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**WASHINGTON BIODIVERSITY INITIATIVE**  
A FEASIBILITY ASSESSMENT



BY  
JOE LA TOURRETTE  
B. WAYNE LUSCOMBE, Ph.D.

PREPARED FOR  
**DEFENDERS OF WILDLIFE**  
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**ABOUT DEFENDERS OF WILDLIFE**

Defenders of Wildlife is a leading nonprofit conservation organization recognized as one of the nation's most progressive advocates for wildlife and biodiversity conservation. The West Coast Office emphasizes alternative approaches to environmental decision-making through partnerships that engage a broad spectrum of participants to help find common ground and constructive solutions.

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## EXECUTIVE SUMMARY

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Over the next 25 years, Washington is in danger of losing much of its biodiversity (defined most simply as "the variety of life and its processes"[Defenders of Wildlife 1998]). Continued habitat loss and degradation pose a significant risk to many vulnerable plant and animal species and the natural processes that support them, especially in the Puget Sound region, where most of the state's population and growth is concentrated.

Few if any federal laws or programs address protection of plants, animals and ecosystems before they become imperiled; the same can be said of most state governments. To address this need, some states, including Florida and Oregon, have developed state-level initiatives to protect and restore biodiversity.

In April 2001, Defenders of Wildlife commissioned a study on the feasibility of a statewide biodiversity project in Washington state, similar to the successful Oregon Biodiversity Project. This contracted feasibility study includes a policy assessment and a technical and GIS management assessment. It is based on a number of information sources, including contractors' expertise, current research



*Few if any federal laws or programs address protection of plants, animals and ecosystems before they become imperiled; the same can be said of most state governments.*

and personal interviews with more than 70 federal, state, local and tribal natural resource and GIS managers, state elected officials and representatives from conservation and business organizations.

The Oregon Biodiversity Project (1993-1999) was a private sector-based collaborative effort that involved a wide range of interests, including federal, state and local governments, academia, industry, and conservation organizations. Initiated by Defenders of Wildlife in collaboration with The Nature Conservancy of Oregon and the Oregon Natural Heritage Program, the Oregon project produced a statewide biodiversity analysis and outlined a broad conservation strategy to guide future action. The project developed a number of high quality products, including a full-color atlas that outlined major findings and a separate publication on landowner conservation incentives. The Oregon project has been widely recognized as a model for future biodiversity projects in other states.

## **RECOMMENDATIONS AND CRITICAL ISSUES**

Based on the policy and technical assessments, this report recommends that a Washington biodiversity initiative, similar to the Oregon Biodiversity Project, should be initiated in Washington state as soon as possible. In support of this recommendation, the study finds that:

- There is a strong base of understanding and support among federal and state agency administrators and nonprofit conservation groups for pursuing a Washington biodiversity initiative.
- There is currently support within the Executive Branch and Washington Legislature for moving forward now with a statewide biodiversity initiative. (See Appendix IX for legislative authorization.)
- The technical capability currently exists within federal and state agencies, as well as selected local and tribal governments and conservation groups, for developing a statewide biodiversity initiative.

- Several important conservation planning efforts are currently underway, which could be building blocks for a Washington biodiversity initiative. The most significant and relevant effort is the Ecoregional Conservation Planning project currently being undertaken by The Nature Conservancy, Washington Department of Fish and Wildlife, Washington Department of Natural Resources, and the Office of Community Development.

In moving forward with a Washington biodiversity initiative, a number of existing and potential barriers and issues will have to be addressed. This report recommends establishment of a Washington biodiversity council, preferably through legislation or an executive order, with representation from major stakeholders and interest groups, to address these issues, including:

**STAKEHOLDER PARTICIPATION AND SUPPORT.** Participants should include appropriate state, federal and tribal agencies, local governments, interested conservation groups and representatives from the business community, especially agriculture, commercial timber and the building industry. The challenge will be to design a process that is both efficient and allows stakeholders to participate in a meaningful way.

**INTERAGENCY COOPERATION.** Although cooperation among state agencies has improved in recent years, formal direction from the governor, or preferably the legislature, would ensure a higher level of involvement and coordination.

**APPROACH.** Biodiversity conservation strategies increasingly look beyond "hotspots" of species richness and traditional reserves, embracing a broader approach that also addresses the role of working landscapes and incentives for landowners to conserve ecological processes and functions. However, analytic tools and management strategies for this broader approach are less well developed.



**PROJECT OBJECTIVES AND SCOPE.** Support for the notion of starting with a statewide assessment and conservation strategy is not unanimous. Some suggest starting with a pilot effort at the regional level. Others would only focus on priority regions. Similarly, some believe the objective should be to provide a framework and coordinated strategy for conservation at a statewide level. At the other end of the scale, some believe the project should support planning and decision-making for on-the-ground action at the local level.

**PROJECT SUSTAINABILITY.** There is general agreement that a Washington biodiversity initiative should not end with the production of a set of products. There is, however, no consensus on how to structure and maintain on-going support functions.

**PROJECT LEADERSHIP AND MANAGEMENT.** There is no consensus on who should lead a biodiversity initiative in Washington, but most people surveyed felt strongly that it should not be led by a single government agency. Most preferred management through a collaborative structure of some kind involving both government and non-government interests.

**TIME FRAME AND COST IMPLICATIONS.** The time frame and costs for the development of a biodiversity initiative are largely unknown and will depend on a variety of factors, including many of those cited above.

**POLITICAL OPPORTUNITY.** **As this report goes to press, the Washington Legislature is putting finishing touches on Senate Bill 6400 which established and partially funds a biodiversity council (see Appendix IX for a copy of the bill).**

**FUNDING.** Funding a new conservation program will not be easy, but it will not be an insurmountable challenge if proponents can adequately convey the benefits of the project to public and private decision-makers and stakeholders.

### NATIONAL AND REGIONAL LOSSES OF BIODIVERSITY

We are facing a major crisis in the United States. We are in danger of losing much of our biodiversity in the next 25 years. Although we do not fully understand the consequences of this continual loss of native plant and animal species, and the ecosystems in which they function, we do know that healthy functioning ecosystems have substantial significance for our quality of life and for sustaining the natural resource industries, such as agriculture forestry, and outdoor recreation, that are so important for our Northwest economy.

The Nature Conservancy, in a 2000 publication *Precious Heritage: Status of Biodiversity in the United States*, indicated that one-third of the native U.S. flora and fauna is already considered to be of "conservation concern" from habitat loss, degradation and fragmentation due to sprawl development, agriculture and other land modifications (Stein et al. 2000). This trend is expected to continue unless we have a system of conservation lands in place to protect biodiversity values. The Environmental Law Institute's 2001 report, *Status of the States: Innovative State Strategies for Biodiversity Conservation* (Environmental Law Institute



*As the smallest and second most densely populated of all the rapidly-growing Western states, Washington is in particular danger of losing much of its diversity of plant and animal life, and the natural processes that support them, in the next 25 years.*

2001), notes that few if any federal laws or programs address protection of plants, animals and ecosystems before they become imperiled; the same can be said of most state governments. To address this national loss of biodiversity, some states, including Florida and Oregon, have developed state-level initiatives to protect and restore biodiversity.

Washington state is no exception to the national trend of biodiversity loss. As the smallest and second most densely populated of all the rapidly growing Western states, Washington is in danger of losing much of its diversity of plant and animal life, and the natural processes that support them. This is especially true in the Puget Sound region, where most of the state's population and growth is concentrated. The state's population in 2000 was 5.8 million; this is expected to increase by almost two million by 2020. Without a statewide program to identify areas of important terrestrial and aquatic biodiversity, and a coordinated effort to protect those areas and natural processes, the long-term prognosis for Washington's biodiversity is discouraging.

## **WHAT IS BIODIVERSITY?**

Defenders of Wildlife, in its publication *Oregon's Living Landscape* (Defenders of Wildlife 1998), defines biodiversity as "the variety of life and its processes". A widely accepted variation on this definition includes "the variety of living organisms, the genetic differences between them, the communities and ecosystems in which they occur, and the ecological and evolutionary processes that keep them functioning, yet ever changing and adapting" (Noss and Cooperrider 1994).

## **THE OREGON EXPERIENCE**

In 1993, a small group of conservationists, frustrated with single-species and crisis-oriented management of complex natural resource issues, decided to try a new approach in Oregon by initiating the Oregon Biodiversity Project. The statewide effort, led by Defenders of Wildlife, The Nature Conservancy of Oregon and the Oregon Natural Heritage Program, was based on the

assumption that it would be productive to evaluate the overall distribution of species, habitat types, land ownership and management strategies across the Oregon landscape to determine which areas should receive the highest priority for conservation. Over a five-year period, assisted by geographic information system (GIS) technology and a collaborative effort by dozens of public and private cooperators, the Oregon Biodiversity Project was able to shape the outlines of a biodiversity analysis and conservation strategy for the state of Oregon. By 1998, the project had raised and spent more than \$800,000 in public and private funds, in addition to more than \$200,000 in in-kind contributions. A variety of usable products were produced in the first five years of the project, including a full-color atlas containing a biodiversity assessment and strategy, a poster showing 42 "conservation opportunity areas" identified by the project, a CD-ROM containing conservation-related data sets and a number of publications and PowerPoint slide shows explaining the Oregon project.

The Biodiversity Partnership was created in 1999 as the implementation vehicle for the Oregon Biodiversity Project, and to promote similar efforts in other states. The Partnership is a loosely organized entity that serves as a coordinating mechanism for a wide variety of activities relevant to biodiversity conservation on-the-ground and in the policy arena at the federal, state and local levels. Although Defenders of Wildlife provides the administrative support for the effort and maintains a website for the exchange of information ([www.biodiversitypartners.org](http://www.biodiversitypartners.org)), the Partnership does not advocate on behalf of its members. However, in 2001 a coalition of organizations and agencies, many of them active "biodiversity partners" persuaded the Oregon Legislature to adopt a comprehensive incentives bill to facilitate improved biodiversity protection on private lands. Another group of "biodiversity partners" promoted successful sustainability legislation that established the Institute for Natural Resources at Oregon State University.

## **FEASIBILITY STUDY FOR A WASHINGTON BIODIVERSITY INITIATIVE**

In April 2001, Defenders of Wildlife commissioned a study and report on the feasibility of a statewide biodiversity project in Washington state, similar to the successful Oregon Biodiversity Project. The study, assisted by a grant from the Charlotte Martin Foundation, was conducted by Joe La Tourrette, an independent contractor from Olympia, Washington, and Wayne Luscombe, Ph.D., a subcontractor from Portland, Oregon.

There are two aspects to the Washington biodiversity feasibility study: a policy assessment and a technical and GIS management assessment. The lead contractor has extensive knowledge of Washington's wildlife and other natural resources, as well as Washington state government, based on more than 25 years of experience as a state employee and policy consultant to state and federal government agencies; he took the lead in conducting the policy assessment. The subcontractor has vast working knowledge about the development and management of geographic information systems (GIS), based on more than 20 years experience working in that field as a manager with the World Bank; he took the lead in conducting the technical and GIS management assessment.

The feasibility study is based on a number of information sources, including the contractors' personal knowledge, current Internet research and interviews with more than 70 federal, state, local and tribal natural resource and GIS managers, state elected officials and representatives from conservation and business organizations. A policy questionnaire (Appendix I) was used in personal interviews with everyone except GIS managers; a separate technical questionnaire was used for interviews with GIS managers (Appendix II).

Personal interviews were conducted in Olympia, Seattle, Portland, and Vancouver, Washington. A number of phone interviews were also completed with people outside the Seattle-Portland area, and, in a few cases, questionnaires were completed by people who were unavailable for interviews. The combination of personal knowledge, current research, completed questionnaires

and detailed field notes from each interview gave the contractors more than adequate information and insight to assess the feasibility of a Washington biodiversity initiative and to make sound recommendations.

This report represents the findings of the feasibility study. It begins with an overview of the current situation in Washington State, followed by an assessment of the interest, institutional capacity and constraints and opportunities that relate to a statewide biodiversity project. It also examines in some detail the technical capacities and the availability of information to support such a program. Based on these policy and technical assessments, the report makes key recommendations about the feasibility of doing a biodiversity initiative in Washington state and discusses some critical issues that will affect the project's implementation and ultimate success.

## OVERVIEW OF WASHINGTON STATE

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*Washington has lost an estimated 70% of its estuarine wetlands, 50% of its riparian habitat, 90% of its old-growth forest and 70% of its native shrub-steppe and arid grasslands since statehood in 1889.*

Washington State is one of the most biologically diverse states in the union. This is due to a number of factors, including the state's diverse topography, its exposure to Pacific Ocean currents and weather patterns and its location on the migratory path of many wildlife species. Washington has Pacific Ocean seacoast, shrub-steppe desert, native prairies, part of four major mountain ranges and the huge inland estuary called Puget Sound. Washington in fact contains most of the major ecosystem types found in the western United States — all in a state that is about two-thirds the size of Oregon.

Washington is second only to California in human population and population density in the western U.S. The state's population increased from 4.1 million in 1980 to 5.8 million in 2000, with almost 4 million of that population in the Puget Sound region, and is projected to increase by almost two million by 2020. Population density in 1990 was estimated at about 87 people per square mile, compared to 196 people per square mile in California and 42 people per square mile in Oregon. Most of the state's population and rapid population growth is centered in the Puget Sound region, from Bellingham to Olympia, although substantial

growth is also taking place in Vancouver, Spokane, Yakima, Wenatchee, Tri-cities and other metropolitan areas. In the 2000 census, Clark County (Vancouver) was the fastest-growing area of the state.

Rapid, sustained population growth in Washington since the end of World War II has resulted in huge losses of fish and wildlife habitat and biodiversity in urbanizing areas of the state. Again, these losses and changes are most severe in the Puget Sound region, where development pressure and urban runoff continues to affect not only terrestrial habitats but also the streams, rivers and wetlands that nurture Puget Sound, as well as the larger Puget Sound estuary itself. Washington has lost an estimated 70% of its estuarine wetlands, 50% of its riparian habitat, 90% of its old-growth forest and 70% of its native shrub-steppe and arid grasslands since statehood in 1889. These four habitat types are considered among the most diverse and productive in the state. The overall environmental quality of Puget Sound itself has eroded so much since 1950 that a report released by the Department of Natural Resources in 2000, *Changing Our Water Ways* (Washington State Department of Natural Resources 2000), compares Puget Sound to the condition of Chesapeake Bay on the Atlantic Coast in 1980, before the big cleanup effort began in Chesapeake Bay.

## **PUBLIC LANDS**

About 40% of the land base of Washington state is in public ownership, including military bases, the Hanford Nuclear Reservation and state and federal parks, forests and wildlife lands. This does not include tribal lands, which account for another 6%. About 30% of the state's tidelands and 75% of freshwater shorelands are also owned by the state, the remainder having been sold into private ownership after statehood in 1889. (See Appendix XI)

Although this percentage of land in public ownership looks high, it is not large when compared with other Western states such as Nevada (84%) and Oregon (54%). Much of the state's public land and protected wildlife habitat is in



high-elevation forests, managed as National Forests, National Parks, or State Trust Lands. The largest public land manager in the state is the USDA Forest Service, followed by the state Department of Natural Resources.

Lower elevation public lands make up less than half of the total public land base, including wetlands, stream corridors, prairies, shrub-steppe grasslands and forests below 3,000 feet. Appendix XI shows the acreage of federal, state and tribal lands in Washington.

## **HABITAT PROTECTION ON PUBLIC LANDS AND WATERWAYS**

Protection of wildlife and critical wildlife habitat is much easier on public lands and waterways than on private property. Most of Washington's public land base and water resources are managed for fish and wildlife, or managed under a multiple-use concept that addresses the protection and management of important habitat. All public land and water management agencies have some level of responsibility for fish, wildlife and habitat on their lands. Even the Department of Defense and Department of Energy operate active fish and wildlife programs on their lands, including Fort Lewis, Yakima Firing Center and the Hanford Nuclear Reservation. The challenge for protecting biodiversity on public lands depends to a large extent on each agency's mission, management priorities, funding, knowledge of natural resources on its land and its willingness to actually identify areas important for biodiversity and to coordinate with other agencies and groups on issues, such as definitions, standards and protocols.

## **PRIVATE LANDS**

Most of the land base of Washington state (60%) is in private ownership and much of that, at least outside metropolitan areas, is in timber or agricultural production. Private corporate timberlands account for more than 4 million acres or about 10% of the state. Agriculture, including cropland, pastures and orchards, accounts for another 15 million acres, about one-third of the state.

Although private lands in Washington collectively contain many areas of high biological diversity, little is known about the biological values of many of these private lands. They are unmonitored, and in many cases, have no legal protection from activities that could diminish their biological productivity, including mining and certain high yield timber and agricultural practices. A number of state and federal programs have been put in place to try to protect wildlife and critical habitat on private lands. These programs range from federal regulations to protect endangered species in private forests to the State Department of Fish and Wildlife's voluntary Upland Wildlife Restoration program, which provides incentives to willing agricultural landowners to protect and restore wetlands, riparian and important upland habitat for wildlife on private land. Many of these programs are summarized in Appendix IV.

## **HABITAT PROTECTION ON PRIVATE LANDS**

More than 60% of Washington's land base and wildlife habitat is in private ownership and because of that, various local, state and federal agencies, as well as conservation groups, have had to devise many different approaches or tools for identifying and protecting the most important conservation lands. These tools, some of which are summarized in Appendix III, fall into the three general categories: regulations, property acquisition and landowner incentives.

With all the programs and funding sources that Washington has in place, the state still continues to lose many of its most biologically diverse areas to development, and in some cases neglect. There simply are not enough funds or enough of the right tools in place to adequately identify, protect, restore and properly manage areas of biodiversity in Washington, especially on private lands. State and federal regulations only go so far in protecting habitat on private land. Regulations that are in place are usually focused narrowly on endangered species, rather than areas important for biodiversity.

Land acquisition programs are very good mechanisms to permanently protect important habitats that cannot be saved in any other way — but not all land is

for sale, and funds available for acquiring habitat, including conservation easements, are very limited. The most cost-effective way to ensure the protection of important wildlife habitat on private lands is often through the application of various financial and non-financial incentive programs (see Appendix IV). These landowner incentives range from direct local property tax reductions and acquisition of conservation easements to the voluntary inclusion of private property in a program such as the Washington Register of Natural Areas, which is administered by The Nature Conservancy and the Washington Department of Natural Resources.

### BIODIVERSITY IN WASHINGTON

Northwesterners in general and Washingtonians in particular are more in touch and engaged with their natural environment than Americans as a whole or at least they like to see themselves that way. Public support and Washington's elected officials have always been on the leading edge of efforts to develop new national environmental laws and programs, such as the National Environmental Policy Act, Endangered Species Act and the North American Wetlands Conservation Act, as well as strong state programs, such as the Shoreline Management Act and, more recently, the Growth Management Act.

Washington was thrust into the center stage of wildlife conservation in the late 1980s when the northern spotted owl was listed under the federal Endangered Species Act. Timber harvest was eventually scaled back on public lands to accommodate the habitat needs of the owl and other old-growth-dependent species, and the Clinton Administration held a Northwest Forest Summit in 1993 to try to devise ways of protecting spotted owl habitat without completely shutting down the timber industry on public lands. Now, with the recent and impending new listing of various stocks of Pacific salmon under the Endangered Species Act,



*Despite the existence of a number of programs focusing on various aspects of biodiversity in Washington, there is no overarching state policy on biodiversity and no formal institutional framework to support a coordinated statewide conservation strategy. A Washington biodiversity initiative could provide the vehicle for a more comprehensive and effective approach to the state's long-term conservation needs.*

Washington state government, local governments, Indian tribes and the extractive industries, such as timber and commercial fishing, are generally resigned to having to tailor their operations around the requirements for endangered species protection. Even cities, especially in the Puget Sound region, are very aware of the requirements of the Endangered Species Act. While public officials and the private sector may be supportive in general of habitat protection, they are always braced for the potential announcement of a new species listing and a new round of federal and/or state regulations, which must be followed to address the recovery of a listed species.

The term biodiversity is not well understood, even in the conservation community, and understood far less by public officials and the general public who pay for environmental conservation. One of the strongest arguments for the development of a Washington biodiversity initiative is the idea that, by identifying and protecting areas important for biodiversity, the state can get ahead of future endangered species listings. This is probably true, but developing a biodiversity initiative will not be an easy task because natural resource managers and public officials are so focused on applying limited funds and staffing to just meeting the current requirements of existing laws, including the Endangered Species Act and the Growth Management Act. The benefits of a statewide, long-term biodiversity strategy could be a major marketing challenge.

Some of the building blocks for a Washington biodiversity initiative are already in place or under development in Washington state. These include programs such as the Priority Habitat and Species program of the Department of Fish and Wildlife; the Washington Natural Heritage Program of the Department of Natural Resources; the Washington Gap Analysis program; the Salmon and Steelhead Habitat Inventory and Assessment Program of Northwest Indian Fisheries Commission; The Nature Conservancy's Ecoregional Conservation Planning program; and the Department of Fish and Wildlife's Ecoregional

Conservation Planning program. These programs, and others, are described in more detail in the Technical Assessment section, and Appendix III (Existing Institutional Capacity in Washington).

Despite the existence of a number of programs focusing on various aspects of biodiversity in Washington, there is no overarching state policy on biodiversity and no formal institutional framework to support a coordinated statewide conservation strategy. A Washington biodiversity initiative could provide the vehicle for a more comprehensive and effective approach to the state's long-term conservation needs.

## **POLICY INTERVIEWS**

Between March and October 2001, 74 state, federal and tribal agency administrators, elected officials, local planners and representatives of conservation and business organizations were interviewed regarding a potential Washington biodiversity initiative. A list of those interviewed is provided in Appendix V. The interviews were arranged and conducted by contractors Joe La Tourrette and Wayne Luscombe in Olympia, Seattle, Portland and Vancouver, Washington. Interview forms were completed by most of the people interviewed and detailed field notes were kept. The interviews usually commenced with an overview of the Oregon Biodiversity Project, and copies of *Oregon's Living Landscape* (Defenders of Wildlife 1998) were provided to many interviewees. Those who were interested in the Oregon process were also given copies of *Looking for the Big Picture: The Process Behind the Oregon Biodiversity Project* (Defenders of Wildlife 1999), also produced by the Oregon project. A summary of the policy interviews, using the questionnaire format, is provided as Appendix VI.

## TECHNICAL ASSESSMENT

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*A fundamental premise of all biodiversity strategies is that they must be based on credible scientific information and sound analysis.*

One of the first steps in considering if and how a biodiversity project in Washington state should be undertaken was to examine what has been done elsewhere and to learn the lessons from other state initiatives. Some of the work done by the Environmental Law Institute to summarize the programs of the various states was enlightening (Environmental Law Institute 2001), as was, to a very great extent, a review of the processes and lessons learned from the Oregon Biodiversity Project, conducted from 1993 to 1998 (Defenders of Wildlife 1999).

A fundamental premise of all biodiversity strategies is that they must be based on credible scientific information and sound analysis. Because data acquisition, conversion and processing can be extremely expensive, an up-front assessment of the technology requirements and current technology situation will assist the project design and will help formulate a project budget. The Oregon Biodiversity Project highlighted this important recommendation in its post project review *Looking for the Big Picture: The Process Behind the Oregon Biodiversity Project* (Defenders of Wildlife 1999).

The purpose of this section is to describe how a technical review was done for Washington and discuss some of the

results. This section identifies most of the entities that could have a stake in providing information and technological capabilities to a biodiversity project, and it discusses some of the major data sets and sources of information. An overview of some of the existing agencies was provided in the Overview of Washington State section; however, in this section the data programs and technical capacities will be described and examined in more detail.

Through the process of the review, a number of issues and challenges were identified that will require serious attention in order to assure a successful project implementation. These issues and challenges are described with various options for dealing with them. The review of existing information made apparent several critical issues related to handling geospatial data. Considerations for dealing with these issues are described in a related appendix to this report (Appendix VII) to help readers understand basic problems with geospatial data integration and analysis and to guide those undertaking a biodiversity project.

## **THE ASSESSMENT APPROACH**

This assessment of the technical components of a biodiversity project in Washington state relied on multiple sources of information. A primary source was direct interviews with many agencies and individuals who are currently responsible for or involved with biodiversity interests. Many of these interviews included on-site visits, while others, for reasons of expediency, were handled through telephone discussions and email communications. For more detail, see Appendix II, the questionnaire that formed the basis of the technical interviews.

Another valuable source of information was Internet websites, which in many cases provided not only a good inventory of data sets and projects, but also direct access to some of the data, GIS maps and metadata. In addition, the review relied upon limited user assessments to determine the fitness for use of some of the spatial information. In these assessments, users other than the



custodians or developers of the information were asked to comment on or evaluate information from other sources in terms of its reliability, accuracy and limitations.

The review covers many of the primary sources of information, but certainly is not exhaustive\*. For example, not every single county GIS team was interviewed, nor was every Forest Service supervisor's office contacted for their specific information sets. Rather, in the case where many similar institutions exist, only selected ones were examined in order to obtain an indication of the data availability and quality. Also, it was apparent that many of the large GIS users were not, in themselves, data developers or providers, but rather relied on data sets provided by others.

Through the interviews and investigations it became evident that many interesting and valuable programs related to data development and resource assessments have already been done or are in progress in Washington. This is encouraging if a biodiversity project is to be initiated in a timely and cost efficient manner. It also became clear from the interviews that there are differences in opinions and approaches to dealing with issues of biodiversity. Since these issues can have an impact on how a biodiversity project would be implemented and on a project's technical requirements, they are discussed in brief before examining the existing capabilities and information resources.

## **INFORMATION TECHNOLOGY IN WASHINGTON STATE**

GIS is one of the key information technologies assisting with the organization, management, analysis and mapping of data related to biodiversity distributions. Fortunately, Washington was a very early adopter of GIS technologies, with some of the earliest systems being established to manage its vast base of natural resources, particularly forest resources. The resulting benefits from this include a widely held appreciation and understanding among decision-makers of how

\* An online query of INFORAIN's database ([www.inforain.org/dataresources/](http://www.inforain.org/dataresources/)) reveals nearly 175 organizations in Washington state involved directly or indirectly with conservation.

scientific data and spatial information can support sustainable resource management, and a fairly consistent approach among agencies to build technical capacity to handle the data and to perform analysis.

This latter point is important because it means that most state agencies have built their information support systems around common computer software platforms and data structures. In this case, with a few exceptions for handling satellite remote sensing data and some map drafting formats, most systems are built on the backbone of ESRI's ArcInfo and Arcview software. Most of the existing data sets are either ArcInfo coverages or Arcview shapefiles. While not eliminating problems of data exchange and compatibility, this consistency certainly reduces the potential for technical problems when integrating data from different sources.

Although vendors of different GIS software solutions often make claims as to the effortlessness of combining and integrating data from competing systems, it is hardly ever that easy. Therefore, having most information in one of ESRI's formats will be one less hurdle faced by a Washington Biodiversity project, if the project's analysts maintain that basic system architecture.

The technical capacity, in terms of computers, software and skilled staff, of many of the organizations looked at in this review is impressive. Most of the state and federal agencies with an interest in environmental matters and that have data relevant to a biodiversity project have state-of-the-art GIS capabilities and highly skilled staff.

Of state agencies, the GIS capacities of the Fish and Wildlife, Natural Resources, Ecology, and Transportation departments are particularly notable. A number of nonprofit organizations have extensive GIS capabilities as well, that are either used for their own programs or are contracted to support project activities of other agencies or groups. The Nature Conservancy of Washington, for instance, has a sophisticated GIS section in Seattle that supports the organization's ecoregional planning activities. The Pacific Biodiversity Institute, in

Winthrop, Washington, also has considerable GIS capabilities, which support its internal programs as well as some contracted project work. Ecotrust, based in Portland but working on environmental and community development programs from northern California to Alaska, has a very well established GIS capacity that contracts its capabilities to projects with local governments and other nonprofit organizations. CommEn Space is a small nonprofit organization located in Seattle dedicated specifically to providing GIS capabilities to other nonprofit organizations.

There are many other nonprofit organizations with sophisticated GIS capabilities, such as People for Puget Sound; however, these organizations are too numerous to inventory and mostly focus on some discrete portion of the state. There are, of course, the main universities, such as University of Washington, that have strong GIS labs and facilities for training and research purposes and that engage in collaborative projects with state and federal agencies.

Most local governments, at the county level, also have GIS capabilities for supporting planning activities, but these also focus only on a small part of the total area of the state. Individually, they may be instrumental in providing small pieces of the overall geographic data puzzle, and may be directly involved with some of the implementation activities of a Washington biodiversity initiative.

## **SOURCES OF INFORMATION FOR A WASHINGTON BIODIVERSITY INITIATIVE**

Based on this assessment, it appears clear that adequate geospatial information is both available and of sufficient quality to support a biodiversity initiative at some level in Washington state. While there is a scarcity of information concerning the spatial distribution of many common species of flora and fauna, a great deal is known about the distributions of many indicator species, as well as threatened and endangered species. Also, while statewide coverage of detailed

species, habitat or ecosystem information at scales larger than 1:24,000 is non-existent, there is a great deal of information available at 1:24,000 or smaller scales, which is adequate for a state or regional level analysis.

The information era that has developed and matured around the Internet now makes locating and assessing the quality of information much easier. Many earlier biodiversity conservation projects done in other states had to rely on extensive interpersonal contacts to identify data sources and to pry data out of the originating agencies. While most agencies in Washington are concerned that their information be used properly and within its limitations and constraints, there is a growing spirit of cooperation and collaboration which allows information to flow between agencies without many encumbrances. This is not to imply that all agencies work well together on other matters, but at least from the standpoint of making their information available, there is a sense of belonging to a broader information community.

Today, most Washington agencies list their data holdings publicly in on-line catalogs, together with narrative descriptions of the data sets as well as extremely detailed metadata about the quality and extent of the information contained. Many agencies also provide thumbnail sketches of the maps or data sets, and have interactive capabilities to download the information directly from the host's computer to the requestor's computer. In most cases, this facilitates the exchange of information between users and encourages the sharing of data. See Appendix VII for a detailed summary of data issues and considerations.

## **WHO'S DOING WHAT**

There are literally hundreds of geospatial data sets covering all or parts of Washington state, at various scales, residing in dozens of different federal, state, local, private and nonprofit agencies. For the purposes of this feasibility study, it is neither practical nor useful to try to inventory all of the varied data sets in one place. Information technology available through the Internet allows for a distributed network of catalogs, and while the formats of the various websites may dif-

fer significantly, the metadata information about the data sets are relatively consistent. Most agencies follow the federal standard for metadata (i.e., the Federal Geographic Data Committee standard).

Appendix VIII documents and summarizes findings about some of the key data sets and information sources that are crucial to a biodiversity project and provides pointers to many of the other available sources of information. The review attempts to identify known strengths and weaknesses associated with some of the data as they might affect a project. It also examines both specific data programs and general data collection activities of some agencies.



## RECOMMENDATIONS AND CRITICAL ISSUES

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### RECOMMENDATIONS

A Washington biodiversity initiative, similar to the Oregon Biodiversity Project, should be inaugurated in Washington state. This initiative should emphasize both terrestrial and aquatic ecosystems. A seven-month feasibility assessment of political, institutional, and technical support and capabilities in Washington completed in 2002 suggests that a project should move forward as soon as possible, for the following reasons:

- There is a strong base of understanding and support among federal and state agency administrators and non-profit conservation groups for pursuing a Washington biodiversity initiative.
- There is currently support from the Executive Branch and Washington Legislature for moving forward now with a statewide biodiversity initiative. (See Appendix IX, Senate Bill 6400 for legislative authorization.)
- The technical capability currently exists within federal and state agencies, as well as selected local and tribal governments and conservation groups, for developing a statewide biodiversity initiative.



*There is a strong base of understanding and support among federal and state agency administrators and nonprofit conservation groups for pursuing a Washington biodiversity initiative.*

- A number of important conservation planning efforts are currently underway, which could be building blocks for a Washington biodiversity initiative. The most significant and relevant effort is the Ecoregional Conservation Planning project being done by The Nature Conservancy, Washington Department of Fish and Wildlife, Washington Department of Natural Resources and the Office of Community Development. This is a major public-private undertaking, with the Washington Department of Fish and Wildlife's participation being funded in part by federal grants through the Wildlife Conservation and Restoration Program established under the FY 2001 Commerce, Justice and State appropriations bill.

## **CRITICAL ISSUES AND POTENTIAL BARRIERS**

In order for a Washington biodiversity initiative to be successful, a number of existing and potential barriers and issues will have to be addressed. Most of these have already been discussed in the policy and technical assessments above. Some of the most critical issues and potential barriers are:

### PROJECT PHASING

The first phase of a Washington biodiversity initiative is an initial policy and technical feasibility assessment — which has been completed with this report. The second phase should be the establishment of a broad-based, public-private Washington Biodiversity Council by Executive Order of the Governor or, better yet, by the Washington Legislature (see Appendix IX for legislative authorization). Other phases involve issues that should be addressed by the new biodiversity council, including, setting of initiative objectives, data analysis and problem assessment, establishment of conservation goals and strategies and development of action plans to carry out the statewide biodiversity initiative. The last phase, implementation, will involve on-the-ground changes in land allocation and management. It may require a more thorough assessment of existing laws and programs. Implementation will occur through existing, and possibly new, laws and programs.

## TIMELINE

TASK	YEAR 1	YEAR 2	YEAR 3	YEAR 4	ONGOING →
1. Complete feasibility study	•				
2. Establish biodiversity council	•	○	○	○	○
3. Biodiversity council reports to legislature with strategy		•			
4. Biodiversity assessment		•	•		
5. Coordinated biodiversity action plan			•		
6. Plan implementation					
a) Coordinated information management			•	•	→
b) Policy analysis and revision				•	→
c) On-the-ground work			•	•	→

○=Duration unknown

## STAKEHOLDER PARTICIPATION AND SUPPORT

There was general agreement in the policy interviews that a biodiversity initiative must have active involvement of the stakeholder community; that is, the intended users and beneficiaries of this effort should ideally be involved in designing it. As a minimum, stakeholder participation should be sought from appropriate state, federal and tribal agencies, local governments, interested conservation groups and representatives from the business community, especially agriculture, commercial timber and the building industry.



Many of those interviewed also said that stakeholder involvement should begin as early in the process as possible so that there is buy-in by the stakeholders to the process and a sense of ownership. If stakeholders are involved from the beginning there is a greater likelihood that they will accept responsibility for its success and implementation. Some identified the high level of stakeholder participation in the Oregon Biodiversity Project as a key reason for the project achieving a high level of success and acceptance. There is sometimes resistance to building stakeholder involvement in a large project such as this because it is very difficult to achieve, slows down the process and may interfere with the specific agendas of some of the promoting agencies.

In the course of the interviews, several models were suggested for securing adequate stakeholder involvement in the process. One model would be to have all stakeholders involved in the general decisions affecting the project. This can be overly cumbersome and cause delays. Another would be to have all stakeholders involved only in the major decisions about project objectives, directions and funding issues related to the project, and have the project implementation directed by a smaller steering committee of stakeholder representatives. A third model, favored by some of the respondents, is to have the full range of stakeholders involved only at a later stage, when the initiative needs to be implemented. Other models may also be worth considering. The challenge is to design an efficient process in which stakeholders participate in a meaningful way. A professional process designer and facilitator can assist with this.

One potential stakeholder problem was identified in the assessment. The ongoing Ecoregional Conservation Planning project has yet to build a stakeholder constituency beyond the initial partners. While this current partnership arrangement may serve the immediate needs of the four agencies involved, it would probably fall short of our recommended stakeholder involvement for a statewide biodiversity initiative. If the current ecoregional planning project becomes the

main building block for a larger Washington biodiversity initiative, some stakeholders might feel that they were precluded from having input into the original project design and objectives.

We recommend that the new Washington biodiversity council make decisions about its own procedures and further expansion, as well as how stakeholder involvement should be achieved throughout the process of a Washington biodiversity initiative. Creation of a biodiversity council by the Legislature will have the desired effect of bringing most important stakeholder groups to the table, even if they do not initially understand or support the concept of a statewide biodiversity initiative. (See Appendix IX for legislative authorization.)

After the first phase, where initial recommendations are made regarding the full scope of a Washington biodiversity initiative, the council could serve an ongoing role in overseeing the initiative and ensuring that adequate funding, support and stakeholder involvement continues throughout the entire process, from goal-setting through implementation.

#### PUBLIC INVOLVEMENT

The primary challenge in securing political and financial support for a biodiversity initiative will of course be with the stakeholders — those agencies, organizations, businesses and others who will see themselves as directly affected by the project, either in a positive or negative way. But, as with any other large or new public initiative or program, it will also be important to design and conduct a program to provide information to, and solicit ideas from, the general public — those who stand to gain from a long-term biodiversity strategy, and who will pay for development of the initiative through their taxes and user fees. The Environmental Law Institute's report *Status of the States: Innovative State Strategies for Biodiversity Conservation* (Environmental Law Institute 2001) indicated that public involvement should be one of the four core components of a successful state biodiversity initiative.

## INTERAGENCY COOPERATION

There has never been good cooperation and coordination among state agencies in Washington when it comes to sharing proprietary data, expertise and funding. Some of this traditional lack of coordination can be attributed to the inconsistent and often dysfunctional way that conservation agencies have been set up and funded. As mentioned before, the Department of Ecology is the only major state conservation agency that reports directly to the Governor; the rest, including the departments of Fish and Wildlife, Natural Resources, Transportation and State Parks, answer to independently elected or appointed commissioners.

The situation appears to be getting better at all levels, especially among technical and scientific staff. One good example is the earlier-referenced ecoregional planning process currently being conducted in a collaborative way by the departments of Fish and Wildlife and Natural Resources and The Nature Conservancy. But attitudes and interagency rivalries die hard and, unless all state agencies with responsibilities for the environment participate, and are pulled in early as partners, a statewide biodiversity initiative may never get off the ground.

As with the issue of stakeholder involvement, we recommend that all appropriate state agencies be brought into a broad-based Washington biodiversity council created by executive order of the Governor or by the Washington Legislature. Although an executive order does in theory apply to all state agencies, a directive from the Legislature would have more teeth and would ensure a more serious

*But attitudes and interagency rivalries die hard and unless all state agencies with responsibilities for the environment participate, and are pulled in early as partners, a statewide biodiversity initiative may never get off the ground.*

and higher level of involvement on the part of all state agencies, whether or not they report directly to the Governor. (See Appendix IX for legislative authorization.)

#### APPROACHES TO BIODIVERSITY CONSERVATION

While many in Washington recognize the need to conserve biodiversity, there are different ways of defining the concept and different approaches to meeting the challenge. Informational and technological requirements will depend on how these issues are resolved. Several basic questions arise: What does biodiversity conservation mean? And at what scale do we need to address the issue?

Defenders of Wildlife, in its publication *Oregon's Living Landscape* (Defenders of Wildlife 1998), defines biodiversity as "the variety of life and its processes". Another definition is "the variety of living organisms, the genetic differences between them, the communities and ecosystems in which they occur, and the ecological and evolutionary processes that keep them functioning, yet ever changing and adapting" (Noss and Cooperrider 1994).

Another simple but robust definition of biodiversity, is used by the National Biological Information Infrastructure: "Biodiversity or biological diversity is the sum total of the variety of life and its interactions and can be subdivided into (1) Genetic Diversity, (2) Species Diversity, and (3) Ecological or Ecosystem Diversity" (U.S. Geological Survey 2002).

To date, most of the state-level biodiversity projects have focused their attention on species diversity, with some limited attention given to ecosystem diversity. The informational requirements and the technical approach that would be used to address different elements of biodiversity vary considerably.

In Washington, many of the agencies interviewed view biodiversity conservation in terms of identifying areas of species richness or diversity (high number

of species) and believe conservation efforts should use land acquisition and regulations as primary tools. The goal is to protect and maintain the supporting habitats in these species-rich areas as a means of conserving the biodiversity.

There is a growing trend within the state and elsewhere to view biodiversity within the context of healthy ecosystem management; however, the related analytical tools and management techniques are less well understood. This approach extends beyond traditional "reserves" to encompass the working landscape and the ecological processes that sustain healthy habitats. It suggests the need for a broader range of tools than just regulation and land acquisition and seeks to find appropriate incentives to encourage all land managers, public and private, to maintain sustainable, healthy ecosystems. However, because an approach that looks at the ecological functions and services provided within an ecosystem is less well understood, there is a tendency to default back to just considering species richness as the measure for biodiversity.

#### SCALE AND GEOGRAPHIC SCOPE OF PROJECT

The issue of scale has a direct impact on the informational requirements and the technical approaches to be used in a biodiversity initiative. Does a state-level biodiversity project need to address general concerns and serve as a tool to introduce the major issues into the policy dialogue, or does it need to be detailed and specific in order to assist local decision-makers and planners?

Thematic scale is an important consideration — should a biodiversity initiative focus on detailed species distributions, natural communities or broad ecosystems? As noted in *Oregon's Living Landscape*, "trying to inventory and manage thousands of individual species that may be vulnerable is, from a practical standpoint, clearly impossible" (Defenders of Wildlife 1998). A strategy used by The Nature Conservancy and the Natural Heritage Programs was to combine a "coarse filter" approach focusing on conservation efforts for natural communities with a "fine filter" approach attending to concerns for individual at-risk species that might escape the broader filter. These approaches should be

complementary; however, as the Oregon study points out, an efficient coarse filter strategy that effectively conserves examples of natural communities and their associated plant and animal species "could protect 85-90 percent of all species in Oregon, without the need for species-specific management" (Defenders of Wildlife 1998).

This feasibility assessment also found that the appropriate geographic scope for a project in Washington is viewed in different ways by different people. This study was initiated based on the assumption that a statewide assessment and strategy could provide the starting point for more detailed, site-specific surveys, planning and on-the-ground conservation action. The statewide context would identify areas of greatest threat, biodiversity value and opportunity, and provide a blueprint for coordinated action.

Some have suggested that because data sources are more robust in some regions of Washington than in others, and some regions have more critical biodiversity issues than others, it would be logical to just focus on priority regions and leave the rest. Or, complete the entire state, then focus in on regions of greatest need for priority implementation. Another view is that the project should tackle the entire state, but start with one or more pilot regions, developing and testing the methodology in one region before embarking on the whole state. All three of these options lead to a regional, not statewide, conservation strategy.

#### PROJECT OBJECTIVES AND SCOPE OF COVERAGE

Differing points of view about what a biodiversity project should attempt to do were expressed by many of the individuals and agencies interviewed. This obviously has an impact on the project design, both in terms of the data requirements and the kinds of analysis. Some expressed an opinion that there is a need for a coordinated strategy to address biodiversity issues, and that it must begin with a broad-scale overview for policy discussions among high-level decision-makers. Developing an information system to support this objective seems easily within the scope of existing data and capacities. Others expressed an opinion

that a biodiversity project should assist conservation initiatives by providing the tools and resources for targeting opportunities. This objective is also largely achievable through analysis of the various existing data sets and expert scientific knowledge.

At the other end of the scale, there is a view that the project should support local planners and decision-makers with on-the-ground implementation of existing programs. The argument is that, while it will be possible to set policy and identify opportunities, it is difficult to implement conservation programs without adequate field support. This requires levels and kinds of information that are often not readily available over large areas. The data development requirements for a biodiversity project with such objectives would be considerable.

Regardless of how the objectives of a Washington biodiversity initiative are defined, it will be crucial to the success of the project that they in fact be defined, agreed upon, understood and articulated to all the stakeholders involved in the project, as well as elected officials and the general public. This point was made by more than one high-level state administrator in the course of this assessment.

#### PROJECT SUSTAINABILITY

There is general agreement that a Washington biodiversity initiative should not end with the production of products, such as reports, maps and brochures. It should, from the beginning, be designed to have an on-going function of supporting policy and planning by developing techniques and information tools that can be integrated into land management decision-making. A key element of this on-going function is a capacity to readily disseminate biodiversity-related information to analysts and decision-makers.

One of the primary recommendations of the Oregon Biodiversity Project was the establishment of an information system to support conservation planning efforts. Supported by this proposal, the 2001 Oregon Legislature established an

Institute for Natural Resources within Oregon State University to act as a clearinghouse of information, make relevant biodiversity data available to decision-makers, and do research on pressing biodiversity issues. A mechanism with similar objectives needs to be considered in Washington, along with other alternatives. This should not be an afterthought of the project, but should be considered in the initial design and project budget.

The importance of designing and building an effective communications element to the project was emphasized by a number of the interviewees. They stressed that the project should take full advantage of modern information technologies and develop a state of the art capability. This includes making information directly available to users via the Internet, providing on-line mapping and data querying capabilities and developing educational tools and data sets that could be disseminated on CDs.

Several options can be considered for locating this information function. It could be located within a state agency, such as the Department of Fish and Wildlife or Department of Natural Resources, or it could be located within a specialized nonprofit organization. A third alternative would be to locate it in an academic/research institute, such as was done in Oregon. The initiative's partners, via a biodiversity council, should ultimately make the decision as to where this function should be located and how it should be funded. This assessment indicated that there would be resistance among local government and business interests to locating this function in any state agency with regulatory functions.

#### PROJECT LEADERSHIP AND MANAGEMENT

There is a strong concern, particularly among private sector, local government and non-government organization stakeholders, that a government-led initiative to develop a biodiversity strategy and plan is destined to be regulatory and restrictive. Most of the individuals and agencies interviewed felt very strongly that a biodiversity project should not be led by a government agency alone. There was little consensus on who should lead such an initiative, though there



was agreement that the process should be managed by some sort of collaboration among agencies, non-government organizations and academic/research institutions.

Some suggested that the process should be lead by a non-government organization because it might be more focused and could more easily build bridges between a diverse group of stakeholders. The opposing concerns, were that, although non-government organizations could handle the technical and stakeholder development activities well, many lack the experience or infrastructure to secure and administer complex financing for all phases of the initiative, and have no authority to implement it.

Another recommendation was that the initiative should be led by an academic/research institute. It was suggested that a university or research institute would bring credibility to the project with sound scientific research and a nonbiased agenda. Such an institute would also tap into a vast resource of skilled students and research faculty; in return, it would provide encouragement and a breeding-ground for research projects for students and faculty alike. There are several universities that could manage such a project; however, none are without controversy. Although the larger universities have greater breadth to their programs and resources, there is some resistance to awarding the biodiversity project to them because there is a concern that, with their dominance, they wouldn't work well with other agencies and institutions.

Defenders of Wildlife has assumed a lead role in working with the Governor's office and the Legislature to bring attention to the need to protect the state's biodiversity and to establish a broad-based, public-private biodiversity council. Beyond this first phase, we believe that the biodiversity council should decide who does what, and make some decisions or recommendations regarding how a Washington biodiversity initiative is managed.

Based on the experience of similar projects in other states and other countries, the diagram on page 41 presents an organizational model that might work well

for a Washington biodiversity initiative. If this model is accepted, the biodiversity council would of course make the decisions as to the structure of the Council of Partners and the Steering Committee.

#### TIME FRAME AND COST IMPLICATIONS

The time frame and cost for development of a Washington biodiversity initiative are probably the two largest unknown factors in this feasibility study, because they depend on so many other factors, including some discussed here: leadership, interagency cooperation, stakeholder participation, allocation of responsibilities, available funding, scale, geographic scope, implementation options and the extent to which the initiative can build upon existing programs and databases, including the ongoing ecoregional conservation planning effort being conducted by The Nature Conservancy and state agencies. Establishment of a state biodiversity council will create a public-private forum in which all these issues can be addressed and resolved.

#### BUDGET

If we assume that the ongoing ecoregional conservation planning effort will have already initiated much of the basic data gathering, modeling and analysis by the time a Washington biodiversity initiative commences, then we can also project a substantial savings on the overall biodiversity project's anticipated costs for technology (hardware and software), data, staff and management overhead. Given those assumptions, we feel that it is possible to develop tentative cost estimates subject to decisions made by the council.

A budget estimate of about \$600,000 per year for three years should cover the major staff, consulting, communications and administrative costs to complete the assessment and strategy development phases of a Washington biodiversity project. An ongoing effort to coordinate, synthesize and disseminate relevant biodiversity information to planners and natural resource professionals could be maintained for approximately \$300,000 per year. No attempt has been made to

estimate other implementation costs, which will depend on the nature and scope of the conservation strategies that are employed.

#### POLITICAL OPPORTUNITY

While it might be difficult to specify the whole project time frame at this time, the first step in the creation of a Washington biodiversity initiative could begin as soon as January 2002 with informational hearings and work sessions in the 2002 Washington Legislature, and the development of legislative language to create a biodiversity council (see Appendix IX, Senate Bill 6400). The visibility of this feasibility study has created awareness, among a number of key members of the legislature as well as committee and caucus staff, of the Oregon Biodiversity Project and other biodiversity initiatives around the country. Information has been made available to them via interviews, briefings and copies of reports and studies from Defenders of Wildlife and the Environmental Law Institute.

The concept of a Washington biodiversity initiative is also supported by some key managers and policy staff in the executive branch of state government. Following the November 2001 election, the House, Senate and Governor's Office are all controlled by one party, the Democrats. Despite the current economic downturn and impending state budget cuts, this turned out to be the right time to begin the process of developing a Washington biodiversity initiative. The legislature approved Senate Bill 6400 authorizing the creation of a biodiversity council and partially funding the process (see Appendix IX for the legislative authorization).

#### FUNDING

When asked to name the most important barriers to the success of a Washington biodiversity initiative, most people we interviewed indicated a shortage of funding for the initial phase. Most also expressed that, if possible, the project should be funded by a mix of public and private funds.

Funding a new conservation program such as the Washington biodiversity initiative will not be easy this year or next. The state is not being ordered to do so by the courts or a federal regulatory agency. The state General Fund surplus that looked so promising only two years ago has all but dried up, due to an economic downturn and voter-approved tax cuts. And, when natural resource funding is stacked up against criminal justice, K-12 education and social service entitlements, it accounts for a small and shrinking part of the state budget in Washington.

Federal funds were made available to the Washington Department of Fish and Wildlife and other state wildlife agencies by Congress in the FY 2001 Commerce, Justice, State appropriation bill, for wildlife conservation; the department has elected to use these funds for its participation in ecoregional planning. Additional funds are available in FY 2002 through the Department of the Interior's State Wildlife Grants program. These federal funds have already provided the means to begin the process of developing a Washington biodiversity initiative, a financial advantage that Oregon conservationists did not have when they initiated the Oregon Biodiversity Project in 1993. At least one federal agency and one state agency have indicated an interest in budgeting funds for their participation in a Washington biodiversity initiative.

We know that one of the primary motivations in establishing and conducting a biodiversity program is that it provides a context in which to make more cost-effective decisions regarding the protection and management of wildlife habitat and other natural resources. Single-species conservation strategies are often quite expensive, particularly when options are limited. Savings resulting from more effective conservation and more efficient coordination among government agencies could repay the costs of a Washington biodiversity project many times over. Funding will be a challenge but, if the benefits of the project are apparent to public and private decision-makers and stakeholders, it might not be the largest barrier to deal with.

## **IMPLEMENTING A WASHINGTON BIODIVERSITY INITIATIVE**

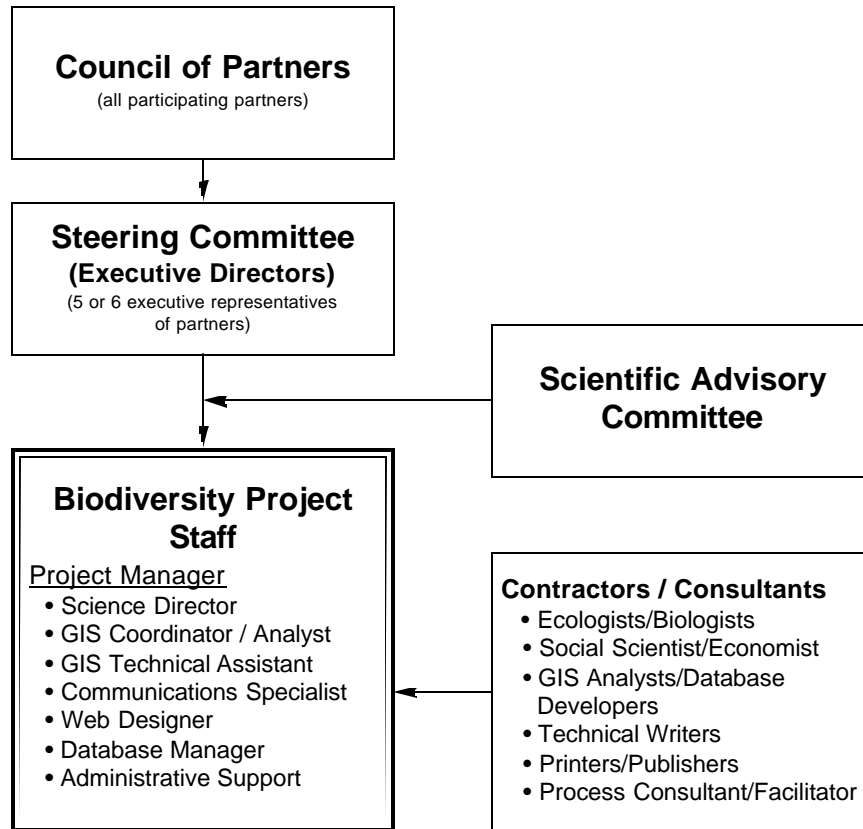
This report has discussed some of the tools already in place for identifying and protecting areas of high biodiversity, including regulations, land acquisition programs and, to a more limited extent, landowner incentives (Appendix IV). However, existing programs and funding sources are inadequate for implementing a Washington biodiversity initiative.

While state and federal programs, such as the Shoreline Management Act, the Growth Management Act and the Endangered Species Act, address some wildlife habitat concerns, the efforts are not well coordinated, and do not present a comprehensive strategy for dealing with conservation issues. The biodiversity initiative proposed in this report would address some of these shortcomings and issues.

Implementation of a comprehensive strategy for dealing with conservation issues through a Washington biodiversity initiative will be coordinated by a biodiversity council, representing major stakeholders and interest groups. This council was established by the 2002 Legislature (see Appendix IX).

The diagram on the next page suggests a possible model for managing and implementing a biodiversity initiative based on the concept of an overarching management council. It recognizes that a council of all partners might be too unwieldy to address specific management, administrative and technical issues, and instead proposes a smaller steering committee to deal with these matters. The council should be tasked (either directly, or through its executive steering committee) with carrying out key steps of the biodiversity initiative, including (i) setting objectives; (ii) data analysis and problem assessment; (iii) establishing specific conservation goals; (iv) developing conservation strategies (looking, at a minimum, at regulation, acquisition and incentive tools); (v) preparing plans of action; and (vi) facilitating implementation.

## A PROPOSED ORGANIZATIONAL MANAGEMENT STRUCTURE



The "data analysis and problem assessment" step is likely most efficiently accomplished through existing programs in the Washington Department of Fish and Wildlife, in conjunction with the Department of Natural Resources, the state Office of Community Development and The Nature Conservancy. Some modification to this consortium's ecoregional planning methodology may be required to meet the objectives of the larger biodiversity initiative, but by and large, these programs have a solid technical and information base to undertake the assessments. Also, "preparing plans of action" and "implementation" cannot be undertaken by the council directly; rather the council would work through its constituent member agencies to promote and coordinate programs and activities.

In the absence of any local group championing the cause, Defenders of Wildlife assumed the role of promoting the concept of a “council” with the Governor's office and legislative leaders, and could serve as a catalyst in coordinating partners to draft a framework for the first phases of a biodiversity initiative. If these recommendations are accepted, Defenders of Wildlife and other partners will need to take immediate steps to build a broad-based support platform. Because several biodiversity-related programs are already “out of the starting blocks.” Now that the legislature has authorized the establishment of a council, Defenders could facilitate a meeting of key partners to launch and organize the drive.

As a minimum in the early stages, the partners should include, but not be limited to, the state departments of Fish and Wildlife, Natural Resources and Ecology; the state Office of Community Development; the federal government's Bureau of Land Management and USDA Forest Service; and nonprofit organizations such as The Nature Conservancy, Pacific Biodiversity Institute and the Gap Analysis Program. Other agencies and organizations, including local government and business groups, should also be invited to participate at whatever stage and level they feel is appropriate.

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# APPENDIX I

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## POLICY QUESTIONNAIRE

1. Are you familiar with the Oregon Biodiversity Project?
2. Do you think Washington state would benefit from a similar habitat assessment and statewide conservation strategy? If so, how?
3. Would your organization or agency benefit from a Washington Biodiversity Project? Would you participate? If so, how would you use it to address your goals?
4. Who else would benefit from a Washington Biodiversity Project? How might it be used by other organizations, agencies, or businesses?
5. Do you see any barriers or obstacles to developing and/or using a Washington Biodiversity Project? If so, what should be done to get around these barriers?
6. Who do you think should lead the development of a Washington Biodiversity Project? Who (organization or agency) do you think should manage and disseminate the data?
7. How should a Washington Biodiversity Project be funded? Should funding come from one source or a mix of public and/or private sources?

### TECHNICAL QUESTIONNAIRE

#### INFORMATION FOR A BIODIVERSITY ASSESSMENT IN WASHINGTON STATE

1. What is the primary topic or subject of the data set? (e.g., soils, species distributions, vegetation cover, infrastructure, population distributions, etc.)
2. Which agency was responsible for developing the data set? Which agency is responsible for managing and maintaining the data set?
3. Does the information represent a static point in time or is it time-series data? When was the information collected and how current is it?
4. What is the geographic coverage? (e.g., state, county, watershed, ecoregion, etc.)
5. At what geographic scale is the information collected and stored? (e.g., 1:250,000); Is the scale consistent throughout the coverage?
6. To what extent is the data set complete? (i.e., is it complete, in-progress, being updated, etc.)
7. In what format is the information? (i.e., is the format digital, hard copy maps, statistical tables, reports, etc.)
8. What is the policy for sharing or disseminating the information?
9. Would there be cost implications for the use of the data by a biodiversity project? If so, explain.
10. Are there copyright issues associated with the information which would restrict the use and dissemination of the data?
11. How readily available is the information? (e.g., does it require prior administrative clearance, how long does clearance take, etc.)
12. How is the information disseminated? (e.g., CDs, Internet, tapes, disks)

13. Are Metadata available for the data sets? What format is used for the Metadata?
14. Is there a Data Dictionary available? How well defined are the themes, variables and coverages?
15. The data sets are compatible with which GIS systems? (e.g., ArcInfo, Erdas, etc.)
16. What are the known weaknesses in the information and data sets? (i.e., are there known problems with the original data?)
17. Are there other existing data sets that potentially overlap or conflict with this data set?
18. How would you assess the overall quality of the information? (i.e., its "fitness for use")



### EXISTING INSTITUTIONAL CAPACITY IN WASHINGTON

#### FEDERAL AGENCIES

Major federal land and water management agencies in Washington include the Bureau of Land Management, U.S. Fish and Wildlife Service, USDA Forest Service, Bureau of Reclamation, National Park Service, U.S. Army Corps of Engineers and the departments of Defense and Energy. As shown in Appendix XI, the Forest Service is by far the largest public agency in terms of acreage owned and managed for wildlife and other natural resources. About 75% of the federal lands in the state are distributed among the Olympic, Gifford Pinchot, Mt. Baker-Snoqualmie, Okanogan-Wenatchee, Colville, and Umatilla National Forests.

The National Park Service is second in size of the federal agencies, with most of its land ownership within the Olympic, Mt. Rainier and North Cascades National Parks, all in western Washington. The Bureau of Land Management is fifth in size, with more than 390,000 acres. The U.S. Fish and Wildlife Service manages a large national system of wildlife refuges dedicated to protecting critical habitat, primarily for migratory birds and species listed under the Endangered Species Act.

Each federal agency operates under its own mandate and rules, but all are involved to some degree in the protection and management of fish and wildlife habitat. That includes the departments of Defense and Energy, which own and manage large blocks of wildlife habitat, primarily in three areas: Fort Lewis, Yakima Firing Center, and the Hanford Nuclear Reservation respectively.

At least three other federal agencies are involved in a major way with the protection of selected fish and wildlife habitat, even though they are not significant land managers; the Environmental Protection Agency and the U.S. Army Corps of Engineers, which are charged with the protection of rivers, waterways and wetlands under the federal Clean Water Act, and the National Marine Fisheries Service, which oversees the protection, management and harvest of marine and anadromous fish.

#### FEDERAL AGENCY GEOGRAPHIC INFORMATION SYSTEM (GIS) CAPABILITIES

GIS capabilities in federal agencies play an important role in the management and utilization of natural resources in Washington. The information collected by some of the federal agencies is

important for the establishment of a biodiversity strategy. Only the key agencies that have relevant information are discussed; all of the agencies provide Internet access to information about their data holdings.

**Bureau of Land Management (BLM)** has GIS data holdings for the Oregon/Washington region, consisting of some statewide coverages of base data at 1:100,000 or smaller. More detailed coverages at scales of 1:24,000 or larger of specific resource data exist primarily for areas managed by BLM, with some private lands included. The statewide coverages consist mostly of base data, such as administrative boundaries, transportation networks and hydrology, and are derived from other sources, whereas the larger-scale resource data sets are developed internally. To facilitate data organization and management, BLM has categorized its GIS data holdings into five categories: Base Data, Transportation, Water Resources, Wildlife, and Miscellaneous.

**U.S. Fish and Wildlife Service (USFWS)** has adopted an ecosystem approach to conservation, recognizing the need to understand and deal with relationships and interdependencies of all elements in the landscape. Washington State is covered by the USFWS Region One Office, which uses GIS technology to help develop and monitor land management plans, and to support research and initiatives for conservation programs. The National Wetlands Inventory Center (NWI) of the U.S. Fish and Wildlife Service has prepared geospatial data sets using the Wetlands and Deepwater Habitats Classification (Cowardin) at scale 1:24,000 for relevant areas of the state.

**U.S. Geological Survey (USGS)** is the primary science agency for the Department of the Interior and has extensive natural science expertise. It has powerful GIS capabilities and is responsible for collecting and maintaining information in one of the country's largest holdings of earth and biological data. It has fostered and promoted many data and research oriented programs, both nationally and globally. For example, it is a key player in the United Nations GRID program, and has promoted programs in the United States such as the Gap Analysis Program, Biological Resources Division, the Center for Biological Informatics (CBI) and the National Biological Information Infrastructure.

**USDA Forest Service** has established a Natural Resource Information System (NRIS) designed to support field-level users and planners with basic natural resource data. The Forest Service is still working on proposals for establishing data standards and procedures for its GIS operations. Although the Forest Service is administrated in regions (Washington falls within Region 6 — Pacific Northwest Region), the main geographic information resources, with specific information about the forest areas, are within the individual forests. Each of six National Forests in Washington is individually managed, and there is little consistency in how GIS data are handled or used at the local level.

**Interior Columbia Basin Ecosystem Management Project (ICBEMP)** is a joint project of the Forest Service and the Bureau of Land Management. It was initiated in 1993 by a presidential directive to develop a scientifically sound and ecosystem-based strategy for management of national forests and BLM lands in the interior Columbia Basin. Although focussing primarily east of the Cascades, ICBEMP, given a considerable budget, has developed an extensive GIS capability with over 170 different data layers or themes to support the assessment work of the project.

## WASHINGTON STATE AGENCIES

Responsibility for the protection and management of Washington's natural resources is shared among a number of state agencies. Some of these agencies answer directly to the Governor, and some are overseen by citizen commissions appointed by the Governor. The Department of Natural Resources is administered by an independently elected official, the Commissioner of Public Lands.

When the state agencies were created by the Legislature, there were probably very good reasons for organizing and structuring various state agencies as semi-independent entities. But the practical effect over the years has been that there has been too much competition and not enough cooperation among natural resource agencies on many critical issues, including water policy, timber management, and even management of salmonid fisheries, prior to the merger of the Departments of Fisheries and Wildlife. Fortunately, there appears to be steady improvement with regard to interagency cooperation; state agencies cooperate and coordinate programs much more than they did in the past, at all levels, but especially at the technical and scientific levels.

Part of the explanation is that the Endangered Species Act and other federal mandates have forced agencies to work more closely together and to share resources. Another part can probably be attributed to better leadership and management at all levels of state government, from the Governor's office and Legislature down to the GIS managers and field biologists.

The fact remains, however, that the four largest natural resources agencies in Washington—Departments of Fish and Wildlife, Natural Resources, Transportation, and Ecology—and the State Parks and Recreation Commission, all answer to different bosses. That organizational factor alone can result in less than effective cooperation and program coordination, particularly on something as large and complex as a proposed Washington biodiversity initiative.

State agencies have a number of tools (programs) available to them for the protection of wildlife and wildlife habitat. Some of these tools are available through federal laws and federal agencies; others have been provided by the Washington Legislature. Wildlife and habitat protection programs fall into the three general categories of regulation, land acquisition and landowner incentives, and they are spread out among many state and local agencies.

The most important programs available to state, federal and local agencies are summarized in Appendix III. Although all the state agencies do their best with limited funding and staff, the collective and interactive effect of all these state programs does not add up to anything approaching an effective program to protect critical habitat and biodiversity. The two agencies most directly responsible for the protection and management of wildlife and wildlife habitat are the Department of Fish and Wildlife (WDFW) and the Department of Natural Resources (WDNR). These agencies, plus the Parks and Recreation Commission, own or control more than three million acres of public land and wildlife habitat; they are discussed below in more detail, followed by a brief description of other, smaller state agencies:

**Department of Fish and Wildlife** (WDFW) was created by the Washington Legislature in 1994 by merging the Departments of Wildlife and Fisheries. The combined agency is now the largest state wildlife agency in the country, with more than 1,600 employees working out of the Olympia

headquarters and six regional offices around the state. The director of fish and wildlife is appointed by a nine-member Fish and Wildlife Commission, which is in turn appointed to six-year staggered terms by the Governor.

The agency has primary responsibility for the protection and management of all marine and anadromous fish, shellfish, freshwater fish and terrestrial wildlife-about 500 animal species statewide. The department regulates all legal harvest of fish and wildlife, enforces wildlife laws and manages 840,000 acres of land, more than half of which is owned by the department (Appendix XI); the remainder is leased from other public agencies, including Department of Natural Resources and the U.S. Bureau of Reclamation.

During each biennial budget cycle, WDFW identifies critical habitat areas that should be protected in public ownership. When funds are made available, these habitat lands are acquired, often with a mix of state and federal funds, and managed as part of the state Wildlife Areas Program. The primary source of state funds available for habitat acquisition is the Washington Wildlife and Recreation Program (WWRP), which is administered by the Interagency Committee for Outdoor Recreation (IAC).

Over the last 30 years, Washington's fish and wildlife agency has gone through significant changes, including a gradual management shift away from primarily harvest management of game species to the protection and management of all wildlife species and their habitats. The regulation of hunting and fishing remains an important role of the Department and Commission, not to mention an important source of revenue from licenses and fees. But growing public interest in the protection and enjoyment of all wildlife species, plus the advent of laws such as the federal Endangered Species Act, has forced the agency to become much broader in its management scope in recent years.

The Department of Fish and Wildlife is much more concerned now with the protection and management of critical wildlife habitat and biodiversity than it was 30 years ago. A steady decline in the percentage of hunters and sport-fishers in the general population and a dramatic increase in non-consumptive wildlife recreation, have forced all wildlife agencies to shift program emphasis and available funding to meet new demands. Many WDFW programs are summarized in Appendix III.

**Department of Natural Resources (WDNR)** was established by the Washington Legislature to manage land, tidelands and shorelands deeded to the state by the federal government at statehood in 1889 and acquired by the state in the 1930s. Next to the USDA Forest Service, WDNR is the largest public landowner in the state. The agency is administered by the Commissioner of Public Lands, who also chairs the Board of Natural Resources, which guides decisions about all state trust lands, aquatic lands and conservation lands, and the Forest Practices Board, which establishes rules to regulate forest practices and timber harvest on both public and private lands; the Forest Practices Act is administered by WDNR.

WDNR is the largest manager of state lands in Washington, with more than 5.6 million acres of uplands, tidelands and freshwater aquatic lands under its direct management jurisdiction. Most of these lands, including managed forests, commercial properties, farms, rangeland, and waterways, are managed as trust lands to provide a continuous flow of income to build public schools,

universities, community colleges, prisons and other state facilities, as well as capital facilities and public services in 19 counties with Forest Board trust lands. Revenues to the state exceed \$250 million per year from these trust lands.

WDNR also owns and manages a statewide system of Natural Area Preserves (NAPs) and Natural Resource Conservation Areas (NRCAs), which are managed for educational and scientific study and available for limited public use. The combined statewide acreage of NAPs and NRCAs is 105,700 acres. The Washington Natural Heritage Program, located within WDNR, collects and analyzes data about native ecosystems and species. This data is stored and managed on a Natural Heritage GIS database, which is referenced in more detail below. Like WDFW, WDNR is able to acquire key parcels of Natural Heritage-quality lands each year with funds appropriated by the Legislature to the WWRP. The Legislature also authorizes the transfer (acquisition) of selected state trust lands to conservation status via the Trust Land Transfer program.

**Washington State Parks and Recreation Commission (WSP)** appoints the Director of State Parks, who in turn manages a system of 125 state parks and about 260,000 acres of land, much of it used for public recreation, most of it in an undeveloped condition. The Commission has no regulatory responsibilities beyond the state park system but is responsible for the protection of wildlife habitat and biodiversity on state parklands. In recent years, the State Parks Commission has moved beyond their recreation mandate by expanding efforts to identify, protect and interpret important wildlife habitat and other natural resources on its lands. As with WDFW and WDNR, State Parks has been able to acquire key parcels of parkland and natural area through the WWRP program, discussed in Appendix IV.

## **OTHER STATE AGENCIES**

There are a number of other state agencies with direct or indirect responsibility for the protection and management of wildlife, habitat and biodiversity, including the following:

- **Washington Department of Ecology (WDOE)** is an environmental agency tasked to protect, preserve and enhance air, land and water quality in the state. The Director of Ecology is appointed by the Governor. In addition to promoting good environmental management practices and supporting sustainable community development, WDOE has regulatory responsibilities to deal with pollution and natural resource degradation issues. Technical and financial assistance is also provided to industry, landowners and local government. WDOE has direct responsibility for protection of wetlands, including the identification and classification of important coastal wetlands and riparian areas. This authority is derived from the agency's water quality mandate, as well as its role in administering and enforcing the state Shoreline Management Act (SMA). In addition to the agency's regulatory responsibilities under SMA, WDOE provides loans, grants and technical assistance to private landowners, local governments and other state agencies to protect and restore wetlands and improve water quality.
- **Washington Department of Transportation (WDOT)** is responsible for building and maintaining the state's highway infrastructure, together with bridges, tunnels, ferries and rail services. The Department is administered by the Secretary of Transportation, who is appointed by a seven-member Transportation Commission. The Commission in turn is appointed by the Governor.



The need to provide transportation for the state requires that WDOT assume the role of developer. As such, the Department must obtain permits from federal, state and local agencies when projects pass through sensitive areas, such as wetlands or stream corridors, or have the potential to impact threatened or endangered species. Biologists who work for WDOT assist the agency in both obtaining necessary permits and protecting sensitive habitat areas. Agency biologists are frequently involved in project impact assessment, biological assessments for threatened and endangered plant or animal species, stream surveys, fish-passage assessment and enhancement, maintenance and evaluation of wildlife mortality data, interagency training and environmental research.

- **Puget Sound Water Quality Action Team (PSWQAT)** is a small state agency with the goal of restoring and protecting the biological health and diversity of Puget Sound by protecting and enhancing the Sound's water and sediment quality, fish and shellfish and wetlands and other habitats. The Director is appointed by the Governor and the agency is overseen by the Puget Sound Council, which advises the Director on work plan priorities and monitors implementation of the Puget Sound Water Quality Action Plan — the primary document that guides the programs of the Action Team.

Action Team staff work with tribal and local governments, community groups, citizens and business and federal and other state agencies to develop and carry out two-year work plans, which address specific objectives to clean up Puget Sound and protect the biological resources of the Sound.

- **Washington Conservation Commission (WCC)** is a small state agency that supports and coordinates the conservation work of local conservation districts. WCC administers the Conservation Reserve Enhancement Program (CREP) through a partnership with the federal Farm Services Agency. It is also conducting a statewide Salmon Habitat Limiting Factors Analysis program, which identifies habitat factors limiting the success of salmon in each of 62 watersheds or Water Resource Inventory Areas (WRIAs) of the state. The agency is overseen by a commission of ten members, some of whom are appointed by the Governor, some elected by conservation districts and some representing state agencies.
- **Interagency Committee for Outdoor Recreation (IAC) and Salmon Recovery Funding Board (SRFB):** The IAC was created by the Washington Legislature in 1964 to administer the federal Land and Water Conservation Fund and other state and federal grant programs for outdoor recreation and conservation. The agency still serves that important function. In fact, it was expanded in size and scope to administer the Washington Wildlife and Recreation Program (WWRP), created by the Legislature in 1989. The IAC is currently completing a Public Lands Inventory Project, funded by the Legislature, which will inventory and summarize public and tribal land ownership in Washington, as well as provide an assessment of state and federal habitat and recreation lands, describe the historical, policy and economic issues surrounding public and tribal lands and recommend ways to improve public land reporting and geographic information systems (GIS).

In 1999, the IAC was also given responsibility for staffing the new Salmon Funding Recovery Board (SRFB) (pronounced surfboard), which was set up to administer state and

federal grant funds to protect and restore habitat for listed or depressed stocks of Pacific salmon. Grants are made available to public agencies and private groups, on a competitive basis, to acquire and/or restore important habitat, including wetlands and riparian zones.

#### STATE AGENCY GIS CAPABILITIES

Many Washington State agencies have developed capacities for collecting, analyzing, and managing spatial information. Although there is still a lack of overall coordination and standards in how this information is represented and managed, there is considerable consistency in the technical way that the information is handled. The agencies that have established GIS capabilities to support their information management needs have for the most part used a common suite of software products developed by the Environmental Systems Research Institute (ESRI). These common bases facilitate the exchange of information; however, integration may still be hampered by the issues of data quality, geographic scale, and thematic classifications.

While many of the agencies have GIS capabilities, this review focuses primarily on those that produce and manage information that is germane to the assessment of biodiversity conditions and ecosystem health. Specific details of the various data programs in each of these agencies are included in the Technical Assessment section.

- **Washington Department of Fish and Wildlife (WDFW):** One of the more important GIS facilities resides with the Washington Department of Fish and Wildlife, which has developed and manages GIS databases related to important fish and wildlife species. It has an in-house GIS computer facility with a number of skilled GIS analysts and technicians and production capabilities to respond to both internal and public requests for mapped information. It provides map products and summary reports responding to common queries about locations of fish and wildlife species. These responses consider, of course, the sensitive nature of some of the data and may restrict its distribution, for example, being careful not to reveal publicly the specific locations of rare and endangered species.
- **Washington Department of Natural Resources (WDNR):** To meet its responsibility to protect and manage natural resources and state trust lands, WDNR has established a corporate digital GIS Section within the Information Technology Division. One of the important programs managed by WDNR is the Washington Natural Heritage Program, established in 1981. This program is supported by a GIS database representing the location and status for rare plant species and high-quality terrestrial and wetland ecosystems in the state. The Washington Natural Heritage Program is part of a national system; however, the institutional home for the program within each state varies considerably, from state agencies, such as WDNR, to conservation-based NGOs.
- **Washington Department of Transportation (WDOT):** The Planning and Programming Service Center within the Department has established a Cartographic and Geographic Information Systems (CGIS) section to support the mapping, planning and infrastructure assessment requirements of the Department. The CGIS capabilities are based on ESRI's suite of software; however, the digital cartographic production of maps is based on a Computer

Assisted Drafting and Design (CADD) system (MicroStation/J). The data storage formats of the two systems differ, but through standard conversion procedures and with some limitations can be exchanged between the two systems.

- **Washington Department of Ecology** has a well-established GIS program. It develops and maintains spatial data sets, conducts GIS applications and projects, publishes maps related to environmental and ecological issues and provides services and training, on a for-fee basis, to local, state and federal clients.
- **Washington State Geographic Information Council (WAGIC)**, within the Washington Department of Information Services, was established to promote, coordinate, and facilitate the use and development of geospatial information in the state. Its focus is not only state agencies, but also includes federal, regional, and local government agencies, as well as tribal and private concerns. It does not develop or store geospatial information, but rather provides information services, such as a clearinghouse of data, and facilitates coordination and communication amongst data providers and users by operating a list server. The Council, with membership from many of the GIS-involved agencies, is attempting to develop data standards for the state and produce a framework for information to identify data gaps and ensure that at least a minimum of data is available.

Many other state agencies have GIS capabilities, but are less directly related to the focus of this review, which is biodiversity conservation and ecosystem management. For example, the Washington Department of Health (WDOH) uses GIS data sets and analysis to ensure that public health is protected in the state. It uses GIS to help locate health facilities, map issues related to immunization and disease trends, map real-time health alerts and evaluate the public's access to health care, among many other related applications. These programs of other agencies, while less related to a biodiversity project, speak to the overall advanced state of affairs in Washington state as related to GIS and spatial data sets.

## TRIBAL AGENCIES

There are 28 federally recognized Indian tribes in Washington, many of which own and manage large tracts of fish and wildlife habitat. The Yakama Indian Nation and Colville Confederated Tribes are by far the largest tribal landowners; together, the two tribes own and manage about 2.3 million acres of forestland and other wildlife habitat in eastern Washington. The combined tribal acreage in Washington is approximately 5,000 square miles.

The diversity of wildlife and wildlife habitat on tribal lands reflects in many ways the biodiversity of the state as a whole. Most tribes, especially coastal tribes, are engaged with the management and harvest of salmon, shellfish and other marine resources. For the Yakamas, Colvilles and other tribes with large land holdings, terrestrial wildlife is also important to their culture and their economic development. Washington's Indian tribes are important partners in any large-scale efforts to identify, protect and manage fish and wildlife habitat and biodiversity, not only because they are large landowners but also because the federal courts have granted them "co-manager" status for the fish and wildlife resources that exist on certain off-reservation lands ceded to them by federal treaties for usual and accustomed harvest of fish and wildlife.

The tribes collectively are strong advocates of wildlife conservation. Most of the tribes have some fish and wildlife management capabilities. Some of the larger tribes, such as the Yakama Nation and the Colville Confederated Tribes, have large fish and wildlife departments, with conservation and harvest management programs as sophisticated as state and federal wildlife agencies.

#### TRIBAL GIS CAPABILITIES

The Northwest Indian Fisheries Commission (NWIFC) was established in the mid-1970s to assist Washington's Treaty Indian tribes organize and manage fisheries. The function of the commission has since been expanded to include other aspects of natural resource management, but their primary emphasis is still on fisheries. The commission has established a sophisticated GIS capability to assist with these resource management responsibilities. Most of the GIS activities to date have focused on fish resources, particularly in support of the SSHIAP program. Most of the spatial data collected by the commission are at a scale of 1:24,000 and relate specifically to streams. Information is collected on stream gradients, physical characteristics and obstacles or barriers (such as culverts and dams). The commission also collects and manages information on the distribution of fish stocks.

The geographic focus of the NWIFC's GIS activities is west of the Cascade Mountains, covering predominantly Water Resource Inventory Areas (WRIA) 1-23. The base data for the SSHIAP program, in western Washington is fairly complete, with some geographic coverages more complete than others; for example, the barrier coverage is in various stages of completion, while other coverages are completed at the initial draft stage.

Individual tribes in Washington have also established GIS capabilities to support their resource management responsibilities. These capabilities are not uniform across all tribes, but span the spectrum from next to nothing to very significant. Larger tribes, such as the Yakama, Quinault, and Muckleshoot, have extensive GIS capabilities with strong analytical functions, while others have very little capacity for GIS activities. Most of the GIS activities were first established on the reservations to manage land allocation to tribal members and to establish legal property boundaries. Many tribes have since expanded their activities to support their co-management responsibilities on ceded lands — public lands that have been ceded to them by federal treaties for purposes of harvesting fish, shellfish and wildlife. Much of the tribes' GIS data is at a scale of 1:24,000.

#### LOCAL GOVERNMENTS

In Washington, land use planning and environmental programs are very much locally driven and locally administered. The state legislature has established a number of statewide environmental programs such as the State Environmental Policy Act (SEPA), Shoreline Management Act (SMA), and Growth Management Act (GMA), but these programs are administered with a high level of local discretion by the state's incorporated cities and 39 counties.

GMA, for instance, requires local governments to identify and protect critical areas, but the state has a limited role in determining which areas meet the statutory definition and how the local jurisdictions will go about protecting these areas. There is always a certain amount of tension

between state agencies and various local governments regarding land use planning and environmental protection. But this tension is not necessarily bad in that most cities and counties have accepted responsibility for the protection of their own critical environment resources.

Washington's decentralized system probably works as well as more centralized approaches taken in other states for protecting wildlife habitat and other important environmental resources. The decentralized model certainly defines the cities and especially the counties as important partners in designing and administering any statewide programs to protect and manage the environment. Although state funding usually falls short of what local governments feel they need, some counties have used state mandates and available funding to develop effective programs to identify and protect fish and wildlife habitat and other open space resources such as wetlands and agricultural land.

In addition to state funds, the Legislature has provided cities and counties with some of their own discretionary funding options for land and water conservation on both public and private land. The state Current Use Taxation law allows cities and counties to levy an optional property tax of up to \$.0625 per \$1,000 assessed value. These funds are then credited to a special Conservation Futures fund to be used to acquire open space lands through fee title purchase, conservation easements or purchase of development rights.

The same state law also permits local governments to utilize a "Public Benefit Rating System" (PBRS), whereby reduced property taxes are assessed on private lands where the owners are willing to defer development and protect to protect habitat and other open space values on their lands. Counties also have the option of imposing a small Real Estate Excise Tax (REET) on property transfers — the proceeds to be used for the acquisition of property interests in conservation areas, defined as open space, wetlands, aquifer recharge areas, shoreline areas, natural areas, and other lands important to preserve flora and fauna. These local conservation options are also included in Appendix III.

#### LOCAL GOVERNMENT GIS CAPABILITIES

County Governments have GIS and mapping capabilities that support their planning processes and their public communication efforts. With the exception of data concerning detailed land use, zoning, land parcel information and some infrastructure, much of the primary GIS data used by county administrations come from other sources. The county governments are primarily data users rather than data developers. The level of sophistication of county GIS programs is generally consistent with the population size of each county and the complexity of its land use planning and property taxing programs.

#### **NON-GOVERNMENTAL CONSERVATION ORGANIZATIONS (NGOS)**

A number of nonprofit organizations are actively working to identify, protect and restore critical fish and wildlife habitat and biodiversity in Washington. The Nature Conservancy, National Audubon Society, Ducks Unlimited, Inc., Rocky Mountain Elk Foundation and Trust for Public Land are some national organizations with Washington state offices. Others, such as People for Puget Sound and the Inland Northwest Wildlife Council, work within the state or the region.

Each of these organizations has their own focus, but all are concerned with the conservation of wildlife, wildlife habitat, and biodiversity. The land trust movement has grown rapidly in the Northwest in the last ten years and especially in Washington, where there are now 33 active land trusts. Most land trusts only work in one or two counties; others such as the Cascade Land Conservancy, do conservation work in larger regions of the state. Land trusts are not only growing in number and size, they are also becoming important conservation partners to state and federal agencies.

#### GIS CAPABILITIES IN NONPROFIT ORGANIZATIONS

A large number of local conservation agencies and organizations in Washington have geospatial information and GIS capabilities that could support a biodiversity strategy for the state. Again, this review is not exhaustive, but identifies some of the key organizations that may play a significant role, either directly in the preparation of a strategy or in the provision of data:

- **The Nature Conservancy of Washington (TNC)** is the largest membership-based conservation group in Washington and works with communities, government agencies, private sector corporations and landowners to protect critical habitats. TNC currently owns 41 preserves in Washington covering nearly 20,000 acres, in addition to helping protect another 320,000 acres of critical habitat through conservation easements and management plans. The key to their approach is land acquisition and management of areas representing important habitat.

TNC has a major program in Washington state and across the United States for identifying and assessing natural areas whose protection would "ensure the long-term survival of viable, vulnerable species and natural communities" on an ecoregional basis. To accomplish their Ecoregional Conservation Planning effort, TNC has developed a methodology based on GIS tools, spatial data, and expert opinion to identify areas of high-value habitat and species richness. In Washington, they are currently actively involved with WDFW, WDNR, and Washington Office of Community Development (OCD) in an process to identify priority areas for biodiversity conservation. TNC has powerful GIS capabilities and staff expertise to perform the requisite analysis and develop the spatial data models.

- **People for Puget Sound (P4PS)** is a nonprofit organization concentrating on the protection and restoration of the land and waters of Puget Sound. The organization uses GIS capabilities to analyze landscape ecology and set priorities for estuarine restoration. It is also conducting a detailed coastal survey of the state, which will create a valuable source of geospatial information for comprehensive planning and resource conservation.

As with many nonprofit organizations, People for Puget Sound, for the most part, relies on existing geospatial data sources for primary information, but adds value to the information through its GIS analysis and modeling.

- **Northwest Land Trust Alliance: (LTA)** is one of many individual land trusts that have developed or are developing sophisticated GIS capabilities to both manage their existing properties and conservation easements and establish landscape priorities for future projects. The Northwest Land Trust Alliance has indicated it will be an enthusiastic partner in the development and implementation of a Washington biodiversity initiative.

- **The Trust for Public Land (TPL)** works to protect land through conservation for the enjoyment and benefit of the public. It works with landowners, government agencies and communities to protect and conserve areas for parks, open spaces, historic landmarks and natural areas. TPL makes use of spatial information and GIS analysis to direct decisions about which lands should be conserved and to develop management plans. Also, since one of its objectives is to promote a strong connection between people and land, it uses its spatial analysis and information to educate the public and to develop a strong appreciation for the environment. Most of the spatial information that TPL uses comes from other sources and it uses contract services for some of its GIS analysis.
- **Ecotrust** is a nonprofit organization supporting the emergence of a conservation economy in the coastal temperate rain forest bioregion of North America. It has extensive GIS capabilities for supporting community-based decision-making and offers downloadable GIS data sets and interactive mapping from its Internet website. Inforain is the GIS-based "bioregional information system" sponsored by Ecotrust and designed to help organizations, businesses and individuals get access to relevant geospatial information. Some information sets and maps are bundled together and distributed as a packaged system for particular areas; for example, information has been compiled and disseminated for the Willapa Watershed, in southwest Washington, in a readily useable CD-ROM format.
- **Pacific Biodiversity Institute (PBI)** conducts research in ecology, conservation biology and natural resource management. PBI has sophisticated GIS capabilities and through geospatial analysis provides decision-support to public agencies, educational institutions and other nonprofit conservation organizations. PBI relies heavily on earth and biological data from other sources, but they have been instrumental in developing a GIS data set on Wildlands for Washington, and have supported the development of the Wildland Information Network for the Pacific Northwest. A number of agencies and organizations, including The Trust for Public Land, work closely with PBI on specific GIS development needs.
- **Northwest Habitat Institute (NWHI)** focuses on the development of GIS products and tools to promote sustainable ecosystem management, and in particular to assist land owners and managers in developing strategies and programs for natural resource conservation and management. Working primarily in Washington and Oregon, NWHI has developed wildlife habitat and vegetation maps for Washington.

### REGULATORY, ACQUISITION AND INCENTIVE PROGRAMS FOR WILDLIFE HABITAT

A number of federal, state and local programs and funding sources are used by conservation agencies and organizations to secure, restore and/or enhance critical fish and wildlife habitat and other areas with important biodiversity. Some of these programs are listed below:

#### REGULATORY PROGRAMS

- **Federal Endangered Species Act (ESA)** The act protects species listed under the ESA, as well as critical habitats, from hunting, transport, or other harassment. Section 10 of the Act allows for permitted "incidental take" as part of an otherwise lawful activity such as timber harvest or development. The Act is co-administered in Washington by the U.S. Fish and Wildlife Service and National Marine Fisheries Service.
- **Federal Clean Water Act (CWA)** The act prevents or permits discharges of pollutants to waters of the United States; NPDES permits are required for legal discharges into navigable waters. Section 404 of the Act regulates filling but not dredging, draining or clearing of wetlands. The Act is administered by the Environmental Protection Agency (EPA) in close collaboration with the Washington Department of Ecology.
- **Growth Management Act (GMA)**: Passed in 1990, this statewide Act requires each city and county with a population of more than 50,000 to develop plans that designate and protect critical areas, including wetlands and other important habitat. The program is locally administered, although some funding and technical assistance is provided by the state. Cities and counties are required to review, evaluate, and if necessary update their comprehensive plans and development regulations, including ordinances to protect critical areas by September 1, 2002.
- **State Shoreline Management Act (SMA) (RCW 90.58)** The act regulates development on shorelines of the state, defined as lakes 20 acres or greater in size, streams with flows over 20 cubic feet per second and all lands within 200 feet of shorelines of the state, plus associated marshes, bogs and swamps. It is administered by Washington Department of Ecology and city and county governments, which are required by law to adopt local Shoreline Management Programs. Local SMPs must be updated, along with local GMA plans and ordinances, in 2002.



- **State Hydraulics Code (RCW 75.20.100)** The code protects fish habitat, including wetlands, within ordinary high water mark of marine waters, lakes, ponds, and streams. The code is administered by the Department of Fish and Wildlife.
- **Bald Eagle Protection Rules (WAC 232-12-292)** The rules require WDFW to identify and protect bald eagle habitat and buffer zones on all non-federal and non-tribal lands in Washington. A process is outlined for protecting habitat via management planning.
- **Forest Practices Act (RCW 79.09)** The act regulates forest practices, including timber harvest, on private lands. Forest Practices rules impose standards for road construction, snag retention and for protecting streams, stream corridors and certain types of forested wetlands. This law is administered by the Department of Natural Resources.

## HABITAT ACQUISITION AND RESTORATION PROGRAMS

- **Land and Water Conservation Fund** The fund was authorized by Congress in 1963 to reinvest offshore oil and gas royalties into acquisition of outdoor recreation and conservation lands. Congress may appropriate up to \$90 million/year to states and federal agencies, including the U.S. Fish and Wildlife Service, to acquire full or partial interests in land or waters, including critical fish and wildlife habitat.
- **North American Wetlands Conservation Act (NAWCA)** The act provides grants to agencies, organizations, and nonprofit organizations to protect, restore, and enhance important wetland wildlife habitat. Standard grants are available up to \$1 million; small grants are available up to \$50,000. NAWCA grants are provided through the U.S. Fish and Wildlife Service and require at least 50% non-federal match for each grant. The Act is authorized at \$50 million per year.
- **National Coastal Wetlands Conservation Grants (NCWCG):** This program is authorized by Section 305 of the Coastal Wetlands Planning, Protection, and Restoration Act of 1991 and is funded by a small percentage of the federal excise tax on small engines and fuel. Grants are made annually to state agencies through the U.S. Fish and Wildlife Service for coastal wetland habitat protection and restoration projects. Each grant in Washington requires at least 25% non-federal match and grants may only be used in coastal counties.
- **Washington Wildlife and Recreation Program (WWRP)** This program was established in 1990 by the Washington State Legislature. Appropriations are made on a biennial basis to state and local agencies, through the Interagency Committee for Outdoor Recreation, for acquisition of critical wildlife habitat and natural areas. Since 1990 more than \$362 million has been appropriated to agencies for acquisition of habitat and recreation lands.
- **Aquatic Lands Enhancement Account (ALEA):** Revenue from the leasing of state aquatic lands and tidelands is available annually as habitat grants to state and local agencies. Grants up to \$1 million are available for acquisition of fish and wildlife habitat and/or restoration of marine, estuarine and riverine habitat for state and federal listed species. The program is administered by the Department of Natural Resources.

- **Salmon Recovery Funding Board (SRF Board):** The SRF Board was established in 1999 to administer state and federal funds made available for salmon recovery efforts. Competitive grants are available, through watershed councils and other "lead agencies", to state, tribal and local agencies, nonprofit organizations and private landowners for habitat acquisition and restoration projects. Primary focus is on anadromous streams and associated wetlands. The program is administered by the state Interagency Committee for Outdoor Recreation (IAC).
- **Conservation Futures:** Counties are authorized to levy a property tax of \$0.0625 per \$1,000 of assessed valuation to be credited to a special Conservation Futures Account. These funds are available to the county governments for acquisition of conservation easements, development rights or fee-title acquisition of open space lands, including fish and wildlife habitat. Counties electing to establish Conservation Futures programs often establish partnerships with local land trusts and other conservation groups.
- **Real Estate Excise Tax (REET):** Cities and counties, with local voter approval, may impose an excise tax of .25% or less on the sale of real estate, the proceeds to be used for capital projects, including conservation areas and "other lands and waters that are important to preserve flora and fauna."

#### **HABITAT INCENTIVE PROGRAMS**

- **Natural Resource Conservation Service (NRCS):** NRCS has a number of programs that provide direct financial incentives to farmers and other private landowners for protecting, restoring and/or enhancing wetlands and other habitat on their lands. Included here are the Wetlands Reserve Program (WRP), Environmental Quality Incentive Program (EQIP), Northwest Salmon Initiative, and the Wildlife Habitat Incentives Program (WHIP).
- **U.S. Fish and Wildlife Service:** The Fish and Wildlife Service also has a number of voluntary programs to encourage landowners to restore and enhance fish and wildlife habitat and native plant communities on their land. Included are Partners for Fish and Wildlife and the Washington State Ecosystems Conservation Program.
- **Environmental Protection Agency: (EPA)** EPA works in partnership with other federal and state agencies to provide technical and financial assistance to non-industrial forest owners for good stewardship of their lands, including protection and enhancement of fish and wildlife habitat.
- **Washington Department of Fish and Wildlife:** The Upland Wildlife Restoration Program establishes long-term agreements with willing landowners to protect and enhance wildlife habitat on their lands. Incentives consist mainly of technical assistance and a landowner recognition program.
- **Public Benefit Rating System (PBRS):** Counties may offer a property tax reduction to landowners who are willing to protect wildlife habitat and natural amenities on their property, if the amenities are deemed to be of benefit to the community. The PBRS is applied to determine which landowner applications are appropriate for application and the level of tax relief available to each applicant.

## APPENDIX V

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### INTERVIEW CONTACTS AND SOURCES OF INFORMATION JOE LA TOURRETTE AND WAYNE LUSCOMBE, PH.D.

#### FEDERAL AGENCIES

##### **USDA Forest Service** ([www.fs.fed.us](http://www.fs.fed.us))

Grant Gunderson, Wildlife Program Manager (503-808-2991) ([ggunderson@fs.fed.us](mailto:ggunderson@fs.fed.us))  
Phone Interview: 9/4/2001 (Wayne)

Stephen Bown, GIS Coordinator (503-808-2864) ([sbown@fs.fed.us](mailto:sbown@fs.fed.us))  
Meeting: 8/16/2001 (Wayne)

##### **Bureau of Land Management (BLM)** ([www.or.blm.gov](http://www.or.blm.gov))

Todd Thompson, Acting State (OR/WA) Biologist (503-952-6382)  
([todd\\_thompson@or.blm.gov](mailto:todd_thompson@or.blm.gov))  
Meetings: 6/19/2001 (Joe), 9/11/2001 (Wayne)

##### **U.S. Fish and Wildlife Service (FWS)** ([www.fws.gov](http://www.fws.gov))

Carey Smith, Pacific Coast Joint Venture Coordinator (360-696-7630)  
([carey\\_smith@fws.gov](mailto:carey_smith@fws.gov))  
Meeting: 10/24/2001 (Joe)

#### STATE GOVERNMENT

##### **Washington State Senate** ([www.leg.wa.gov](http://www.leg.wa.gov))

Senator Ken Jacobsen, Chair, Senate Natural Resources and Parks Committee  
(360-786-7690)  
Meetings: 5/1/2001, 6/5/2001 (Joe)

Senator Bob Oke, Ranking GOP, Senate Natural Resources/Parks Committee  
(360-786-7650)  
Meeting: 6/27/2001 (Joe)

Gary Wilburn, Natural Resources Counsel, Senate Democratic Caucus  
(360-786-7350) (wilburn\_ga@leg.wa.gov)  
Meetings: 5/1/2001, 6/5/2001 (Joe)

**Governor's Executive Policy Office** (www.governor.wa.gov)  
Bob Nichols, Senior Executive Policy Advisor  
(360-902-0642) (bobn@ofm.wa.gov)  
Meeting: 4/16/2001 (Joe)

Ron Shultz, Executive Policy Advisor  
(360-902-0676) (ron.shultz@ofm.wa.gov)  
Meeting: 6/4/2001 (Joe)

**Governor's Salmon Recovery Office** (www.governor.wa.gov/esa)  
Lynn Singleton, Salmon and Watershed Information Coordinator,  
(360-902-2232) (Lynn.Singleton@esa.wa.gov )  
Meeting: 6/27/2001 (Joe and Wayne)

**Washington Department of Fish and Wildlife** (www.wa.gov/wdfw)  
Jeff Koenings, Director (360-992-2200)  
Meeting: 6/5/2001 (Joe)

Dave Brittell, Assistant Director  
(360-902-2504) (brittjdb@dfw.wa.gov)  
Meetings: 5/1/200, 6/5/2001 (Joe)

Rocky Beach, Wildlife Diversity Division Manager  
(360-902-2510) (BEACHRJB@dfw.wa.gov)  
Meetings: 3/13/2001 (Joe), 4/19/2001 (Joe and Wayne), 5/1/2001 (Joe)

Dr. David Johnson, Landscape Planning Manager  
(360-902-2603) (JOHNSDHJ@dfw.wa.gov)  
Meetings: 3/15/2001 (Joe), 6/18/2001 (Wayne)

Dr. John Pierce, Research/WRDS Division Manager  
(360-902-2511) (PIERCEDJB@dfw.wa.gov)  
Meeting: 10/16/2001 (Joe and Wayne)

Tom Owens, Data Systems Manager  
(360-902-2489) (OWENSTEO@dfw.wa.gov)  
Meeting: 4/25/2001 (Wayne)

Elizabeth Rodrick, Land Conservation Manager  
(360-902-2696) (rodriear@dfw.wa.gov)  
Meetings: 3/13/2001, 5/1/2001 (Joe), 9/26/2001 (Joe and Wayne)

**Washington Department of Natural Resources** ([www.wa.gov/dnr](http://www.wa.gov/dnr))

Jennifer Belcher, Former Commissioner of Public Lands (1992-2000)

Meeting: 11/29/2001 (Joe)

Bonnie Bunning, Executive Director, Policy and Program Administration  
(360-902-1104) (BONNIE.BUNNING@wadnr.gov)

Meeting: 5/24/2001 (Joe)

John Gamon, Natural Heritage Program Manager  
(369-902-1661) (JOHN.GAMON@wadnr.gov)

Meetings: 4/19/2001 (Joe and Wayne), 5/1/2001 (Joe)

Steve Farone, Information Manager  
(360-902-1349) (STEVE.FARONE@wadnr.gov)

Meeting: 6/18/2001 (Wayne)

Tom Mumford, Head of Nearshore Habitats Program  
(360-902-1079) (TOM.MUMFORD@wadnr.gov)

Did not meet-not available

Helen Berry, Nearshore Habitats Program  
(360-902-1052) (HELEN.BERRY@wadnr.gov)

Meeting: 6/18/2001 (Wayne)

**Washington State Department of Ecology** ([www.ecy.wa.gov](http://www.ecy.wa.gov))

Joe Williams, Assistant to the Director/Acting Deputy Director

(360-407-7011) (joew461@ecy.wa.gov)

Meeting: 6/8/2001 (Joe)

Joy Denkers, GIS Technical Services Manager

(360-407-7128) (jden461@ecy.wa.gov)

Meeting: 6/27/2001 (Wayne)

**Washington State Department of Transportation** ([www.wsdot.wa.gov](http://www.wsdot.wa.gov))

Shari Schaftlein, Deputy Director, Environmental Services

(360-705-7000) (Schafts@wsdot.wa.gov)

Completed questionnaire returned to Joe

Elizabeth Lanzer, GIS Manager

(360-705-7476) (LanzerE@wsdot.wa.gov)

Meeting: 6/27/2001 (Joe and Wayne)

Fred Bergdolt, Wetland Biologist Monitoring Program Field Coordinator

(360-570-6645) (bergdof@wsdot.wa.gov)

Meeting: 6/27/2001 (Wayne)

Bob Thomas  
(360-705-7000) (Thomasbo@wsdot.wa.gov)  
Meeting: 6/27/2001 (Wayne)

Barb Aberley  
(360-705-7000) (Aberleb@wsdot.wa.gov)  
Completed questionnaire returned to Joe

**Interagency Committee for Outdoor Recreation** ([www.wa.gov/iac](http://www.wa.gov/iac))

Laura Eckert Johnson, Director  
(360-902-3000) (laurae@iac.wa.gov)  
Meetings: 6/20/2001 and 10/31/2001 (Joe)

**Office of Community Development** ([www.ocd.wa.gov](http://www.ocd.wa.gov))

Shane Hope, Managing Director (360-725-3055) (shaneh@cted.wa.gov)  
Meeting: 6/11/2001 (Joe)

Chris Parsons, Project Manager (360-725-3054) (chrisp@cted.wa.gov)  
Meeting: 6/11/2001 (Joe)

**Puget Sound Water Quality Action Team** ([www.wa.gov/puget\\_sound](http://www.wa.gov/puget_sound))

Duane Fagergren, Deputy Director  
(360-407-7303) (dfagergren@psat.wa.gov)  
Meeting: 8/3/2001 (Joe)

Doug Myers, Planning Manager (360-407-7322) (dmyers@psat.wa.gov)  
Meeting: 8/3/2001 (Joe)

**Washington Conservation Commission** ([www.conserver.org](http://www.conserver.org))

Steve Meyer, Executive Director  
(360-705-7476) (smey461@ecy.wa.gov)  
Meeting: 6/27/2001 (Joe)

Ed Manary, Salmon Recovery Coordinator  
(360-705-7476) (eman461@ecy.wa.gov)  
Meeting: 6/27/2001 (Joe)

**LOCAL GOVERNMENT**

**Clark County Department of Community Development** ([www.co.clark.wa.us](http://www.co.clark.wa.us))

Patrick Lee, Long Range Planning Division  
(360-397-2375 ext.4112) (patrick.lee@co.clark.wa.us)  
Meeting: 9/11/2001 (Wayne)

David Howe, Planner II, Habitat Biologist Rural Team  
(360-397-2375 ext. 4598) (david.howe@co.clark.wa.us)  
Meeting: 9/11/2001 (Wayne)

Rod Swanson, Groundwater Geologist/Senior Planner  
(360-397-6118 ext. 4581) (rod.swanson@co.clark.wa.us)  
Meeting: 9/11/2001 (Wayne)

John Tyler, Endangered Species Program/Environmental Policy Analyst  
(360-397-2232 ext. 4945) (john.tyler@co.clark.wa.us)  
Meeting: 9/11/2001 (Wayne)

**Thurston Regional Planning Council** ([www.trpa.org](http://www.trpa.org))  
Steve Morrison, Senior Environmental Planner  
(360-786-5222)  
Meeting: 9/17/2001 (Joe)

**Kittitas Conservation District** Ellensburg ([www.kccd.net](http://www.kccd.net))  
Nicole McCoy, GIS Analyst  
(509) 925-8585  
Phone Interview: 9/24/2001 (Wayne)

**Washington State Association of Counties** ([www.wacounties.org/wsac](http://www.wacounties.org/wsac))  
Paul Parker, Assistant Executive Director  
(360-753-1886)  
Meeting: 8/10/2001 (Joe)

## UNIVERSITIES

### University of Mississippi

Dr. Alan Falconer, (former director of Utah GAP analysis project)  
(228-688-1936) (FALCONER@spacecommerce.com)  
(ALAN.FALCONER@ssc.nasa.gov)  
Phone Interview: 4/20/2001 (Wayne)  
University of Washington Washington State Gap Analysis Program  
([www.fish.washington.edu/naturemapping/wagap/public\\_html](http://www.fish.washington.edu/naturemapping/wagap/public_html);  
[www.wa.gov/wdfw/wlm/gap/dataprod.htm](http://www.wa.gov/wdfw/wlm/gap/dataprod.htm))

Karen Dvornich, Gap Analyst  
(206-543-6475) (vicon@u.washington.edu)  
Phone Interviews: 8/1/2001 (Joe), 9/10/2001 (Wayne)

## NATIVE AMERICAN GOVERNMENT

**Northwest Indian Fisheries Commission** ([www.nwifc.wa.gov](http://www.nwifc.wa.gov))  
Jim Anderson, Executive Director  
(360-438-1180) (anderson@nwifc.wa.gov)  
Meeting: 9/24/2001 (Joe)

Randy McIntosh, SHIAP Representative  
Phone interview: 11/8/2001 (Wayne)

## **NONPROFIT ORGANIZATIONS/INSTITUTES**

### **The Nature Conservancy** ([www.tnc.org](http://www.tnc.org))

David Weekes, Director, The Nature Conservancy of Washington  
(206-343-4344) ([dweekes@tnc.org](mailto:dweekes@tnc.org))  
Meeting: 8/8/2001 (Joe and Wayne)

Len Barson, Director of Government Relations  
(206-343-4344) ([lbarson@tnc.org](mailto:lbarson@tnc.org))  
Meeting: 8/8/2001 (Joe and Wayne)

Terry Cook, Director of Science and Stewardship  
(206-343-4344) ([Tcook@tnc.org](mailto:Tcook@tnc.org))  
Meetings: 3/15/2001 (Joe), 8/8/2001 (Joe and Wayne)

Mark Goering, GIS Analyst  
(206-343-4345 ext. 319) ([mgoering@tnc.org](mailto:mgoering@tnc.org))  
Meeting: 8/8/2001 (Wayne)

Zach Ferdana, GIS Analyst  
(206-343-4345 ext. 343) ([zferdana@tnc.org](mailto:zferdana@tnc.org))  
Meeting: 8/8/2001 (Wayne)

Tracy Horsman, GIS Analyst, Freshwater Initiative Analyst  
(206-343-4345 ext. 399) ([thorsman@tnc.org](mailto:thorsman@tnc.org))  
Meeting: 8/8/2001 (Wayne)

Cathy Macdonald, Director of Conservation Programs, The Nature Conservancy of Oregon (503-230-1221) ([cmacdonald@tnc.org](mailto:cmacdonald@tnc.org))  
Meeting: 8/24/2001 (Wayne)

### **Land Trust Alliance** ([www.lta.org](http://www.lta.org))

Dale Bonar, Director, Northwest Program  
(206-522-3134) ([dbonar@lta.org](mailto:dbonar@lta.org))  
Meeting: 8/8/2001 (Joe and Wayne)

Liz Bell, Co-director, Northwest Program  
(206-522-3134) ([ebell@lta.org](mailto:ebell@lta.org))  
Meeting: 8/8/2001 (Joe and Wayne)

### **The Trust for Public Land** ([www.tpl.org](http://www.tpl.org))

Roger Hoesterey, NW Regional/Washington State Director  
(206-587-2447) ([roger.hoesterey@tpl.org](mailto:roger.hoesterey@tpl.org))  
Meeting: 8/8/2001 (Joe and Wayne)



**People for Puget Sound** ([www.pugetsound.org](http://www.pugetsound.org))  
Dr. Jacques White, Director, Habitat Program  
(206-382-7007) ([jwhite@pugetsound.org](mailto:jwhite@pugetsound.org))  
Meeting: 8/8/2001

Philip Bloch, GIS Analyst (206-382-7007) ([pbloch@pugetsound.org](mailto:pbloch@pugetsound.org))  
Meeting: 8/8/2001

**National Audubon Society** - Washington State Office ([www.audubon.org](http://www.audubon.org))  
Jeff Parsons, State Director  
(360-786-8020) ([jparsons@audubon.org](mailto:jparsons@audubon.org))  
Meeting: 10/31/2001

**The Oregon Natural Heritage Program** ([www.abi.org/nhp/us/or](http://www.abi.org/nhp/us/or))  
Jimmy Kagan, Director/Ecologist  
(503-731-3070) ([Jimmy.Kagan@ORST.edu](mailto:Jimmy.Kagan@ORST.edu))  
Meeting: 8/24/2001 (Wayne)

**Northwest Habitat Institute** ([www.nwhi.org](http://www.nwhi.org))  
Thomas O'Neil, President, Habitat/Wildlife Ecology  
(541-753-2199) ([habitat@nwhi.org](mailto:habitat@nwhi.org))  
Meeting: 8/28/2001 (Joe and Wayne)

Charley Barrett, GIS Director  
(541-753-2199) ([Charley@nwhi.org](mailto:Charley@nwhi.org))  
Meeting: 8/28/2001 (Joe and Wayne)

**Pacific Biodiversity Institute** ([www.pacificbio.org](http://www.pacificbio.org))  
Jason Karl, Wildlife Biologist/Senior GIS Analyst  
(509-996-2490) ([jason@pacificbio.org](mailto:jason@pacificbio.org))  
Phone Interview: 8/30/2001 (Wayne)

**Ecotrust**-([www.ecotrust.org](http://www.ecotrust.org))  
Mike Mertens, GIS Programmer and Analyst  
(503)222-8108 ([mikem@ecotrust.org](mailto:mikem@ecotrust.org))  
Meeting: 8/17/2001 (Wayne)

Michele Dailey, GIS Analyst  
(503-222-8108) ([michele@ecotrust.org](mailto:michele@ecotrust.org))  
Meeting: 8/17/2001 (Wayne)

**Association for Biodiversity Information** ([www.abi.org](http://www.abi.org))  
Patrick Crist, Project Manager, Decision Support Systems (703) 908-1821)  
Phone Interviews: 8/31/2001 (Joe), 9/13/2001 (Wayne)

## **AGRICULTURE**

**American Farmland Trust** ([www.farmland.org](http://www.farmland.org))  
Don Stuart, Northwest Regional Director  
(253-446-9384) ([dstuart@farmland.org](mailto:dstuart@farmland.org))  
Meeting: 9/26/2001 (Joe)

**Washington Farm Bureau** ([www.wsfb.com](http://www.wsfb.com))  
Linda Johnson, Environmental Director  
(360-357-9975)  
Meeting never scheduled - phone call not returned

## **TIMBER INDUSTRY**

**Washington Forest Protection Association** ([www.woodcom.com](http://www.woodcom.com))  
Peter Heide, Director of Forest Management  
(360-352-1500) ([pheide@wfpa.org](mailto:pheide@wfpa.org))  
Meeting: 8/13/2001 (Joe)

**Weyerhaeuser Corporation** ([www.weyerhaeuser.com](http://www.weyerhaeuser.com))  
Jim Rochelle, Senior Wildlife Biologist (Retired)  
(360-491-3974)  
Meeting: 8/29/2001 (Joe)

## **BUILDING INDUSTRY**

**Associated General Contractors of Washington** ([www.agcwa.com](http://www.agcwa.com))  
Willie O'Neil, Environmental Policy Director  
(360-352-5000) ([woneil@agcwa.com](mailto:woneil@agcwa.com))  
Meeting: 8/29/2001 (Joe)

## **INTERNET SEARCHES**

Interior Columbia Basin Ecosystem Management Project ([www.icbemp.gov](http://www.icbemp.gov))  
Contact Becky Gravenmier (503-808-2851)  
Web search: 8/14/2001

Washington State Geospatial Data Archive (UW) ([wagda.lib.washington.edu](http://wagda.lib.washington.edu))  
Web search: 8/14/2001

Washington State Conservation Commission ([gis.conserver.org/index.php](http://gis.conserver.org/index.php))  
Web search: 8/14/2001

Washington State Geographic Information Council ([www.wa.gov/gic/](http://www.wa.gov/gic/))  
Web search: 8/14/2001

Washington State Department of Natural Resources ([www.wa.gov/dnr/](http://www.wa.gov/dnr/))  
Web search: 4/17/2001

Washington State Department of Fish and Wildlife ([www.wa.gov/wdfw/](http://www.wa.gov/wdfw/))  
Web search: 4/17/2001

Washington State Department of Ecology ([www.wa.gov/doe/](http://www.wa.gov/doe/))  
Web search: 6/28/2001

USDA Natural Resources Conservation Service ([www.nrcs.usda.gov](http://www.nrcs.usda.gov))  
Web search: 9/14/2001

Inforain — Directory of Conservation Organizations in Cascadia  
([www.inforain.org/dataresources/envdir.htm](http://www.inforain.org/dataresources/envdir.htm))  
Web search: 8/20/2001

CommEn Space ([www.commenspace.org](http://www.commenspace.org))  
Web search: 8/10/2001

Northwest Indian Fisheries Commission ([www.nwifc.wa.gov](http://www.nwifc.wa.gov))  
Web search: 9/26/2001

Yakama Indian Nation ([www.goia.wa.gov/tribalinfo/yakama.html](http://www.goia.wa.gov/tribalinfo/yakama.html))  
Web search: 9/26/2001

Tulalip Indian Tribe ([www.tulaliptribes.com](http://www.tulaliptribes.com))  
Web search: 9/26/2001

Clark County ([www.rtc.wa.gov/ccweb/index.cfm](http://www.rtc.wa.gov/ccweb/index.cfm))  
Web search: 9/26/2001

Pierce County ([trion.co.pierce.wa.us/map/start.cfm](http://trion.co.pierce.wa.us/map/start.cfm))  
Web search: 9/26/2001

### SUMMARY OF POLICY INTERVIEWS BY QUESTION

#### **1. Are you familiar with the Oregon Biodiversity Project?**

State agency administrators and their top policy staff were mostly unaware of the Oregon project until it was explained to them in an interview. Some state policy staff and GIS managers were aware of the Oregon project, as were some legislative staff. Many federal managers interviewed were aware and supportive of the Oregon project because they work in a regional context that includes both states; in fact, some federal natural resource managers interviewed participated in the Oregon effort. None of the tribal or local government managers we interviewed were familiar with the Oregon project until we explained it.

Representatives of national environmental groups, such as The Nature Conservancy and National Audubon Society, were familiar with, or at least aware of, the Oregon Biodiversity Project because they also tend to work in a regional context, including frequent professional contact with their peers in Oregon. Groups that work only in Washington state were generally unfamiliar with the Oregon project.

Local planners, tribal administrators and business representatives interviewed were generally unaware of the Oregon Biodiversity Project, except for one recently retired timber industry wildlife biologist, who actually worked on the Oregon project as an industry representative. He was supportive of the Oregon effort.

#### **2. Do you think Washington state would benefit from a similar habitat assessment and statewide conservation strategy? If so, how?**

#### **3. Would your organization or agency benefit from a Washington Biodiversity Project? Would you participate? If so, how would you use it to address your goals?**

Most people interviewed tended to answer questions number two and number three together, and therefore their responses are summarized together.

The concept of doing a Washington biodiversity initiative drew broad and mostly enthusiastic statements of support from federal and state conservation agency administrators. The concept was also supported by NGOs whose main focus is the conservation of fish and wildlife and other

natural resources, including the National Audubon Society and People for Puget Sound. A number of reasons were cited for the support; some consistent answers regarding the benefits of the project included:

- A more strategic approach to conservation goals and priorities and better coordination of interagency and public-private conservation efforts;
- Better products and tools for identifying and protecting those areas important for biodiversity; and
- A way to shift conservation efforts away from the current species-by-species approach required by the Endangered Species Act to an approach that centers on biodiversity as its goal — a way to hopefully get ahead of the ESA listing curve.

A few state administrators qualified their support by cautioning that, to be successful, a biodiversity initiative must be scoped out carefully and collaboratively and that the intended uses of the project need to be well articulated before the project moves forward. Most agencies and organizations indicating support also want to be involved in the development of the biodiversity initiative.

Some legislative and agency staff interviewed were not only supportive of a Washington biodiversity initiative, but thought we should begin to address the issue in the 2002 Legislative session.

The response to a Washington biodiversity initiative was less enthusiastic from local government representatives, who are usually on the receiving end of most new state and federal programs that mandate land use planning and environmental protection. Local governments, both cities and counties, are in a unique position in that, by law, they are expected to respond to and implement programs, such as the Growth Management Act and Endangered Species Act, but they do not feel that they are usually given enough funding or tools to get the job done.

On the other hand, most local government representatives interviewed indicated they could support a new approach to identifying and protecting critical habitat if it were done right. Some of the conditions for local government support implied from the interviews include:

- If the state was seriously committed to the biodiversity initiative as the best approach to identifying critical areas, and if the state was willing to follow through with the program;
- If the state provided technical and financial assistance to the affected local governments;
- If the new biodiversity initiative built on inventory and assessment work already done by the locals; and
- If local government representatives were included in the development of the program from the beginning.

The response from business representatives reviewed was mixed but generally cautious. One environmental representative from the building industry indicated that a Washington biodiversity initiative could be helpful in focusing growth and development into areas of least impact, as long as it did not create a redundant system to replace current programs such as the Limiting Factors Analysis currently being done for salmon habitat.

One response from an industry group representing large timber companies was negative. The timber industry feels that it has already been responsive to the Endangered Species Act requirements to protect spotted owl and salmon habitat, as well as to state-sponsored efforts to protect habitat on private land, such as the Timber, Fish and Wildlife agreement. At first glance, the Oregon biodiversity study looked to one timber industry representative like a program that might bring a whole new round of regulatory requirements to protect habitat.

A focused marketing effort will be needed to gain support from the timber industry, perhaps with the help of selected supportive timber representatives from Oregon. Attempts to interview anyone from the Washington Farm Bureau were unsuccessful. A regional representative of the American Farmland Trust could see potential benefits for farmers and ranchers by strengthening the rationale for public funding of conservation programs on private land.

**4. Who else would benefit from a Washington Biodiversity Project? How might it be used by other organizations, agencies or businesses?**

Many of the people who were interviewed about a Washington biodiversity initiative suggested other individuals, agencies and organizations that we should interview — which in turn led to some very productive interviews with people who were not on the original interview list. The referrals also resulted in a longer time frame and larger sample size than originally planned for the interview questionnaires.

The most common answer to the question of who else would benefit was "local governments". This answer was given by federal and state agency managers, legislative staff and representatives from the business and conservation communities, all of whom understand that the job of identifying and protecting habitat often falls to the cities and counties who administer state environmental laws and who must respond to laws, such as the Growth Management Act and Endangered Species Act. Other answers to this question included: other state and federal agencies, developers, the tourism industry, environmental education and other conservation groups that are focused on identifying and protecting important wildlife habitat.

**5. Do you see any barriers or obstacles to developing and/or using a Washington Biodiversity Project? If so, what should be done to get around these barriers?**

Very few people indicated that completing a Washington biodiversity initiative would be easy. The potential barrier to a statewide initiative most commonly mentioned was that of funding. The economy is slowing down, state budget cuts are being planned and many public agencies and private conservation organizations are looking at trying to maintain existing programs, rather than starting new initiatives. Even though most interviewees advised that securing funds would be difficult, many indicated that, if it could be shown that the products from such an initiative would allow agencies and conservation groups to be more cost-effective in their approach to identifying

and protecting important areas, and if the scientific community were convinced that this is really the best available science, then support and funding could probably be generated in both the public and private sectors.

Another barrier mentioned by agencies and conservation group representatives alike was the traditional lack of cooperation among agencies, especially state agencies. Agencies are working more closely than ever on some technical and policy levels, but there is a long tradition of poor cooperation and coordination among state agencies when it comes to sharing proprietary data, expertise and funding. Unless the issue is addressed up-front, it will probably impede or prevent the success of a project as large and broad-based as a statewide biodiversity initiative.

Some of those interviewed indicated that the problem of interagency cooperation could only be addressed by the Legislature — the one organization that all state agencies must listen to. Another barrier, or at least a source of resistance, will be a perception that this new initiative would somehow dilute and pull funding away from other important efforts, such as the Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP) and Limiting Factoring Analysis.

**6. Who do you think should lead the development of a Washington Biodiversity Project? Who (organization or agency) do you think should manage and disseminate the data?**

**Leadership:** A couple of state administrators suggested that a Washington biodiversity project should be led by the Department of Fish and Wildlife or the Department of Natural Resources. Business representatives were not supportive of that idea; one suggested instead that a new quasi-governmental group be created, citing the National Fish and Wildlife Foundation as an example.

Most people interviewed felt that an effective public-private partnership would be needed to ensure the success of such a large undertaking, and to ensure credibility in both the public and private sectors. Some agency administrators suggested the need for a "biodiversity czar" to bang heads and make everyone work together. Others felt that an existing consulting organization with GIS expertise (the Pacific Biodiversity Institute was mentioned by some) should be retained to run the process and create the products. Some interviewees, including some legislative staff, felt that, if the various affected stakeholder groups could be convened to support and design a Washington initiative, decisions about "who did what" could be made by the stakeholders themselves.

**Data Management:** In the policy interviews, it was mentioned that a new Institute for Natural Resources has been established at Oregon State University to provide reliable, objective, natural resource expertise, information and assistance to the public and policy makers. This idea, as it might relate to a Washington biodiversity initiative, got a positive reaction from most agency, business and conservation group representatives we interviewed in Washington. Universities are generally regarded as scientifically competent and politically neutral, whereas many state agencies are seen as having their own agendas, especially those with regulatory responsibilities. The University of Washington was mentioned as a possibility, although some people felt that we might get better service from Washington State University or another smaller state university. WSU is located in Pullman, in eastern Washington, but the school now has a satellite campus in Vancouver and programs in other locations around the state.

**7. How should a Washington Biodiversity Project be funded? Should funding come from one or a mix of public and/or private sources?**

One business representative suggested that funding should all come from private sources, possibly thinking that there should not be a direct connection between this project and the regulatory programs managed by state agencies. However, the overwhelming majority of people interviewed felt that a Washington biodiversity initiative should be funded by a combination of federal, state and private sources. One state policy staff person suggested that a foundation or foundations should be asked to commit funding for the life of the project, with public and other private funds used when they become available. Most people were not very specific, although one state manager expressed that most of the funds should come from the private side. One conservation group representative thought that private money should be used to "prime the pump" and that public funds would follow. Almost nobody we interviewed thought that funding a Washington biodiversity initiative would be an easy task.



## APPENDIX VII

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### DATA ISSUES AND CONSIDERATIONS

Although GIS technology in Washington state is considerably sophisticated and wide-spread, and that vast amounts of information exist in many different agencies using common data structures, caution must still be used to ensure that data are used properly and that analytical procedures using these data are valid. Several important issues and considerations related to data compatibility and integration are discussed here because working with much of this information is still very complex, despite the commonalities, and these complexities and considerations directly affect the project's time frame and budget.

Some of the more important considerations are:

- i) **Geographic Scale** — Geographic scale is one of the most important considerations for any spatial analysis. This includes the scale of the original data capture, the scale of analysis, and the scale of representation. Understanding how scale has an impact on analysis can help prevent the information from being used in unintended and inappropriate ways. The digital nature of the information easily permits an unwary user to use the data at a scale for which it is not designed. This is probably one of the most common errors and misuses of GIS data.

Scale affects the level of generalization in the data. To illustrate, a 0.5mm line on a 1:1,000,000 map represents a half kilometer wide swath on the ground. Therefore, a feature such as a road or a boundary, which may be very narrow on the ground, is represented within a half kilometer accuracy on the map. On the other hand, a similar 0.5mm line on a 1:24,000 map represents a relatively narrow swath of only 12 meters. At small scales (e.g., 1:500,000 or 1:1,000,000), many small features or areas are eliminated in the generalization process. There is nothing technically to prevent an unwary user from integrating two such data sets in an analysis; however, the results are unreliable in terms of what is found on the ground. This is what often accounts for extremely divergent line and point representations in data sets from different sources. Consider as examples, line representations of coasts, islands and rivers don't coincide from one data set to the next; small coastal towns or coastal roads appear to be in the ocean; or small streams and rivers appear to meander in one data set but don't appear at all in another.

Therefore, one of the important considerations is to ensure that the scale of information supports the required scale of analysis.

- ii) **Temporal Dimension** — Some data sets capture a "picture" at a particular point in time and remain static. With no subsequent updates, the information becomes dated immediately. In some cases, this information remains valid for analysis; for example, when examining change in a condition over time, static information from an earlier time period is essential to the equation. But, the quality of analysis is greatly diminished if one uses historical information to assess current conditions (for example, using dated vegetation cover data to evaluate current habitat conditions).

Many data sets, however, are periodically updated as conditions change and as new data are collected. These data sets should also be considered carefully, because the updating regimen may not be regular and it may not be consistent across the entire geographic scope of the data set.

For a variety of reasons, including budgetary, staff resource availability, usage demand or management interest, some areas or regions may be kept more current than others, and with sporadic updating, the data set may no longer have the same consistent reliability over the entire geographic area. The collection of updated information is often delegated to regional authorities who are more closely responsible for local activities and programs; however, differing levels of commitment and skills on the part of regional management and staff often produces data of varying quality.

- iii) **Map parameters** — Maps are not only representations of geographic areas but also in many ways mathematical constructs. Mathematics plays a crucial role in transforming a three-dimensional world reality into a two dimensional conceptual map. Furthermore, the identification and description of geographic locations rely on quantification as defined by some sort of a coordinate system. Coordinates may then be represented on a physical map according to some projected transformation or in a digital form in a database.

The technical details of the mathematical transformations are of little interest to most map readers; however, they take on added significance for someone integrating different information in the context of a GIS spatial analysis. Not knowing the coordinate system in which data are stored, or not knowing the type of projection or the projection parameters of a map, makes it extremely difficult and time consuming to bring different data sets into a common frame of reference. A common reference system is essential to any spatial.

Therefore, good "metadata" (i.e., detailed information about a data set, including source information, projection system and parameters, when it was created and updated, etc.) is extremely helpful and saves the analyst a great deal of time and effort in integrating a data set into the analysis at hand.

- iv) **Data Quality** — While the quality and value of any spatial analysis is highly dependent on the knowledge and abilities of the analyst, it can only be as good as the quality of the information supporting it. The aforementioned issues can also be considered to affect the quality or "fitness for use" of data, but other factors are also important:

- Graphic Reliability — The graphic representation of geographic features on a map or in a GIS is by nature a generalization of reality and therefore inherently distorted. Depending on the scale and the quality of the representation, it may be more or less a close approximation to the real thing. Other graphic considerations are also important. To illustrate the potential problem, drainage patterns, with few exceptions such as in karst topography, are expected to show continuous, uninterrupted flow from higher elevations to lower elevations, and ultimately to the sea.

For a purely visual representation, it is not critical if the drainage lines are not contiguous, but for a GIS stream network analysis that uses a data set of drainage features that are not "connected" is very problematic. It becomes impossible, for example, to automatically delineate watersheds or to model stream flows.

To use a data set with such graphic deficiencies, often requires a great deal of time and effort on the part of the analyst to first "clean" the data. This may take months to "correct", or at least "patch", the errant graphic data. These kinds of data manipulations are often unexpected at the outset of a project and result in the project running significantly over budget and beyond the time schedule.

In some situations, the graphic features are simply interpretations of real world phenomena and may not have a distinctive representation on the ground. For example, the boundaries between soil classes or vegetation groups is seldom a sharp line as implied on a map; there is usually a gradation over space between soil classes and vegetation groups.

- Attribute Accuracy — There are two aspects in considering the accuracy of the way values are attributed to geographic features. The first, and easiest to describe, is simply whether or not a feature has been correctly recorded on the map or in the data set; usually these incorrect identifications result from human error at the data input stage. The second aspect is more difficult to assess, because it depends to a great deal on interpretation. Often times the definition of variables depends on a qualitative assessment and different analysts may describe certain phenomena, such as soil associations, differently.

An illustration to demonstrate how different interpretations could affect an analysis is where one agency would classify the land use according to their objectives and another agency would classify the same area according to a different use. One actual example (albeit outside Washington), had three different agencies classifying the same parcel of land in three different ways: agricultural, forestry, and grazing. Each agency had its own criteria for classifying the information; but, for an unsuspecting user, the resultant analysis could be greatly distorted.

Before using a data set, a GIS analyst should closely examine the data to ensure that it is consistent with the definitions used in the study and that it is consistent with definitions used in other data sets.

It is also important to note that secondary users of information can often be credited with improving data accuracy and consistency. In some cases, errors or inconsistencies in the data, which originated at the source agency, are corrected or modified by end users. In such cases, it

may be prudent to use the modified data from the secondary source rather than the original data set. However, when dealing with dynamic information or data that changes periodically, however, it is usually good practice to go back to the original source to take advantage of recent updates, instead of relying on second, third or fourth generation information. The quality of information, which has passed from user to user and has been subsequently modified, is difficult to assess unless the changes have been well documented and is acknowledged by the original providers.

## APPENDIX VIII

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### REVIEW OF BIODIVERSITY INFORMATION SOURCES

#### PRIORITY HABITATS AND SPECIES DATABASE

The Priority Habitats and Species Database (PHS) is a source of information, as the title suggests, for identifying important habitat areas and species distributions. The Washington Department of Fish and Wildlife manages this database. The metadata for this database describes it as follows:

The Priority Habitats and Species (PHSPOLY) Database consists of polygons that describe occurrences of priority habitats and species. Priority habitats are those habitat types with unique or significant value to many fish or wildlife species. Priority species are those fish and wildlife species requiring special efforts to ensure their perpetuation because of their low numbers, sensitivity to habitat alteration, tendency to form vulnerable aggregations, or because they are of commercial, recreational, or tribal importance. All priority species mapped areas represent known use areas; they are not potential habitats. PHSPOLY may include locations of federal and state listed species (threatened, endangered, sensitive, candidate) and other priority non-game and game species. Locational data are associated with tables detailing each priority habitat and species. PHSPOLY data are compiled by WDFW biologists using the best information available from research efforts, surveys, or field observations. The source of each delineated feature is described in the associated attribute tables. These data are not an exhaustive inventory of priority habitats and species for the State of Washington ([www.wa.gov/wdfw/hab/phspoly.htm](http://www.wa.gov/wdfw/hab/phspoly.htm)).

Data in the PHS database are compiled at a nominal scale of 1:24,000; however, locational accuracy of much of the data depends on how accurately the information is represented by the field biologist on the compilation map. Stated accuracy of information in this database ranges from within one-quarter mile to a general area.

This database is updated as new information becomes available. The overall accuracy of the information in the database is difficult to assess, because fish and wildlife are mobile and habitat conditions change. Much of the information is based on physical sightings, which means that the database indicates that a species is present. However, areas that do not show the presence of a species or habitat type does not necessarily mean that the species is absent, only that there have

been no observations of that species or habitat type. Because information in this database changes frequently, it is important that users ensure that they are working with the most up-to-date version.

PHS data are readily available upon request from the WDFW; however, WDFW screens the requests to ensure that revealing highly sensitive data about threatened or endangered species does not put the species at additional risk. The products from the PHS program include maps, typically at a scale of 1:24,000 (USGS 7.5 minute quad maps), and narrative summaries of sites and habitat areas. PHS maps and data are used by public agencies, as well as private developers, for siting new developments.

### **WASHINGTON NATURAL HERITAGE PROGRAM**

The Washington Natural Heritage Program (WNHP) is managed by the Washington Department of Natural Resources (WDNR). The Natural Heritage spatial data represents location and status information for rare plant species, high-quality terrestrial ecosystems, and high-quality wetland ecosystems within Washington ([www.wa.gov/dnr/htdocs/fr/nhp/refdesk/gis/fsgis.htm](http://www.wa.gov/dnr/htdocs/fr/nhp/refdesk/gis/fsgis.htm)).

The Natural Heritage database provides very valuable information; however, it too has many limitations and constraints. Although biological and species surveys continue, there are many areas of the state that have never been inventoried for special flora or fauna, and knowledge of the terrestrial and aquatic ecosystems in some areas is rather minimal.

As with the PHS data, positive indications of the occurrence of species in an area confirms that the species, at some point in time, has been present, but the contrary cannot be assumed. That is, if the database does not indicate the occurrence of a species in a particular area, it does not necessarily mean that the species is excluded. It may just mean that the area hasn't been surveyed or that no observations have been recorded.

Although great efforts have been made to standardize data collection and reporting of Natural Heritage data (for example, scientists are supposed to report information using the WNHP Rare Plant Sighting Form), there is still great variability in the procedures. Some regional biologists are very diligent in collecting and reporting new information, while others update data in their region more sporadically. While these data sets are extremely valuable, the data should be used only under careful consideration and review by a knowledgeable scientist and in consultation with WDNR staff to ensure that the limitations of the information are fully understood.

Most of the data have been mapped from 1:24,000 USGS quadrangles or from 1:12,000 orthophotos. The information is intended to be used at the 1:24,000 scale. Using it at smaller scales (i.e., 1:250,000) is possible, but many features may become too small to visualize or represent.

The WNHP data are distributed both in ArcView shapefile and ArcInfo Coverage formats. They include both a Current and an Historic data layer to help users identify changes over time.

The WNHP data are readily available from WDNR; however, WDNR insists on a licensing agreement to ensure that the information will be properly used, credited, and not widely dissemi-

nated to other third party users. This helps ensure that sensitive location data about high-risk species will not be divulged unknowingly, and that data users, if always required to go back to the source, will be ensured that they have access to the most current set of information.

### **WASHINGTON GAP PROJECT**

The GAP (**G**ap **A**nalysis **P**rogram-**A** **G**eographical **A**pproach to **P**lanning) data are based on an interpretation of vegetation types and habitat associations. The GAP program, funded by the Biological Resources Division of the USGS, is located with the Washington Cooperative Fish and Wildlife Research Unit at the University of Washington, and is closely associated with the WDFW ([www.wa.gov/wdfw/wlm/gap/dataprod.htm](http://www.wa.gov/wdfw/wlm/gap/dataprod.htm)).

The Washington State GAP program was part of a national effort in the early 1990s to map areas important for biodiversity across the United States. By mapping these areas and overlaying them with maps of places protected by public ownership, the hope was that conservation agencies and groups would focus their efforts on those gaps or unprotected areas that were important for biodiversity.

The GAP data contain coarse-scaled information about current land cover and vertebrate distributions. The land cover maps were derived from satellite Thematic Mapper (TM) images obtained in 1991. The distributions of vertebrates were developed from GIS models, based on the known limits of their ranges and habitat associations. Based on these habitat and vertebrate distribution maps, centers of species richness are derived, which can then be examined in the context of land ownership to determine appropriate strategies for protection and conservation. The stated intention is to determine critical habitat before it becomes critical, and before its fauna becomes endangered.

Information from the GAP program is extremely useful for national and regional assessments; however, the coarse nature of the data restricts its use for detailed analysis and planning. Much of the GAP mapping was done with a minimum mapping unit of 100 hectares, although the original TM satellite data has a finer level of detail. Because the GAP data are interpreted from satellite imagery at a fixed point in time, the data are static and do not reflect the dynamic changes in vegetation, habitat and land use over time. This is easily overcome (although at great expense), however, by acquiring more recent satellite imagery, creating maps of current land use and analyzing changes in spatial patterns.

### **WASHINGTON DEPARTMENT OF ECOLOGY**

The Washington Department of Ecology (WDOE) has extensive GIS capacity and spatial data on environmental factors contributing to water and air quality. There are nearly 20 proprietary data sets that have been created and are managed by WDOE, and they have direct access to nearly a hundred other data sets that have been created by other agencies. WDOE provides its data free of charge, except for a minimal service charge to cover costs of reproducing and distributing the data, but it does require a licensing agreement with data users. This agreement is basically to prevent unauthorized distribution of WDOE data for purposes other than those originally intended.

WDOE manages an excellent Internet website that gives users a summary view of the data, together with the associated Federal Geographic Data Committee (FGDC) formatted metadata, and allows users to download the information ([www.ecy.wa.gov/services/gis/data/data.htm](http://www.ecy.wa.gov/services/gis/data/data.htm)). All downloadable spatial data sets are provided in ArcInfo export formats.

## **WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**

The Washington State Department of Transportation (WDOT) also has extensive GIS capabilities and a well-managed Internet website, from which users can search over a hundred different data sets with the associated metadata, view summary images, and download data sets of interest ([www.wsdot.wa.gov/gis/geodatacatalog](http://www.wsdot.wa.gov/gis/geodatacatalog)). The WDOT has, in its data holdings, information related not only to transportation, but also information on political and administrative boundaries, public lands managed by WDNR, hydrology, environmental data managed by WDOE, species and habitat information managed by WDFW, as well as various GIS data sets produced by local county planning offices.

The scale of information of the many data sets varies from 1:24,000 to 1:500,000. The quality of the various data sets is also variable and needs to be assessed for its fitness for use on a case by case basis. As with data sets from other agencies, WDOT GIS data sets are also in ArcView and ArcInfo formats.

## **SALMON AND STEELHEAD HABITAT INVENTORY AND ASSESSMENT PROGRAM**

The Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP) is conducted by the Northwest Indian Fisheries Commission (NWIFC) in cooperation with WDFW. The program is a collaboration of 29 partners including state and federal agencies, academic and research institutions and private sector groups, including timber companies, and is designed to support regulatory, conservation and analysis efforts (see [www.nwifc.wa.gov](http://www.nwifc.wa.gov) and [www.nwifc.wa.gov/sshiap](http://www.nwifc.wa.gov/sshiap)).

SSHIAP collects data about the distribution of fish stocks and habitat conditions, including barriers to salmon migration, such as dams and impassable culverts. The methodological approach used by SSHIAP is first to delineate watersheds into discrete stream segments, and then identify current and potential fish distributions by SaSI stock. (SaSI, or Salmonid Stock Inventory is a standardized, uniform approach to identifying and monitoring the status of Washington's salmonid fish stocks). The SSHIAP approach also identifies and quantifies obstructed and degraded habitat, as well as the historical habitat.

Information is derived from aerial photographs, field surveys, existing databases, historical records and the expertise of tribal, state and other biologists. The nominal scale at which information is collected and represented is 1:24,000. The inventory data are stored and managed in Microsoft ACCESS format, allowing the information to be queried on watershed, stream basin, individual tributary or species basis. This information is integrated into a GIS database allowing mapping and spatial analysis.



SSHIAP currently covers Water Resource Inventory Areas (WRIAs) 1-23, which is primarily the western part of the state. Work is partially funded and underway to extend SSHIAP coverage to the eastern part of the state (i.e., WRIAs 24-62). WRIA boundaries are the watershed boundaries established by the State of Washington for planning and conservation purposes.

### **INTERIOR COLUMBIA BASIN ECOSYSTEM MANAGEMENT PROJECT**

The GIS databases managed by the Interior Columbia Basin Ecosystem Management Project (ICBEMP) were derived from source maps, air photos or acquired from other sources at scales ranging from 1:12,000 to 1:4,000,000. There are over 170 different GIS data layers or themes developed for this program, which focuses primarily on the upper Columbia River Basin east of the Cascades. Much of the information is derived from other data providers, including the USDA Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service, Environmental Protection Agency, U.S. Geological Survey, Bureau of Mines, Bonneville Power Administration, universities, state agencies, American Indian tribes and non-governmental organizations.

The ICBEMP overall program is well funded and considerable resources have gone to the development of the information support system. Although much of the base data has come from other sources, value has been added to the data sets by integrating them into common theme groups, resolving issues of data consistency, and creating new, derived information from analysis. Some of the derived information has been controversial and the accuracy questioned. For example, there has been criticism of the ICBEMP derived information about road densities and roadless areas. As with all data, before using any of the derived ICBEMP information, users should evaluate it in terms of its accuracy and its fitness for use.

The major theme groups organized by the ICBEMP include Aquatic, Atmospheric, Cultural, Fisheries, Hydrologic, Physiographic, Species Ranges, and Vegetation. Detailed information about all of the data sets, including thumbnail images and FGDC standard metadata can be obtained from the program's Internet website ([www.icbemp.gov/spatial/html/dathlp.html](http://www.icbemp.gov/spatial/html/dathlp.html)).

### **ECOREGIONAL CONSERVATION PLANNING PROCESS**

The Nature Conservancy (TNC) has initiated a national program to map natural communities that represent the diversity of life on earth and to use those maps and associated data to direct their own programs and influence other conservation efforts across the United States. The ecoregional plans are based on amended ecoregional units delineated by Bailey et al. (1995).

The Nature Conservancy of Washington has taken the lead within the larger TNC organization for developing an ecoregional conservation plan for the Puget Trough — Willamette Valley Ecoregion of Washington, Oregon and British Columbia. TNC is currently working closely with the Washington Departments of Fish and Wildlife, Natural Resources and Community Development to ensure that the Washington state component of the plan will be useful to those agencies in identifying critical habitats for protection and special management.

WDFW has invested significant funding and staff resources to this effort and indicates that the agency plans to use this ecoregional planning as a cornerstone of their overall effort to develop a State Wildlife Conservation Strategy for all wildlife species and habitats. WDFW is funding its

considerable participation in this ecoregional planning effort with a federal appropriation provided to state wildlife agencies by Congress in the FY2001 Commerce, Justice and State appropriations bill.

TNC relies heavily on geospatial information developed by primary sources, such as WDFW and WDNR and with some exceptions, does little primary data development. Value is added to much of the information that they use, in that they spend considerable effort in verifying and correcting data sets from other sources and new information is created from their analytical models. The Ecoregional Conservation Planning (ECP) project has already begun to develop ecoregional models, using the TNC methodology, and identify priority habitat areas for conservation and management.

Many of the useful geospatial and biological data sets have already been identified by this project and integrated into their analysis. If the Ecoregional Conservation Planning effort continues at its current pace and serious level of commitment, it will be one of the main, if not the main, building blocks for a larger Washington biodiversity initiative.

#### **AVAILABILITY OF HISTORICAL VEGETATION MAPS**

Historical vegetation maps are important to be able to establish a baseline of information about habitat types and vegetation distributions. Often, historical maps of vegetation don't exist, and in order to obtain a view of past conditions, an interpretation and backward extrapolation of past and current trends are required. The Biodiversity Project in Oregon had to go to great lengths to establish a baseline of historical vegetation, since at the time no adequate map existed.

For Washington state, some attempts have been made to create an historical vegetation map. The Northwest Habitat Institute (NWHI) has created an historical vegetation map at a scale of 1:1,000,000 with a resolution of 1kilometer. It represents vegetation at a point in time approximating the year 1850 (see website [www.nwhi.org](http://www.nwhi.org)).

The ICBEMP program has an historical vegetation map for Oregon and Washington dated circa 1936. The data set originated with the USDA Forest Service and is based on data captured from the 1936-37 Historical Vegetation Maps of Andrews and Cowlins. The data are intended for use at a broad scale; they are appropriate for regional level analyses, even analyses at a sub-basin or possibly a sub-watershed level. Metadata concerning the USDA Forest Service's historical vegetation data can be found on the website [www.icbemp.gov/spatial/metadata/veg/425.htm](http://www.icbemp.gov/spatial/metadata/veg/425.htm).

While these historical maps are recognizably coarse scale and interpretive, they are adequate to serve as a base of historical data, even though refinements related to scale or species classifications may be required as the biodiversity project progresses.

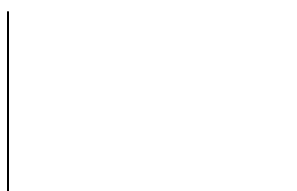
## APPENDIX IX

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### SENATE BILL 6400









## APPENDIX X

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### LIST OF ACRONYMS AND ABBREVIATIONS

BLM	Bureau of Land Management
CADD	Computer Assisted Drafting and Design
CBI	Center for Biological Informatics
CGIS	Cartographic and Geographic Information System
CJS	Commerce, Justice, and State appropriation bill
CREP	Conservation Reserve Enhancement Program
ECP	Ecoregional Conservation Planning
ELI	Environmental Law Institute
ESA	Endangered Species Act
ESRI	Environmental Systems Research Institute
FGDC	Federal Geographic Data Committee
GAP	Gap Analysis Program-A Geographic Approach to Planning
GIS	Geographic Information System
GMA	Growth Management Act
GRID	Global Resources Information Database
HPA	Hydraulics Project Approval
IAC	Interagency Committee for Outdoor Recreation
ICBEMP	Interior Columbia Basin Ecosystem Management Project
NAP	Natural Area Preserves
NAWCA	North American Wetlands Conservation Act
NBII	National Biological Information Infrastructure
NEPA	National Environmental Policy Act
NGO	Non-governmental Organization
NRCA	Natural Resource Conservation Areas
NRIS	Natural Resource Information System
NWHI	Northwest Habitat Institute
NWI	National Wetlands Inventory
NWIFC	Northwest Indian Fisheries Commission

P4PS	People for Puget Sound
PBI	Pacific Biodiversity Institute
PBRS	Public Benefit Rating System
PHS	Priority Habitats and Species Database
PSWQAT	Puget Sound Water Quality Action Team
REET	Real Estate Excise Tax
SEPA	State Environmental Policy Act
SMA	Shoreline Management Act
SRFB	Salmon Funding Recovery Board
SSHIAP	Salmon and Steelhead Habitat Inventory and Assessment Program
TM	Thematic Mapper
TNC	The Nature Conservancy
TPL	Trust for Public Land
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USFS	United States Forest Service
USGS	United States Geological Survey
WAGIC	Washington State Geographic Information Council
WCC	Washington Conservation Commission
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WDOE	Washington Department of Ecology
WDOH	Washington Department of Health
WDOT	Washington Department of Transportation
WNHP	Washington Natural Heritage Program
WOCD	Washington Office of Community Development
WRIA	Water Resource Inventory Area
WWRP	Washington Wildlife and Recreation Program



## APPENDIX XI

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### MAJOR LAND MANAGEMENT AGENCIES IN WASHINGTON AND ACREAGE OF LAND OWNED IN WASHINGTON

<b>Federal Agencies</b>	<b><u>Acres</u></b>
USDA Forest Service	9,189,418
National Park Service	1,831,283
Bureau of Reclamation	480,149
Dept. of the Army	404,313
Bureau of Land Management	395,929
Dept. of Energy (Hanford Nuclear Reservation)	363,612
<b>State Agencies</b>	<b><u>Acres</u></b>
Dept. of Natural Resources (upland)	2,975,136
Dept. of Natural Resources (tidelands/aquatic)	2,407,000
Dept. of Fish and Wildlife	461,036
Dept. of Transportation	152,464
State Parks and Recreation Commission	107,619
<b>Indian Tribes</b>	<b><u>Acres</u></b>
Yakima Nation	1,152,945
Colville Confederated Tribes	1,119,269
Quinault Nation	181,488
Spokane Tribe	131,787