Act (RCW 84.34), beyond the six counties currently employing it may require commitments of state support.

In any case, making a clear and persuasive case to the Legislature is essential, including consideration of how the request to the Legislature fits into the proposed package of initiatives and other funding sources.

2. State Bonds

Issuing bonds allows a state to raise revenue and pay for significant up-front investments that it could not otherwise afford on a year-by-year or appropriation basis. Using bonds spreads the costs of projects out over a longer time period. Bonds could be used to fund many of the financial incentives studied by the Council, including current use taxation at the local level and conservation banking.

Nationwide, bonds are a common and successful means of financing conservation projects. In particular, the state of California uses several billion dollars annually through voter-approved bonds for a wide variety of conservation projects. In Washington, bonds are indirectly used to finance the Washington Wildlife and Recreation Program via the state's capital construction budget, but clear precedent exists in other states (including numerous other states besides California) for using bonds directly for conservation.

Bonds used for conservation are usually "general obligation" bonds rather than "revenue" bonds because biodiversity projects do not usually generate revenue that could be used to secure the bond. Therefore the bonds are instead backed by the state and, indirectly, by taxpayers.

Federal Funding

Several of the most substantial sources of federal funding for conservation are embedded in the 2002 and new 2007 Farm Bill. Evergreen Funding Consultants reports that these programs have collectively brought more conservation funding to Washington State than any other source. These programs are summarized briefly below because little opportunity currently exists to expand these funds, other than to encourage local entities to take advantage of them.

In addition, the federal government offers a variety of grant opportunities. Many of them are focused on specific goals and may be applicable to individual biodiversity conservation initiatives. However, the best approach is probably to match grants to specific initiatives, an effort beyond the scope of this brief funding summary.

3. Federal Conservation Payments

The 2002 Farm Bill included seven programs that make payments to farmers in exchange for conservation. The new 2007 Farm Bill (still deadlocked in the Senate) would extend the Conservation Reserve Program and the Conservation Reserve Enhancement program, extend and expand the Wetland Reserve Program, extend and increase funding for the Environmental Quality Incentives Program, continue the Conservation Innovation Grants, continue and

expand the Grasslands Reserve Program, improve the structure of the Conservation Security Program, and extend the Wildlife Habitat Incentive Program. These programs currently contribute several million dollars annually to conservation projects in Washington.

Beyond the Farm Bill-authorized programs, only a few other federal programs apply to biodiversity conservation. One of them is the Landowner Incentive Program, administered by the U.S. Fish and Wildlife Service.

Taxes and Fees

Taxes and fees are a clear means of raising revenue but new statewide taxes and fees can be expected to face highly organized and fierce opposition. Several options are presented below.

4. Real Estate Transfer Tax

A two-year statewide real estate transfer tax for conservation was enacted in Washington in 1987. Since 1990, counties have been authorized, with voter approval, to enact their own real estate excise taxes of up to 1%, but only San Juan County currently uses this mechanism. State-level real estate transfer taxes for conservation are common in other states.

Maryland has a unique real estate tax that applies to agricultural land converted to other uses, and funds from the tax go specifically to fund agricultural easements.

5. Sales Taxes

Several other states used dedicated sales taxes to fund conservation activities. Arkansas and Missouri apply the sales tax broadly, but in Texas the tax is applied specifically to sporting goods, in California and Pennsylvania it is applied to cigarettes, and in Minnesota it is applied to lottery tickets and cigarettes.

6. Tourism Fees

Fees on tourism are a common means of providing for amenities with tourism value. Fees applied on airplane tickets, hotel rooms, and cruise ship berths are in some cases used to fund conservation and acquisition projects. Delaware and Florida both tax hotel rooms, for example.

Fees can also be applied at recreation sites, such as park entrance fees, the Northwest Forest Pass, or special permit fees for hunting, rafting, harvesting, or other commercial or recreational ventures.

7. Other Conservation-Specific Revenue Mechanisms

In addition to taxes and fees, many other states have used specific products to fund conservation. License plates, novelty stamps, and lottery revenues are all common means of funding conservation.

Trust Funds and Endowments

An **endowment** is a large investment where the principal remains intact and the investment income is used by the holding institution for its operations. Typical for educational institutions, endowments are also common for large charitable organizations, including the National Wildlife Federation. A **trust** is an arrangement where money or property is managed by one organization for the benefit of another. For example, Washington's forest trust is held by the people and managed by the state. If no forest lands were sold, the "principal" would remain intact and this trust could also be considered an endowment.

8. Establish a Biodiversity Trust or Endowment

Clearly, having a large trust or endowment to benefit biodiversity would be an excellent component of a sustainable financing portfolio. However, building up enough principal to enable significant annual income would be a great challenge. Both public and private funding would likely be needed, a situation that would require a unique organizational structure with some independence from state government operations. The fund could perhaps be initiated by surplus state revenues, when available, and grown through corporate, foundation, and individual contributions.

Offsets, Mitigation, and Transfers

Offsets and mitigation are a means for development activities that impair biodiversity to fund conservation efforts in nearby or other locations. While they do not necessarily result in a net growth of biodiversity, offset, mitigation, and conservation "banking" structures may include enough flexibility to encourage or require net biodiversity improvements. Transfer of Development Rights programs allow for landowners to sell development rights from lands that provide conservation value, with the rights being transferred to a nearby urban area.

9. Expand use of Conservation Banking

Under federal and state regulations, environmental impacts of construction on wetlands must be mitigated by contributing to an offsite restoration project. The same concept could be applied more broadly (beyond wetlands) to include other biodiversity values, including specific species habitat. Evergreen Funding Consultants reports that conservation banking is part of the funding plan for Shared Strategy (and presumably the new Puget Sound Partnership) and so new momentum may be underway for expanded conservation banking in Washington.

10. Expand Use of Transfer of Development Rights

Transfer of development rights (TDR) programs allow individuals to purchase and sell residential development rights from lands that provide a public benefit such as forest, trails, open space, or habitat for threatened or endangered species. Transferred development rights can be used to build additional houses on other parcels in more appropriate areas such as designated urban growth areas. TDR programs have many benefits: landowners who sell development rights receive financial compensation without developing or selling their land, the public receives permanent preservation of the land, and developers can continue to build at higher densities.

A TDR also responds to growth management objectives by focusing growth in urban areas where services such as sewer, water, and transportation exist or can be readily provided. In Washington, Clallam, Thurston, Whatcom, King, and Snohomish counties have TDR programs.

TDR programs require the designation of “sending” sites, or areas from which development rights may be sold, and “receiving” sites, or areas where development credits may be applied.

In Washington, TDR programs have so far had only mixed success, due mostly to insufficient financial incentives and pre-existing zoning in some areas that has precluded the benefits of a TDR program. A study in Snohomish County concluded:

- TDR programs are only viable where they are the least costly method of achieving developers’ goals. Rezones, planned residential developments, or density bonuses in existing urban areas can often be cheaper than obtaining rights through TDR programs.
- Similarly, TDR programs must provide the best means of realizing financial return from the landowners’ property.

If these conditions can be met, research indicates that TDR programs can be successful means of conserving biodiversity.

Ecosystem Service Payments

An “ecosystem service” is a crucial public service or product provided by an ecosystem, such as clean water, timber, habitat, soil development, or agricultural pollination. While these values are usually “free” to the public, a growing recognition of their importance has begun to develop market-based mechanisms for their support and conservation. Examples are described below.

11. Carbon Sequestration Payments

Given the rapidly growing field of greenhouse gas mitigation, the demand for projects to sequester carbon is likely to continue to grow. In many cases, projects that sequester greenhouse gases also benefit biodiversity. For example, conservation tillage can both sequester carbon and benefit biodiversity. Standard methods to measure the carbon sequestration values of various practices are still in their early stages, but if best practices and conventions can be established, it may be possible for farms or timber operations to sell carbon sequestration values to carbon-offset providers (such as Native Energy or Climate Trust) or on the open market (via Chicago Climate Exchange or other broker), helping to improve the economics of conservation. A recent report by the University of Washington for the Washington Department of Natural Resources estimated that carbon sequestration could add \$500 to \$700 of net present value to each acre of forest land in the coming years.

12. Broader Ecosystem Services Payments

While carbon sequestration looks at only one variable (carbon), a biodiverse landscape provides many other benefits, including clean water, productive soil, and habitat, all of which have real value to the economy. To attempt to recognize the value of these broad benefits, and to avoid

potential unintended consequences of focusing only on a single metric (i.e., carbon), many researchers are advocating moving to more broad-based payments or credit-trading schemes that include multiple benefits. While these efforts are still in the early stages, the trends toward increased market recognition of ecosystem services may help bring about such a system in the long term.

13. Market Certification Programs

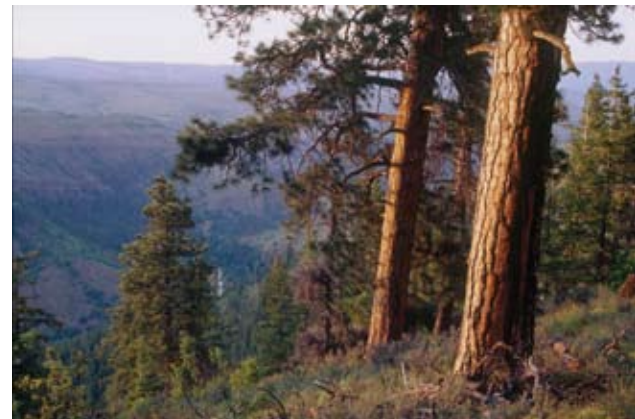
Market certification programs, such as organic food or Forest Stewardship Council lumber, are intended to raise the market price of a commodity in exchange for certifiable improvements in land stewardship practices. Although some controversy remains about the effectiveness of the programs at catalyzing large-scale improvement in land stewardship practices, the certifications (particularly organic food) have been successes in the marketplace and do bring increased revenue to landowners.



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CHARLES GURCH

B. Regional Pilot Projects

Eastern Washington Pilot Project

Healthy Lands Initiative

WORKING TO CONSERVE THE DIVERSITY OF LIFE IN WASHINGTON STATE

Background

Executive Order 04-02, which created the Washington Biodiversity Council, directed the Council to demonstrate the applicability of incentive programs in two biodiversity conservation pilot projects, one on the east side of the state and one on the west side.

Each project received \$20,000 from the Council and ran from January 2006 through June 2007.

The Council's Pilot Projects Committee chose the projects.

Pilot Projects Committee

Bonnie Bunning, chair
Washington Department of Natural Resources

Brian Collins
Skokomish Nation

Rob Fimbel
Washington State Parks and Recreation
Commission

John Marzluff
University of Washington

Jackie Reid
Thurston County Conservation District

Ken Risenhoover
Port Blakely Tree Farms

Steve Tharinger
Clallam County Commission

Josh Weiss
Washington Forest Protection Association

Megan White
Washington State Department of Transportation

WASHINGTON BIODIVERSITY COUNCIL
P.O. BOX 40917
OLYMPIA, WA 98504-0917
INFO@BIODIVERSITY.WA.GOV
360-902-3000
TTY: 360-902-1996
WWW.BIODIVERSITY.WA.GOV

Project Summary The Healthy Lands Initiative brought together the agriculture, land conservation, planning, and economic development communities to learn about the biodiversity in north central Washington and to explore conservation tools and resources, both existing and potential.

Key Accomplishments

- **Created slide show and DVD, *Nature of North Central Washington***, with input and feedback from residents and ecologists.
- **Analyzed available conservation incentives and developed slide show, *Conservation and Agriculture: Moving beyond the traditional into the sustainable***.
- **Reached 300 people in community dialogue process** through focus groups and discussions.
- **Organized a culminating forum with more than 60 attendees**. This led to the formation of the Healthy Lands Coalition and a strategic plan.
- **Convened a habitat farming work group**, which created a conceptual program that would pay farmers for growing riparian habitat.
- **Facilitated grassbanking work groups** and identified strategies for and barriers to grassbanks in north central Washington.

Lessons Learned

- **Local production is valuable.** Producing *Nature of North Central Washington* as a collective effort took a long time, but it allowed the slide show to reflect the contributions of many people. Even long-time residents learned something new and expressed an invigorated pride of place.
- **Gaps exist in incentive programs.** Analysis revealed that available incentive programs do not address invasive species, altered fire regimes, or climate change as their primary focus.
- **Institutional challenges remain.** The habitat farming program remains a case study of how slowly these things can move, even with willing participants, available funds, scoping, and a restoration plan.
- **Balancing land uses is critical.** Grassbank work groups clarified that the key to future efforts is making the case that livestock grazing can be compatible with wildlife needs.

Relationship with the Washington Biodiversity Council's Strategy

Several learnings from the project inform the recommendations put forth in the *Washington Biodiversity Conservation Strategy: Sustaining our Natural Heritage for Future Generations*.

- **Growing conservation markets is slow, but the effort is a valuable learning process that will benefit future efforts.**
(Incentives and Markets Strategy 2.3)
 - Work to develop a habitat farming program in Chelan County—one that addresses economic, community, and ecological needs—requires that diverse partners share in the responsibilities associated with this complex project.
 - A desire for broadening partnerships led to a joint proposal to the Ruckelshaus Center for Policy Consensus. This project is one of ten asked to submit a full proposal.
- **Dialogue among landowners and incentives providers offers unexpected benefits.**
(Incentives and Markets Strategy 2.1; Education Strategy 5.4)
 - Grassbank work group participants agreed that learning about grassbanks was valuable even though they decided not to pursue grassbanking at this time. Meeting with others to discuss landowner/producer needs, species needs, limitations, and opportunities was especially worthwhile.
 - Small focus groups are an effective tool for scoping out issues and identifying leaders.
 - The newly-formed Healthy Lands Coalition, a result of the community dialogue process, has several capacity-building charges. It plans to develop education and outreach program to showcase and build upon local conservation successes.
- **Raising awareness of biodiversity issues feeds opportunities for networking and education.**
(Education Strategy 5.1, Education Strategy 5.4)
 - *Nature of North Central Washington* serves as a platform for complementary programs about, for example, individual counties or habitat types.
 - The slide show/DVD invites continuing input from the community: information, images, stories.
- **Local needs give rise to citizen science initiatives.**
(Education Strategy 5.2, Education Strategy 5.3; Science and Information Strategy 4.2)
 - The grassbank work groups clarified the need for a common language and protocol for monitoring and for sharing results of management actions in shrub-steppe habitats. This stimulated the creation of new partnerships to conduct rangeland monitoring workshops.
 - Student Achievement from the Ground Up, a program that brings landowners, teachers, and students together to monitor landscape change, has been launched with a coalition of partners in north central Washington.

Project Partners include:

Institute for Rural Innovation and Stewardship, North Central Washington Resource Conservation and Development Council, Okanogan Conservation District, Foster Creek Conservation District, The Nature Conservancy, Icicle Fund, and the Community Foundation of North Central Washington.

Key Participants:

Jay Kehne

North Central Washington
Resource Conservation
and Development Council

Nancy Warner

The Nature Conservancy

Kathleen Deason

Foster Creek
Conservation District

Kent Mullinix

Formerly with the Institute
for Rural Innovation and
Stewardship

Western Washington Pilot Project

Pierce County Biodiversity Alliance

WORKING TO CONSERVE THE DIVERSITY OF LIFE IN WASHINGTON STATE

Background

Executive Order 04-02, which created the Washington Biodiversity Council, directed the Council to demonstrate the applicability of incentive programs in two biodiversity conservation pilot projects, one on the east side of the state and one on the west side.

Each project received \$20,000 from the Council and ran from January 2006 through June 2007.

The Council's Pilot Projects Committee chose the projects.

Pilot Projects Committee

Bonnie Bunning, chair
Washington Department of Natural Resources

Brian Collins
Skokomish Nation

Rob Fimbel
Washington State Parks and Recreation
Commission

John Marzluff
University of Washington

Jackie Reid
Thurston County Conservation District

Ken Risenhoover
Port Blakely Tree Farms

Steve Tharinger
Clallam County Commission

Josh Weiss
Washington Forest Protection Association

Megan White
Washington State Department of Transportation

WASHINGTON BIODIVERSITY COUNCIL
P.O. BOX 40917
OLYMPIA, WA 98504-0917
INFO@BIODIVERSITY.WA.GOV
360-902-3000
TTY: 360-902-1996
WWW.BIODIVERSITY.WA.GOV

Project Summary The Pierce County Biodiversity Alliance organized a BioBlitz, or rapid biological inventory, in the lower White River Biodiversity Management Area (BMA) between Buckley and Sumner. The BioBlitz ground-truthed species diversity, engaged citizen scientists, and served as a kick-off for community stewardship planning.

Key Accomplishments

- **Conducted 24-hour BioBlitz** in June, 2006, involving 100 professional and citizen scientist volunteers.
- **Recorded nearly 600 observations of animals and plants.** Observed 123 of 158 predicted species of birds, mammals, reptiles and amphibians (78%).
- **Contacted over 90 landowners** on both King and Pierce County sides of White River about the BioBlitz and the biodiversity management area tax incentive.
- **Aided formation of two community stewardship groups,** Crescent Valley Alliance (Washington Department of Wildlife's 2006 Conservation Organization of the Year) and Friends of the Lower White River.
- **Facilitated joint proclamation** by County Executives Ron Sims and John Ladenburg that endorses community efforts to protect biodiversity of the lower White River.

Lessons Learned

- **Unexpected landowner category—difficult to engage.** Limited Liability Corporations (LLCs) hold significant parcels along the lower White River for investments or future development. These "non-working" lands have no local contacts; they are not addressed in existing incentive programs.
- **River corridor lacks sociological cohesiveness.** The lower White River stretches between several jurisdictions; the people living there identify more with their town than with the river itself. As a result, PCBA is working initially with county and city personnel to develop a stewardship plan.
- **Tax incentives are highly utilized.** More than 70% of eligible landowners already enrolled in Current Use Taxation programs.

Relationship with Council Strategy

Several learnings from the project inform the recommendations put forth in the *Washington Biodiversity Conservation Strategy: Sustaining our Natural Heritage for Future Generations* (August 31, 2007)

- **Citizen Science works well to engage people in biodiversity conservation.**
(Education Strategy 5.3)
 - Over 25 citizen volunteers participated in 2006 BioBlitz, including high school and college students.
 - Twenty residents and eight teachers trained in data collection technique (NatureMapping).
- **Citizen Science helps fill gaps in knowledge; Biodiversity Inventory need not be expensive.**
(Education Strategy 5.3, Science and Information Strategy 4.2)
 - BioBlitz ground-truthed predicted species and made preliminary determination of threats and stressors. Data are being used in lower White River biodiversity stewardship plan.
 - Occurrence records are useful for Washington Natural Heritage Program landscape mapping project.
 - Species lists are informing Cascade Land Conservancy's option to buy Puget Sound Energy parcels along the lower White River.
- **Local government staffs are critically important** for providing expertise and technical assistance for community biodiversity conservation efforts.
(Land Use and Development Strategy 3.1, Land Use and Development Strategy 3.5)
 - Planning, conservation, wildlife, and data management expertise are all represented in the Pierce County Biodiversity Alliance and all are vital to its success.
 - Staff members from several jurisdictions are key to biodiversity stewardship planning in the lower White River corridor.
 - Gaps and challenges increase as agency staff are reduced or detailed away from biodiversity planning.
- **Small investments yield successes in community stewardship programs.**
(Education Strategy 5.4)
 - With assistance from Pierce County Biodiversity Alliance, Crescent Valley Alliance completed a stewardship plan, received grant funding to post informative signs at its watershed boundaries, and undertook the National Wildlife Federation's Community and Backyard Wildlife Habitat program.
- **Landowners on the rural-urban interface need innovative incentives.**
(Incentives and Markets Strategy 2.2)
 - Tax incentives are already well-utilized by landowners along the lower White River.
 - Certain sectors (warehouses, corporate landowners, "non-working" lands) are not the focus of existing incentive programs.

Project partners include: Pierce County Planning and Land Services Department, Washington Department of Fish and Wildlife, University of Washington, Cooperative Fish & Wildlife Unit, Metro Parks Tacoma, National Wildlife Federation, Puyallup River Watershed Council, Pierce County Conservation District, Crescent Valley Alliance (CVA), Friends of the Lower White River (FLWR).

Key Participants:

Katherine Brooks	Michelle Tirhi	Karen Dvornich	John Garner	Linda Burgess
Pierce County Planning & Land Services	Washington Department of Fish & Wildlife	UW NatureMapping	Michele Cardinaux Metro Parks Tacoma	Puyallup River Watershed Council
Gretchen Muller	Dave Seabrook	John Stern	Lucinda Wingard	Jeanne Fancher
National Wildlife Federation	Pierce Conservation District	Tracy Engels PCBA coordinators	Crescent Valley Alliance	Friends of Lower White River

C. Indicators, Goals

PRELIMINARY DRAFT:

Goals, Benchmarks and Indicators for potential use in a Biodiversity Scorecard

NOTE: This is a preliminary set of indicators and is not intended to be complete or comprehensive. The Council recognizes that additional work is needed to develop a robust set of indicators and information sources that are widely supported. *This draft was approved by the Council in April 2007.*

Goal: The state has made significant progress in securing and restoring viable populations of native species and functioning and intact ecosystems which represent our biodiversity heritage.			
	Objective	Potential Indicators for Measuring Progress	Potential Information Sources
A	Significant progress toward improving the status and function of ecological systems and plant associations currently at risk.	<ol style="list-style-type: none"> 1. Decrease in number of threatened or endangered ecological systems. 2. S-ranks (state lists of at-risk species) do not change for the worse. 3. Health of currently at-risk ecological systems are improving. 	<ol style="list-style-type: none"> 1. Number of at-risk <i>ecological systems</i> and <i>plant associations</i> defined as threatened, endangered, or S1 or S2
B	Significant progress toward maintaining the status and function of ecological systems and plant associations currently NOT at risk.	<ol style="list-style-type: none"> 1. Disturbance regimes (fire, flood, insects) are within natural range of variability. 	<ol style="list-style-type: none"> 1. Number of acres currently being managed to restore fire regimes.
C	Significant progress toward improving the status of species currently at risk (at risk defined as threatened, endangered or S1 or S2 on the Washington Natural Heritage Program Scale)	<ol style="list-style-type: none"> 1. Decrease in number of threatened or endangered species. 2. S-ranks (state lists of at-risk species) do not change for the worse. 3. Populations of at-risk species are improving. 4. Recovery plans are in place and are being implemented. 5. Increased knowledge of species at risk and their needs. 	<ol style="list-style-type: none"> 1. Number of at-risk <i>species</i>, defined as threatened, endangered, or S1 or S2 2. Number of recovery plans in place.
D	Significant progress toward maintaining the status of species currently NOT at risk.	<ol style="list-style-type: none"> 1. Number of new state threatened or endangered listings. 2. Species populations are fluctuating within normal range of variability (for example, bird count data). 3. Identification of all species in state and their habitat requirements 	<ol style="list-style-type: none"> 1. Numbers and a list of <i>species</i> that are "sensitive," "watch" or "of concern" —not yet threatened or endangered
E	Significant progress toward ensuring that species and ecosystems present at statehood are restored in the wild in the state.	<ol style="list-style-type: none"> 1. Number of species reintroduced and surviving in the wild. 	<ol style="list-style-type: none"> 1. Lists of species present at statehood that are now thought to be extirpated (not extinct).

Goal: The state has made significant progress in ensuring that healthy ecosystems sustain and support a high quality of life for people.

		Objective	Indicators for Measuring Progress
A	Cultural Value and Aesthetics	Significant progress toward maintaining or improving access to natural landscapes for cultural and spiritual enrichment.	<ol style="list-style-type: none"> 1. Access to natural areas stable or improving. 2. Resident satisfaction with natural features of cities and towns improving or stable. 3. Increase in value of real estate adjacent to protected lands. 4. Counties commit to certain level of greenspace. 5. Preservation/easement of culturally significant sites.
B	Recreation	Significant progress toward maintaining or improving access to natural landscapes for recreational use.	<ol style="list-style-type: none"> 1. Number of park visitors steady or increasing. 2. Ecotourism steady or increasing.
C	Air and Climate	Significant progress toward maintaining or improving provision of clean air and carbon storage capacity of ecosystems.	<ol style="list-style-type: none"> 1. Carbon storage of Washington forests and other lands. 2. Carbon storage of plankton. 3. Carbon storage of shellfish shells. 4. Carbon storage of urban green space. 5. Net gain in carbon storage (restoration, etc.). 6. Percentage of businesses with carbon offset programs. 7. Increase in purchase of hybrid vehicles.
D	Clean Water	Significant progress toward maintaining or improving the capacity of ecosystems to purify and retain water (flood control services).	<ol style="list-style-type: none"> 1. Area of active floodplain increases. 2. Incidence of flooding. 3. Number of municipalities that rely on watersheds for clean water. 4. Ecologically functional wetlands increase in number and area. 5. Number of watershed plans with clean water components. 6. Floodplain restoration plans.
E	Soil	Significant progress toward maintaining or improving soil stability and productivity (including microbial richness).	<ol style="list-style-type: none"> 1. Decrease in mean statewide erosion/acre. 2. Decrease in mean applications of fertilizer/acre. 3. Decrease erosion through forest management. 4. Percentage of farmers practicing low-input farming.
F	Food and Fiber	<p>Significant progress toward maintaining or improving the aspects of healthy ecosystems that contribute to the productivity of forest resources, agriculture, livestock grazing and fishery resources.</p> <p>[Includes pollination, natural pest control, nutrient cycling]</p>	<ol style="list-style-type: none"> 1. Native pollinator communities intact. 2. Natural pest control stable or increasing. 3. Socially and economically important species maintained/restored at levels compatible with levels of extraction. 4. Soil quality on producing lands maintained or improved. 5. Allowable catch limits steady or increasing. 6. Hunting and fishing limits steady or increasing. 7. Production of commodities/acre stable or increasing.

Goal: The state has an institutional framework that fully supports and is accountable for progress toward protecting biodiversity.

		Objective	Indicators for Measuring Progress
A	Governance	Biodiversity conservation is an integral component of the mission, goals, strategic planning, and budgets of agencies and other policy making bodies with a role in managing of the state's natural resources.	<ol style="list-style-type: none"> 1. Agency mission and goals include biodiversity conservation. 2. Biodiversity conservation programs and projects are supported by agency managers. 3. Agencies participate in reporting on indicators for the Biodiversity Score Card. 4. Biodiversity conservation priorities are included and addressed in agency strategic plans, grants, and decision making processes. 5. Government programs and local service delivery are coordinated and effective at on the ground conservation activities.
B	Voluntary Conservation on Private Land	Incentives, market mechanisms, and other voluntary measures are effective, efficient, and widely used mechanisms to conserve biodiversity resources on private lands.	<ol style="list-style-type: none"> 1. The state tracks overall investment and results from conservation incentives. 2. Availability of market-based programs is growing; conservation results are positive. 3. Landowners' experience in applying for incentive programs is improving. 4. Participation of private landowners in incentive programs is increasing. 5. Incentive providers coordinate on program implementation. 6. Adequate and stable funding sources for incentive programs exist. 7. Progress toward removing disincentives.
C	Land Use and Development	Biodiversity conservation is being incorporated into comprehensive planning, implementing programs, and specific development projects.	<ol style="list-style-type: none"> 1. Landowners, planners, and land managers have adequate resources and assistance to identify high priority biodiversity resources. 2. Incentives exist to support landowners in maintaining working lands. 3. Incentives exist to focus development in existing urban areas.
D	Education	The education system provides students with a comprehensive understanding of the science and value of biodiversity.	<ol style="list-style-type: none"> 1. Number of schools that have experiential nature programs. 2. Number of schools participating in citizen science projects. 3. Number of schools that include curriculum specifically addressing biodiversity.
E	Public Engagement	Citizens understand the value of biodiversity, how their actions matter, and the importance of efforts in local communities and ecoregions.	<ol style="list-style-type: none"> 1. Percentage of the public who participate in stewardship activities. 2. Percentage of the public who support biodiversity conservation programs and policies. 3. Number of active citizen science programs in the state.
F	Science and Information	Needed information about the states' biodiversity is readily accessible and user friendly. There is a strong science foundation for policy setting.	<ol style="list-style-type: none"> 1. Biodiversity Science Team established. 2. Biodiversity Data Partnership and Monitoring Plan developed and implemented. 3. Critical gaps in information are being addressed.

Acknowledgements

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Members of the Biodiversity Council Science Committee: Sarah Brace, John Floberg, John Gamon, Elizabeth Gray, Molly Ingraham, John Pierce, Elizabeth Rodrick, Paul Wagner.

Cascadia Consulting Staff: Laura Blackmore, Jessica Branom-Zwick, Marc Daudon, Laila Parker, Christy Shelton.

Additional Consultant Support: Dennis Canty, Julie Colehour, Chris Davis, Dee Frankfourth, John Gamon, Brad Kahn, Josh Lawler, Joe LaTourette, Molly Mathias, Lainie Turner, Jay Thompson.

Strategy Guidance: Bobby Cochran, Carole Richmond, Don Stuart, Sara Vickerman.
John Gamon, principal author of **Washington's Biodiversity; Status and Threats Report.**

Pilot Project Leads: Katherine Brooks, Kathleen Deason, Karen Dvornich, John Garner, Jay Kehne, Michelle Tirhi, Nancy Warner.

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Consultations With Technical Experts, Stakeholders And Others

The Council also thanks the many who offered comments and suggestions throughout the development of the strategy—in letters, emails, and in-person meetings. A list of these individuals follows. Please note that while the Council has endeavored to be thorough and complete in this list, we apologize in advance for any unintended omissions.

Initial Interviews with State Leaders

Brian Boyle, Northwest Environmental Forum; Jim Cahill, Natural Resources Budget Advisor to Governor Gregoire; Alan Durning & Eric De Place, Sightline; Helen Engle, National Audubon Society; Luke Esser, Senator, Washington State Senate; Kathy Fletcher, People For Puget Sound; Debora Hyde and Katherine Brooks, Pierce County Planning Department; Ron Judd, Office of the Governor; Bruce Mackey, Department of Natural Resources; Keith Phillips, Office of the Governor; Joan Thomas, Parks Commissioner; Cliff Traisman, Washington Conservation Voters & Washington Environmental Council; Roger Hoesterey, Regional Director, Trust for Public Lands; Jeff Koenings, Washington Department of Fish and Wildlife; Megan White, Washington State Department of Transportation; Bill Wilkerson, Washington Forest Protection Association.

Education and Public Outreach

Dan Belting, Northwest Trek; Helen Buttemer, Katherine Glew, Biology Programs for Teachers, University of Washington; Karen Dvornich, Dan Hannafious, NatureMapping Program; Lynne Ferguson, Margaret Tudor, Pacific Education Institute; John Garner, Michele Cardinaux Tacoma Nature Center; Jean MacGregor, Curriculum for the Bioregion; Kent Mullinix, Institute for Rural Innovation and Stewardship; Nicole Ricketts, Washington Department of Fish and Wildlife; Abby Ruskey, Environmental Education Association of Washington; Bob Simmons, Chair, and Members of the Governor's Council for Environmental Education; Saul Weisberg, Lee Whitford, North Cascades Institute; Gilda Wheeler, Office of the Superintendent of Public Instruction.

Science and Information

Jim Agee, University of Washington; John Floberg, Cascade Land Conservancy; Jerry Franklin, University of Washington; David Giblin, Burke Museum, University of Washington; Josh Lawler, University of Washington; Merrill Peterson, Western Washington University; Erik Neatherlin, Washington Department of Fish and Wildlife; Gordon Orians, University of Washington; David Peterson, University of Washington; Steve West, University of Washington; George Wilhere, Washington

Department of Fish and Wildlife; staff of the Natural Heritage Program, Washington Department of Natural Resources: Joe Arnett, Rex Crawford, John Fleckenstein, Lisa Hallock, Janice Miller, Jack McMillan.

Incentives and Land Use

Rick Anderson, HDR Consulting; Katherine Brooks, Pierce County Planning Department; Jan Cassin, Parametrix Inc; Bill Clarke, representing Washington Realtors; Bobby Cochran, Clean Water Services; Michelle Connor, Cascade Agenda; Steven Davenport, Paul Jensen, Spokane County Planning Department; Britt Dudek, Foster Creek Conservation District; Chuck Jones, Alliance Consulting (Douglas County Planning/Colville Tribe); Cherie Kearney, Columbia Land Trust; Larry Nussbaum, Stewardship Partners; Monty Mahan, Pierce County Conservation District; Ken Miller, Washington Farm Forestry Association; Doug Peters, Tim Gates, Bill Mandeville, Sam Wentz, Department of Community, Trade and Economic Development; Denise Pranger, Kirk Hansen, Northwest Natural Resource Group; Marja Preston and staff from Bainbridge Island Department of Planning; Joanne Schuett-Hames Washington Department of Fish and Wildlife; Mike Shelby, Western Washington Agriculture Association; Don Stuart, American Farmland Trust; Ted Sullivan, King County Department of Natural Resources and Parks; Paula Swedeen, Earth Economics; Kerry ten Kate, Business and Biodiversity Offset Program; Tim Trohimovich, FutureWise; Sara Vickerman, Defenders of Wildlife; Ray Victorine, Bainbridge Island Forestry Advisory Council; Bettina von Hagen, Ecotrust.

Stakeholder Meetings on Draft Recommendations

Jim Cahill, Jim Skalski, Deborah Feinstein, Office of Financial Management; Nina Carter, Washington Audubon; Mark Clark, Stu Trefry, Washington State Conservation Commission; Joan Crooks, Washington Environmental Council; David Crowell, Todd Woosley, Seattle-King County Association of Realtors; Kathleen Drew, John Mankowski, Keith Phillips, Governor's Policy Office. Mark Doumit, Washington Forest Protection Association; Rick Dunning, Ken Miller, and others Washington Farm Forestry Association; Peter Dykstra, Kitty Rasmussen, Trust for Public Lands; Stan Finkelstein, Washington Association of Cities; Mitch Friedman, David Woods, Conservation Northwest; Terry Hunt, Scott Dahlman, Dan Hammock, Washington State Grange; Billy Frank, Fran Wilshusen and members of the Northwest Indian Fisheries Commission; Eric Johnson, Washington State Association of Counties; John Larson, Washington Association of Conservation Districts; Grant Nelson, Chris McCabe, Association of Washington Business; Jeff Pavey, Charlie Raines, Cascade Land Conservancy; Bill Robinson, The Nature Conservancy; Don Stuart, American Farmland Trust; John Stuhmiller, Washington Farm Bureau.

Commenters on the Strategy Public Review Draft of August 31, 2007

Lynn Bahrych, Washington State Conservation Commission; Frederick Bentler; George Boggs, Whatcom Conservation District; Brian Boyle, Northwest Environmental Forum; Bill Boyum, Washington State Conservation Commission; Wendy Brown, DNR Aquatics-Invasive Species Council; Sarah Close, Stewardship Partners; Alex Conley, Yakima Basin Fish & Wildlife Recovery Board; Rod Crawford, Burke Museum, University of Washington; Scott Dahlman, Washington State Grange; Perry Falcone, Snoqualmie Watershed Forum, King County; Robert Fuerstenberg, King County Water and Land Resources Division; Joe Holtrop, Clallam County Conservation District; Michael Jensen; Jeff Koenings (with others) Washington Department of Fish and Wildlife; Chuck Lennox, Cascade Interpretive Consulting; Jean MacGregor, The Evergreen State College/Curriculum for the Bioregion; Mike Marsh, Washington Native Plant Society; Robert Meier, Rayonier; Ken Miller, Washington Farm Forestry Association; Scott Moore, King County Noxious Weed Control Board; Bobbie Morgan, Natural Landscapes Project; Merrill Peterson, Western Washington University/Natural Heritage Council; Doug Pineo; Ragina Smith, Cascade Land Conservancy; Dale Swedberg, Washington Department of Fish and Wildlife; Paula Swedeen, Earth Economics; Margaret Tudor, Pacific Education Institute; Jennifer Vanderhoof, King County Water and Land Resources Division; Sara Vickerman, Defenders of Wildlife; Carol Yoon, New York Times.

Presentations at Council Meetings

Clay Antieau, Cedar River Municipal Watershed; Tom Banse, Northwest Regional Correspondent, National Public Radio; Alicia Bishop, University of Washington; Linda Burgess, Puyallup River Watershed Council; Jeanette Dorner, Nisqually Tribe; Jim Fox, Recreation and Conservation Office; Mark Goering, The Nature Conservancy; Norm Johnson, Oregon State University; Jennifer Korfiatis, North Central Washington Economic Development District; Dr. Ed Miles, Climate Impacts Group, University of Washington; Erik Neatherlin, Washington Department of Fish and Wildlife; Paul Nelson, Kitsap County Planning Department; Jim Warjone, Port Blakely Companies; members of the Entiat Watershed Planning Unit and staff of Chelan Conservation District.

WASHINGTON
BIODIVERSITY COUNCIL
CONSERVATION | EDUCATION | STEWARDSHIP

1111 Washington Street SE
P.O. Box 40917
Olympia, WA 98504-0917
360-902-3000
www.biodiversity.wa.gov