

Action Plan



The Washington Comprehensive
Monitoring Strategy For Watershed
Health and Salmon Recovery

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In 2001, Governor Locke signed into law Substitute Senate Bill (SSB) 5637, an act relating to monitoring of watershed health and salmon recovery. This law requires the Monitoring Oversight Committee (MOC) to develop a comprehensive statewide strategy for monitoring watershed health, with a focus on salmon recovery. The law incorporates monitoring recommendations provided by the state's Independent Science Panel in its report to the Governor and Legislature in December 2000¹. The law also requires development of a state agency action plan that phases in full implementation of the Strategy by June 30, 2007. Because our legislated task was to fully implement the Strategy by 2007, the high priority monitoring needs have been identified for potential funding in the 2003-05 biennium and the medium priority monitoring needs have been identified for 2005-07 or later biennia. Given the current economic conditions, the Governor and Legislature may need to evaluate the costs versus risks associated with partial or full implementation of the Strategy by 2007. If partial implementation is all that can be accommodated at this time, the Strategy can be used as a blueprint for the future as more funds become available.

The Strategy is expressed in three related documents. These are:

- Volume 1 – Executive Report
- Volume 2 – Comprehensive Strategy
- Volume 3 – Action Plan

Volume 1 is a brief overview of the Comprehensive Strategy and the Action Plan and explains the overall process employed by the MOC.

Volume 2 includes all of the specific information required by SSB 5637 that could be collected in the time provided. It is a compilation of the work of many experts from a variety of agencies and contains detailed descriptions of statistical precision, sampling designs, and other scientific information.

Volume 3, this Action Plan, is designed to indicate costs, priorities, and timelines for implementation of the Strategy.

The intent of the law is to promote “a framework of greater coordination of existing monitoring activities; [...] monitoring activities most relevant to adopted local, state, and federal watershed health objectives; and [...] the exchange of monitoring information with agencies and organizations carrying out watershed health, salmon recovery, and water resources management planning and programs.”

This Action Plan should not be a static document. It has been designed to be responsive to evolving needs and changing priorities. Implementation of the Action Plan over the next several years will produce new ideas and ways of monitoring our successes in protecting and restoring the natural resources of this state. This Action Plan will provide scientifically valid evaluations of the health of our habitat, water, and fish resources, and is intended to be consistent with requirements of the Endangered Species Act (ESA) and the Clean Water Act (CWA).

¹ *Independent Science Panel Report 2000-2: “Recommendations for Monitoring Salmonid Recovery in Washington State”*

Introduction

Implementation of this Action Plan will generate information for use by local watershed groups, regional organizations, agencies, tribes, and other partners. Although a range of different types of actions is included, the Action Plan emphasizes state agency activities and budget considerations for which the legislature has direct influence.

Implementation of the Action Plan will:

- Resolve important scientific, policy, and management questions using an **adaptive management approach**; (*Section I, Adaptive Management and Governance*)
- Ensure **monitoring information is accessible** to the public and all levels of government; (*Section II, Accessible Monitoring Information*)
- **Evaluate and account for the state's investments** in watershed health and salmon recovery actions; (*Section III, Accountability for Restoration Investments*) and
- **Determine trends** in fish, water, and habitat conditions (*Section IV, Monitoring Salmon and Trout*)

The Action Plan concludes with recommended high priority needs and medium priority needs for full implementation of the Comprehensive Monitoring Strategy (CMS). Under the description for each action item a biennial cost estimate is provided and the projected future cost when the cost would be carried forward into future biennia. Where no costs are identified, the item is identified as able to be implemented with current funding and Full Time Equivalents (FTE).

The Action Plan has identified \$54 million dollars per biennium in current monitoring activities crucial to measuring progress in watershed health and salmon recovery. The Action Plan identified 22 action items considered a high priority for funding and at a cost of \$19.9 million. The high priority action items were ranked based upon the following criteria:

- Does the proposed action build a monitoring foundation (protocols, data, etc.)?
- Is it necessary for federal assurances under ESA and CWA?
- Is it an efficient use of existing monitoring?
- Does it give the highest return on the investment (cost/benefit)?
- Does the monitoring relate to agency mandates?
- Does the proposed monitoring fill a monitoring gap/baseline?

In order to be comprehensive, as required by the legislation, additional medium priority monitoring actions could also be funded in future biennia. To comply with SSB 5637, full funding of the comprehensive Strategy would occur by 2007. This may not be realistic and/or necessary. If the elements of this Strategy are implemented carefully, and if the high priority items (especially the top ten) are addressed, future savings and reprioritizations may be possible.

The overall costs to implement the Action Plan items can be summarized in the Table below by major categories and by high and medium priority action items.

Category	Subcategory	High Priority	Medium Priority	Total
Adaptive Management		\$300K	\$0K	\$300K
Information Sharing		\$2,830K	\$3,953K	\$6,783K
Accountability For Restoration and Protection Actions	Habitat	\$2,432K	\$2,110K	\$4,542K
	Water	\$0K	\$48,575K	\$48,575K
	Fish	\$0K	\$0K	\$0K
Measuring Status of the Resource	Habitat	\$5,180K	\$9,320K	\$14,500K
	Water	\$5,670K	\$25,250K	\$30,920K
	Fish	\$3,465K	\$6,540K	\$10,005K
TOTAL		\$19,877K	\$95,748K	\$115,625K

Action Plan Notes

- All costs are in thousands of dollars, unless otherwise specified.
- Line Items are listed in “Implementation Schedule” on page 45.

The Action Plan has been divided into four sections to specifically address adaptive management, access to monitoring information, accountability for state investments, and determining trends in fish, water, and habitat. Within each section are items listed as “Essential Current Monitoring Actions”. These are ongoing agency actions that are an essential part of a monitoring strategy. If monitoring were being designed for the first time, they are among those things that would be implemented first. All identified current monitoring activities are not included as essential.

Also listed within each section are “Recommended New...Activities”. These are new activities currently not funded or implemented, but considered important in implementing a comprehensive monitoring strategy. In some cases they are additions or clarifications to items identified under “Current Monitoring Actions”.

When “Essential Current Monitoring Actions” and “Recommended New...Activities” are taken together, comprehensive monitoring is achieved for the section.

Adaptive Management & Governance Actions

Section I

The purpose of this portion of the Action Plan is to propose action items that will integrate information into decision-making, as required by SSB 5637.

Essential Current Monitoring Actions

1. State of Salmon Report

The Governor's Salmon Recovery Office (GSRO) currently publishes the State of Salmon Report (RCW 75.85.020). It may report the following information:

- A description of the amount of in-kind and financial contributions directly spent on salmon recovery
- A summary of the role of volunteers
- A summary of harvest and hatchery management affecting salmon recovery
- A summary of information regarding impediments to successful salmon recovery
- A summary of the number and types of violations of existing laws pertaining to water quality and salmon, including sanctions imposed for the violations
- Information on estimated carrying capacity of new habitat created
- Recommendations that would further the success of salmon recovery

This information should be continued but expanded. **Cost is \$30K/biennium.** See item 2 under Recommended New Governance Actions below.

This report has proven to be very useful for legislative staff and others interested in state agency performance. It is produced by the GSRO each biennium and represents the state agency implementation plan for the *Statewide Strategy to Recover Salmon*. For governance and adaptive management benefits, this publication should be continued and enhanced. See item 3 under New Governance Actions below. **Cost is \$5K/yr.**

2. Salmon Recovery Scorecard

The Salmon Recovery Scorecard was developed by the Joint Natural Resources Cabinet (JNRC) and is tracked by the GSRO. It is a mix of social and biological indicators that track state agency progress towards achieving their goals in salmon recovery. Although it contains 39 indicators, only 17 are active and funded. This report should be continued. **Cost is \$3K/yr (report only).**

3. Statewide Integrated Assessment Report

The federal Clean Water Act requires Washington State to periodically assess the support of the beneficial uses of all surface waters in the state. The assessment is required to use "all available" information including data on water quality, habitat, and aquatic life, including salmon. The assessment identifies waters meeting all tested standards, waters of concerns, waters impaired by non-pollutants, and waters that require additional pollution controls. The assessment is used for planning specific management actions and to advise policy development. This report should be continued.

Adaptive Management & Governance Actions

Recommended New Governance Activities

These action items, if implemented, should firmly institutionalize monitoring and the “adaptive management” process. The goal is that they are accepted as routine ways of managing habitat, water, and salmon. They are drawn from Part IV of the Comprehensive Monitoring Strategy (Volume 2). The recommended action items are:

- (1) Create a Watershed Monitoring Council,
- (2) Establish State Watershed Health Report Card, and
- (3) Institutionalize the State Agency Action Plan.

1. Create a Permanent Watershed Monitoring Council

A standing oversight group should be established as soon as possible to provide a central point to sustain development, coordination, and dissemination of scientifically sound water, habitat, and salmon related data and information. This oversight body would focus monitoring activities and report on implementation. It would provide the bridge between local watershed monitoring actions and state and federal actions. A model structure and the duties of a permanent Watershed Monitoring Council (WMC) is described below.

Roles and Functions

A permanent WMC would:

- Be a forum for addressing continuing policy and technical issues related to monitoring.
- Encourage and ensure completion of missing elements of the Strategy. The Strategy has attempted to provide a comprehensive approach to monitoring in the time provided by statute. Some elements have, necessarily, not been completed due to the short timeframe².
- Ensure the implementation of the proposed common framework for data and information management so that there is transparency of data for other agencies and the public.
- Assist the progress of agencies’ work to implement their monitoring work plans, performance measures and an adaptive management framework. Assist with coordinating related budget requests.
- Promote inter- and intra- state coordination and communications.
- Recommend government actions designed to consolidate, simplify, and make more efficient state monitoring.
- Provide a forum to coordinate and incorporate local watershed monitoring efforts with statewide efforts. A process would be developed that would permit watershed and region staff to enter data directly into certain state databases. This option would most clearly have the capability of implementing the Strategy and appropriate elements of the Adaptive Management Framework.
- Provide synthesized statewide reporting of environmental monitoring. The Council would publish a biennial Washington State Watershed Health and Salmon report card. The report card’s format could be similar to those developed by the Chesapeake Bay Program and by the State of Maryland’s Environmental Indicators report.

² *These include reaching agreement on sampling protocols for habitat and salmon indicators, data sharing protocols, establishing benchmarks, etc. for some areas of monitoring, and meeting some areas of concern expressed by the Independent Science Panel.*

Adaptive Management & Governance Actions

Structure

A Council should:

- Be established by law.
- Be supported by at least one professional-level staff.
- Report to policy and funding entities as requested, as well as to the public.
- Convene on a regular schedule.
- Be funded by state appropriations, but could apply for monitoring funding from the state and federal funding entities for its activities and for the monitoring activities of others.
- Be chaired by a citizen at large with no vested interest in monitoring activities of any state agency.
- Be housed in a neutral organization that has no direct ties or interest in the outcomes of any specific monitoring report or analysis, and has a reputation for accuracy and integrity. This could be an organization such as the Office of the State Auditor or Washington State Office of the Forecast Council, Office of Financial Management (OFM), Interagency Committee for Outdoor Recreation (IAC), and/or the GSRO.
- Consist of nine voting members and other non voting advisors. Voting members could include representatives of the: Department of Ecology (ECY), Department of Fish and Wildlife (WDFW), Department of Natural Resources (DNR), IAC, and Puget Sound Action Team (PSAT). The Governor should appoint the Chair of the WMC, and two citizens at large and a representative from the Washington treaty tribes. The US Environmental Protection Agency (USEPA), US Fish and Wildlife Service (USFWS), US Forest Service (USFS) and the National Marine Fisheries Service (NMFS) would advise the WMC as needed. The Independent Science Panel (ISP) or a similar entity would provide independent periodic review of WMC products.

Note: All costs are expressed in thousands of dollars

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
1	High	Create a Watershed Monitoring Council	250	250

2. State Watershed Health Report Card

WHAT: Publish a biennial state watershed health report card. The report card’s format could be similar to those developed by the Chesapeake Bay Program and by the State of Maryland’s Environmental Indicators report. The report card should be available at the state’s proposed data portal for those wishing more technical information. **Cost is \$50K.** It should contain four parts:

- Information already required in the State of Salmon Report, including statewide salmon abundance, productivity, distribution, and genetic diversity.

Adaptive Management & Governance Actions

- Watershed health information, including
 - Summary of water quality information from the EPA-Ecology Performance Program Agreement, including biological indicator information, and toxic contamination information;
 - Water quantity and flow conditions for each of the state’s watersheds, including hydrographs and relevant adopted performance measures;
 - Minimum instream flow requirements established and implemented;
 - Water resource project information, such as diversions and storage;
 - Land use and land cover data, including impervious surface area;
 - Population data;
 - Road and road decommissioning data;
 - Riparian condition;
 - Riparian protection; and
 - Aquatic habitat connectivity information.
- Information from watersheds to provide a more complete accounting of all water-related aspects of “watershed health.” Watershed councils that want to implement resource development and habitat restoration actions may want to create a permanent information management system that allows them to track progress toward their respective goals, while allowing for analysis of local status and trend information. They may also want to create and record a baseline of watershed information. Data from these watersheds could be included in the state report.
- Indicators from the Salmon Recovery Scorecard. The report card could also integrate Puget Sound Ambient Monitoring indicators to provide a comprehensive watershed perspective for this region.

BENEFITS FOR THE RESOURCES & PUBLIC UNDERSTANDING: Creates web accessible consolidated information on watershed health and salmon recovery.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
2	High	Combine status reports into Watershed Health report card	50	50

3. State Agency Action Plan

WHAT: Provide for continued development and reporting of performance measures in the State Agency Action Plan.

BENEFITS FOR THE RESOURCES & PUBLIC UNDERSTANDING: This report has proven to be very useful for legislative staff and others interested in state agencies’ performance.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
3	High	Continue State Agency Action Plan	0	0

Summary of Adaptive Management and Governance Costs

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
1	High	Create a Watershed Monitoring Council	0	0
2	High	Combine status reports into Watershed Health report card	50	50
3	High	Continue State Agency Action Plan	0	0
TOTAL			300	300

Access to Monitoring Information

Section II

The key monitoring question addressed in this portion of the Action Plan is:

- How can monitoring information be effectively shared and coordinated with the public and all levels of government?

The ability to obtain monitoring information, evaluated data, and reports in a timely and complete manner has been a key problem for state agencies and for the Governor’s Office and Legislature. The action items listed here provide a strong foundation that will lead to coordinated agency reporting, uniform monitoring protocols and data. It will provide for mutual data entry and sharing between state agencies, salmon recovery regions, and watershed entities. And, most importantly, it will allow timely Internet Web-based access. The MOC, through its public outreach process, heard clearly that the users want access to credible information in a timely manner and accessible through the Web. The MOC also heard that users want the ability to use and enter data into statewide databases rather than going to the expense of creating their own systems.

Implementing a comprehensive state data sharing system is outlined in the figure below and discussed extensively in Part V of the CMS Volume 2:

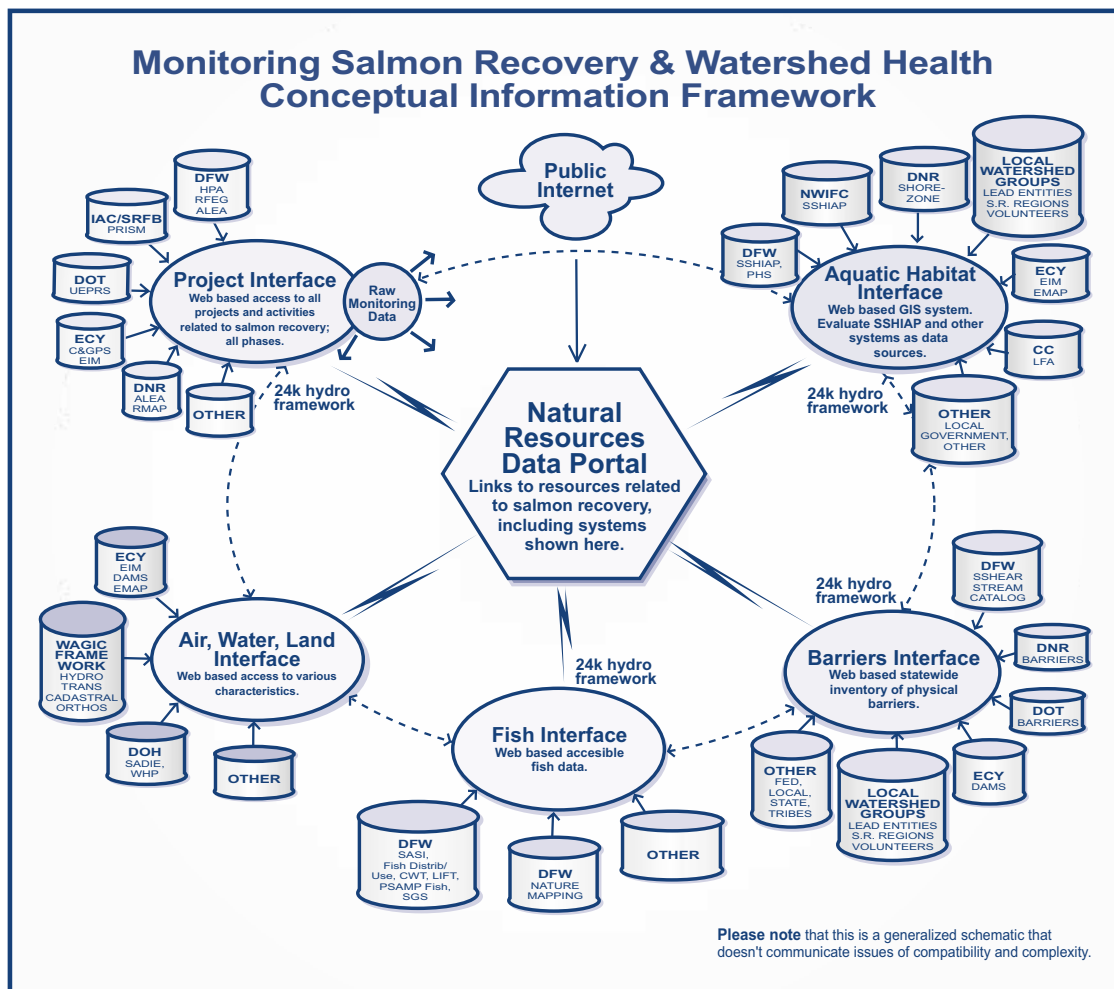


Figure 1. Washington Universal Interfaces and Web Portal

Access to Monitoring Information

Essential Current Monitoring Databases

The following is a brief list of state agency databases (and associated users) that are considered essential to tracking watershed health and salmon recovery. Some of the databases need improvements. These changes are discussed under Recommended New Information Systems.

WA Department of Natural Resources

Hydrography Database – Provides a statewide Geographic Information System (GIS) data layer of surface water features for data analysis and mapping in support of natural resource management. Utilized by DNR staff, Timber/Fish/Wildlife participants and other state, federal, private, agencies, organizations and individuals. Major data development work was initiated in Fiscal Year (FY) 02-03, funded through an approximately \$1,300,000 federal appropriation. Maintenance costs for this data layer are discussed in “Recommended New Information Systems” on page 15.

Transportation Database – The Transportation Database, a DNR GIS data layer, serves as a corporate repository for information on Transportation Routes, with the greatest emphasis on DNR forest roads and trails and private forestlands. Users include DNR land managers/planners, field foresters/engineers/ biologists, Forest Practices staff and wild land firefighters. Outside DNR, other natural resource agencies, private forestland owners, local jurisdictions, and environmental organizations use the database. Major data development work was initiated in FY02-03, funded through an approximately \$574,000 federal appropriation. Maintenance costs for this data layer are discussed in “Recommended New Information Systems” on page 15.

Landslide Inventory and Hazard Zonation – The Landslide Hazard Zonation project (LHZ) will result in two databases, LSI and HaZone. Both GIS-based databases are in the compilation phase at present. LSI is a coverage of mapped landslide locations with their associated tabular data. HaZone is a coverage of mapped landforms, hazard (e.g., inner gorge, high hazard), and associated tabular data. The LHZ project is explicitly mentioned in the Forests and Fish Report, Appendix C, Section III, bullet (f). The LHZ project is in the Cooperative Monitoring, Evaluation and Research (CMER) group workplan under the Mass Wasting Strategy. Both of these database development projects have been funded through the Forests and Fish initiative. Combined project costs are estimated to be 2.195 million dollars through the end of calendar year 2006. Land managers, regulators, researchers, and monitors will use these databases.

Nearshore Habitat Database – The Nearshore Habitat Program inventories and monitors intertidal and shallow subtidal habitats throughout the state, with a focus on Puget Sound. The program is one of eight research components within the Puget Sound Ambient Monitoring Program (PSAMP). There is a broad range of audience/customers. The general public is interested in status and trends information. State, federal and local scientists and managers are interested in status and trends information and in data to improve land management. (Costs are included under Section IV, I “Essential Current Monitoring Activities - Nearshore Marine Habitat Status and Trend Monitoring.”)

Department of Ecology

Environmental Information Management (EIM) System – Primary data repository for managing environmental monitoring data. This system stores physical, chemical, and biological monitoring data, including geographic location of the station where a sample was collected, detailed project information, and information about the quality of the data. Over a million result records have been input to this system representing over 215 studies and 6,000 locations.

Access to Monitoring Information

Puget Sound Ambient Monitoring Program – Sediment Component – The purpose of the PSAMP Sediment Component work is to characterize spatial and temporal trends in the condition of the sediments of Puget Sound via analysis of sediment chemistry, toxicity, and infaunal benthic community composition. Used by all users of Puget Sound sediment data.

Marine Waters Monitoring for Puget Sound Ambient Monitoring Program – Designed to assess water quality of marine waters in the state of Washington. Used by the public, scientists from government, private and academic institutions.

Stream Flow Monitoring Program – Designed to maintain data on stream flow in fresh water rivers and streams in the state of Washington. Used by the public, legislature, state, federal and local officials, private consultants, scientists from government, private, and academic institutions.

Long-term Freshwater River and Stream Ambient Monitoring Program – Assess water quality of fresh water rivers and streams in the state of Washington. Used by the public, legislature, state, federal, and local officials, private consultants, scientists from government, private and academic institutions.

Nonpoint Source Pollution Studies – Database maintained for monitoring and assessing effects of nonpoint source pollution on surface and ground waters statewide. Used by citizens and their legislative representatives, state and local government officials, business and environmental interest groups, tribes, and USEPA.

Total Maximum Daily Load (TMDL) Studies – Database maintained for monitoring and assessing state surface waters to determine pollutant load reductions needed to achieve compliance with state water quality standards. Used by citizens and their legislative representatives, state and local government officials, business and environmental interest groups, tribes, and USEPA.

Toxic Pollution Studies – Database maintained for monitoring and assessing water, sediment, soil, and fish/shellfish tissue statewide to determine toxic pollutant burdens. Used by citizens and their legislative representatives, state and local government officials, business and environmental interest groups, tribes, and USEPA.

Department of Fish and Wildlife

Fishery Monitoring/Coded Wire Tag (CWT) Recoveries – The database provides counts of the observed and estimated numbers of returning coded-wire tagged salmon and steelhead harvested or collected in Washington waters. Data are used by fisheries and hatchery managers for calculating survival of fish stocks and for assessing stock composition in mixed-stock areas. Cost is \$72K/yr.

Marine Bird and Mammal Component of the Puget Sound Ambient Monitoring Program (PSAMP Bird/Mammal) – The purposes of the marine bird and mammal component of PSAMP are to evaluate trends, distribution, and abundance of select species of marine birds and marine mammals utilizing Puget Sound, and to contribute information to assess the overall health of the populations. Requests for PSAMP marine bird and marine mammal data have arisen from a mixture of agencies, universities, public, and non-governmental organizations (NGO). Most recently, these have included government entities such as Canadian Wildlife Service.

Access to Monitoring Information

Smolt Monitoring (SM) – Database used to store annual freshwater production estimates of selected species and stocks of wild salmon. Used by the fishery co-managers, state/federal/local government agencies.

Washington State Fish Passage Barrier and Surface Water Diversion Screening Database (SSHEAR) – Includes data compiled from several WDFW and non-WDFW barrier and screening inventory efforts. The data are statewide in scope but do not represent a comprehensive or complete inventory. Data are updated continually as inventory efforts are ongoing. The data may be used by any group interested in salmon and habitat recovery. Data have been provided to Salmon and Steelhead Habitat Inventory and Assessment Project (SSHIAP), Conservation Commission (CC) limiting factors analysis, regional fisheries enhancement groups, counties, cities, tribes, etc. Cost is \$397K/yr. Legal mandate: Interagency commitments with agencies, local governments, tribes.

Salmonid Stock Inventory Database (SaSI) – The SaSI database contains information on salmonid stock identification, stock status and life history in Washington State. This information can be summarized to track the progress of recovery efforts throughout the state. SaSI and the SaSI database have a broad audience, including both WDFW staff and external customers. Such customers include federal agencies (particularly the NMFS, USFWS, and the USDA Forest Service). Cost is \$51K/yr. Legal mandates: U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty.

Commercial Fish Tickets (LIFT) – Database contains all commercial fishery products landed in the state of Washington. Users of commercial fish harvest numbers, fishing effort, species composition, fishery value data. Cost is \$72K/yr. Legal mandates: U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; Section 7 and 10 ESA authorities; NMFS 4(d) Rule/FMEPs; U.S. District Court Stipulation and Order Concerning Co-management and Mass Marking (1997).

Puget Sound Ambient Monitoring Program Fish Component (PSAMPFC) – Database contains information necessary to monitor the status and trends of fish health in Puget Sound. This Component fits into the larger PSAMP effort, which is focused on ecosystem health. Monitors temporal and spatial trends of toxics, and effects from exposure to toxins. Used by trained lay people, legislators, natural resource and health agency managers, and the scientific/technical community. Legal mandates: Interagency commitment/PSAMP; Legislative Proviso.

StreamNet Fish Presence/Use Data – A statewide GIS layer database of salmonid presence, spawning, and rearing reaches compiled onto the 1:100,000 resolution routed streams layer for Washington State. These data represent extrapolated fish presence and use. Users of salmonid presence/use data include WDFW, other state agencies, federal, local and tribal entities, consultants, private land managers, watershed groups, etc.

Sport Catch Estimates from catch record cards (Sport CRC) – Contains annual post harvest estimates of salmon caught by recreational anglers. The estimates are produced using the harvest reported on sport catch record cards which are required to be returned to WDFW at the end of the fishing year. Used statewide by salmon managers, tribes, GSRO. Cost is \$316K/yr. Legal mandates: U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; Section 7 and 10 ESA authorities; NMFS 4(d) Rule/FMEPs; U.S. District Court Stipulation and Order Concerning Comanagement and Mass Marking (1997).

Puget Sound Sampling Program/Ocean Sampling Program (PSSP/OSP) – Contains sport and commercial salmon fish sampling data for state marine waters and sampling for sport caught marine fish in state marine waters. Used by WDFW, NMFS, treaty tribes, PSMFC.

Access to Monitoring Information

Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP) – Contains salmon habitat and salmon distribution data in Washington. It is the mission of the SSHIAP to provide a statewide, long-term information system that assembles, synthesizes and delivers detailed salmon information. SSHIAP delivers data and summary statistics for a wide range of users. The predominant audience is natural resource managers, data programs, scientists, and groups involved in the recovery planning, restoration, monitoring and mitigation of aquatic systems.

There are currently two versions of the SSHIAP database, one managed by Northwest Indian Fisheries Commission (NWIFC) covering WRIAs 1-23 and one managed by WDFW for WRIAs 24-62. They were designed and are managed under different funding sources with a focus on the needs of slightly different customers. Primary differences are in segmenting methodologies, attributes and data storage. It is possible and essential that these two versions be combined into one consistent and accessible version. The segmentation, attribute, and storage issues can be resolved so that SSHIAP becomes a valuable statewide habitat data management tool. Legal mandate: RCW 77.85 Salmon Recovery Act.

Salmonid Spawning Ground Survey Database (SGS) – The SGS is built from a series of seasonal, systematic surveys of both index and “supplemental” stream sections for evidence of adult salmonid spawning activity. This database contains historical and current data. Information from both the database and the resulting escapement estimates is used by harvest managers, stock biologists, international salmon management technical committees, modelers, and others from state, federal, tribal and local entities. Cost is \$10K/yr.

Hatchery Database - Tracks hatchery release and capture (return) data. Natural resource managers, recreational anglers, local jurisdictions, tribal governments, and state and federal agencies utilize the database. Cost is \$350K/yr. Legal mandates: U.S. v. Washington; U.S. v. Oregon; HCP commitments; Lower Snake River Compensation Plan; Mitchell Act Mitigation; General Hydropower Management Agreements; ESA Section 7 and 10 authorities; NMFS 4(d) Rule/HGMPs.

Hydraulic Project Approval Database (HPA) – The Department is mandated to review and approve projects or activities that occur within state waters so that impacts to fish and aquatic life can be mitigated. The HPA program receives and processes applications for projects within the waters of the state. When an application has been received and reviewed, data related to the application are captured in the HPA database. Data captured include detail about who is conducting the activity, the location, and the physical attributes of the project activity. Current cost to maintain per biennium = \$220,000 (\$110K/yr). The HPA process is under review and is listed under “Recommended New Information Systems” for upgrading.

Volunteer Nature Mapping Database – The Nature Mapping Program is a hands-on, environmental biodiversity research and education program that teams scientists and educators with the public to: engage the general public in appreciation of their natural world and of the fish and wildlife with whom they share it; advance scientific knowledge of regional habitats through unified data collection, subsequent analysis, and mapping; facilitate informed land-use decisions and ecological health monitoring by providing expanded data for improved regional planning. It is recommended that the Nature Mapping Program provide the delivery system for volunteer involvement in salmon recovery for the Strategy.

Access to Monitoring Information

Recommended New Information Systems or Data Related Actions

1. Data Coordinator Position

WHAT: A permanent full time Natural Resources Information Coordinator should be established in 2003.

BENEFITS FOR THE RESOURCES & PUBLIC UNDERSTANDING: This leadership position is essential to successful implementation of data sharing strategies. Tasks would include coordinating the monitoring data team (maintaining standards and protocols, refining metrics, etc.), promoting data standards, data integrity, and data sharing, communicating with staff from all levels of government and public, coordinating with other portals, clearinghouses, and Web based systems, coordinating the portal team (prioritizing enhancements, dealing with funding or management issues, etc.), promoting use of portal and other tools, and working for continuing executive support for data coordination tools and strategies. A “neutral” agency should be utilized to manage the Information Coordinator position, possibly Department of Information Services (DIS), OFM, or IAC or the WMC.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
14	High	Data Coordinator Position	200	200

2. Worldwide Web Portal (Internet accessible information)

Phase 1 – Basic Links

WHAT: A basic Web Portal is being constructed in the fall of 2002. A portal is an Internet web interface to a variety of distributed data, information, and tools. A Salmon and Watershed Information Management Technical Advisory Committee (SWIM TAC) Data Portal Action team was formed to develop the decision package with a budget of \$200,000 to plan and develop a Natural Resources Data Portal in fiscal years 2002 and 2003. Planning and scoping of the portal was done during May through July 2002. Technology Pool funds will be used to make the following datasets downloadable from agency web sites, linked to the portal: DNR, Watershed Administrative Units (WAU), DNR Major Public Lands (MPL), DNR Soils, SaSI (already in progress), and DNR Geology.

DIS or IAC/SRFB will host the portal. Hosting tasks include providing server space, managing the network, researching and installing software patches and service packs, monitoring server status, maintaining/monitoring server security, monitoring log files and tuning databases.

During design and development of the Phase 1 Web Portal, the Monitoring Data Development Group will continue working with federal, local, and tribal partners to establish data sharing plans and methods. These relationships will set the stage for the automated tools to be designed in the next biennium.

The Phase 1 Portal includes links to and information about individual datasets. It does not provide consolidated reports or analysis tools.

BENEFITS FOR THE RESOURCES & PUBLIC UNDERSTANDING: The Phase 1 Portal will be a single place to discover, learn about, and access individual datasets related to Washington State natural resources and salmon recovery efforts. It can grow as data and products become available. Data types such as spatial, tabular, text, and graphics can be accessed through the portal. The portal will link to geographic layers, features, raw and analyzed data, monitoring plans and reports, and organization information. Users can then download or request copies of data.

Access to Monitoring Information

Phase 2 – Canned Maps and Reports

WHAT: Construct Phase 2 of the portal in the 2003-05 biennium.

BENEFITS FOR THE RESOURCES & PUBLIC UNDERSTANDING: Would enhance Phase 1 by creating useful analysis tools. Maps, graphs, and reports would answer frequently asked questions about salmon recovery and watershed health. A small data warehouse would provide download capabilities for data that is not available at a data source site.

Phase 3 – Interactive Maps and Reports

WHAT: Construct Phase 3 of the portal in 2005-07. In Phase 3 the Data Portal becomes the Statewide Universal Data Interface. See the following sections for details.

BENEFITS FOR THE RESOURCES & PUBLIC UNDERSTANDING: Provides interactive maps and distributed queries which will allow users great flexibility and response to individual needs.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
15	High	Build Phase 1 of Web Portal – FY2003	200	48
33	Medium	Build Phase 2 of Web Portal	450	220
38	Medium	Build Phase 3 of Web Portal *	0	0
TOTAL			650	268

* Costs included under Statewide Universal Data Interface section.

3. Statewide Universal Data Interface (Phase 3 of Data Portal)

Figure 1, page 13 represents a framework of universal data sharing and analysis. Many agencies recognize the need to integrate project, habitat, and monitoring data for the purpose of reporting on watershed health and supporting decisions about future watershed investments. The proposed Statewide Universal Data Interface will involve more than links and information about individual datasets which are provided in Phase 1 and 2 of the Data Portal. The Data Interface adds real time access to distributed data, overlaying of multiple datasets into online maps, and other analysis tools like graphs and reports. It can reduce duplication of effort, improve efficiency, and provide consolidated information that is just not available today. It requires a close partnership between agencies at every level.

Individual agencies (state, federal, local, tribal, and private) will continue to manage their own data, but give others the ability to access it for viewing from the universal interface. Appropriate filters and security will be applied.

Additional efficiency will be gained if a data entry interface is provided for local, tribal, and private partners. They would like a single interface to all state-managed natural resources and salmon recovery monitoring data. Appropriate quality assurance processes will be designed. The interface will go through several deployment steps from FY 2004 on.

Access to Monitoring Information

Feasibility Study

WHAT: Complete a Feasibility Study in FY2004 to define the needs, vision, scope, users, risks, solutions, and costs of a statewide universal data interface. Analyze requirements for mapping, reporting, and analysis. Evaluate existing systems for sources of data and software components. Design architecture to support access to a network of distributed databases.

This phase will evaluate current and future collaboration between agencies at every level.

BENEFITS FOR THE RESOURCES & PUBLIC UNDERSTANDING: Develops the overall costs and scope of the project; determines feasibility.

Pilot

WHAT: Build a pilot project of the statewide Universal Data Interface in FY 2005.

BENEFITS FOR THE RESOURCES & PUBLIC UNDERSTANDING: Use the pilot project to test concepts and to refine the design scope, implementation plans, architecture design, and cost estimates for future phases. Test the data sharing agreements proposed in the Feasibility Study. Determine to what extent data sharing is actually feasible. Coordinate with federal system development projects.

Universal Data Interface to Project and Habitat Data

WHAT: Design, develop, and implement in FY 2006, the first release of the statewide Universal Data Interface, to be used by state, local, federal, tribal, and private organizations. Agencies will continue to maintain their own data, but unlike now, others will be able to view data from different agencies together in one place, in one view. Appropriate filters, security, and quality assurance measures will be applied. Release 1 will focus on view-only access to habitat and project data. Evaluate the HPA and Project Information System (PRISM) systems as sources of project data, and SSHIAP as a source of habitat data. Include projects funded by local, federal or private sources as well as state.

BENEFITS FOR THE RESOURCES & PUBLIC UNDERSTANDING: For the first time consolidated natural resource information, including status and trends data, should be available for mapping, reporting, and analysis by agencies, legislators, and the public.

Universal Data Interface to Fish and Barrier Data

WHAT: Design, develop, and implement in FY 2007 the second release of the statewide Universal Data Interface to provide view-only access to fish and barriers data. Evaluate SSHEARbase as a source of barrier data, and Fish Distribution and Use database as a source of fish data.

BENEFITS FOR THE RESOURCES & PUBLIC UNDERSTANDING: The Universal Interface will integrate such existing fish and barrier databases with habitat and project data for mapping, reporting, and analysis.

Access to Monitoring Information

Future Biennia

WHAT: Design, develop, and implement additional releases of the statewide universal data interface to provide access to air/water/land characteristics data, and to provide data entry capabilities for local and other agencies.

Ecology maintains detailed information about air, water, and land characteristics. Most of it is available through their web site, and the new Environmental Information Management system in development will provide query tools. The universal interface will integrate the existing air/water/land databases with habitat, project, fish, and barrier data for mapping, reporting, and analysis.

BENEFITS FOR THE RESOURCES & PUBLIC UNDERSTANDING: The data entry interface will allow local, tribal, and other agencies to enter data into statewide databases using an intelligent interface. This site will be available through the portal, designed for end users, and a single interface to all state-managed natural resources/salmon recovery monitoring data. It will be integrated with the Universal Data Interface.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
12	High	Feasibility Study. FY2004	500	0
13	High	Design, develop, and implement pilot statewide universal interface to habitat and project data. FY 2005	500	0
23	Medium	Design, develop, and implement interface to habitat and project data. FY 2006	500	0
24	Medium	Design, develop, and implement interface to fish and barriers data. FY 2007	800	0
40	Medium	Design, develop, and implement interface to air/water/land data. FY 2009	500	0
43	Medium	Design, develop, and implement interface for data entry by local, tribal, and private agencies. FY 2008	800	0
TOTAL			3,600	0

4. PRISM Monitoring Enhancement

IAC will upgrade its PRISM system to accept and track monitoring information on the effectiveness of SRFB projects, provide training to project proponents, and it will develop approved parameters for measuring project effectiveness.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
34	Medium	PRISM update	223	0

Access to Monitoring Information

5. On-Line Hydraulic Project Approvals

An online application process for WDFW's HPA permits should be funded and built in the 2005-07 biennium. This would substantially improve public service, and ensure that proposed as well as approved water-related projects and activities are in the HPA database and available for watershed analysis.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
48	Medium	Build on line HPA process	480	0

6. Meta Data Standards

The state action agencies should adopt by the end of 2003, the metadata standard format developed by the Federal Geographic Data Council (FGDC) for all types of data. Metadata is address and source information associated with the information being sent.

The state agencies should pool resources to acquire software that simplifies the process of entering and editing FGDC style documentation.

The state agencies should develop a policy requiring that metadata be sent whenever their data is transferred. The metadata always include title of dataset; brief description, contact name, organization, title, and phone number; date of content; theme and place keywords, and where applicable, purpose, data collection methods, use constraints, and spatial reference information.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
52	Medium	Adopt metadata standards	0	0

7. Forest and Fish Information Systems

DNR proposes to maintain and update its Forest Practices Application Review System (FPARS), the Forest Practices water typing system, hydrography data, forest roads data, and the web-serving infrastructure that makes possible public access to these systems. One-time federal funding was provided to initially develop these systems; however, no federal funding was provided to maintain and update these systems over time. Information contained in these systems is critical to continuing implementation of the Forests and Fish Report, the Forest Practices – Salmon Recovery Act (HB 2091), and the Forest Practices Rules. This information is used to review and approve over 6,000 Forest Practice Applications each year.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
21	High	Develop Forest and Fish Information Systems	1,430	1,088

Access to Monitoring Information

8. Ecology EIM Grantee Data Entry

ECY provides grants to local entities to improve water quality. There is currently no external grantee data entered into Ecology's Environmental Information Management (EIM) System. Ecology proposes to develop and implement an external data collection strategy and related Internet tools that grant recipients can use to submit their data to Ecology's EIM system. This will provide information on the overall effectiveness of grants in correcting water quality problems.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
66	Medium	Ecology EIM Grantee Data Entry	200	0

9. Spatial Data Format

By 2003 the state agencies should adopt the North American Datum of 1983 as the standard horizontal control network, and Washington State Plane South as the standard projection and coordinate system. When State Plane coordinates are not available, the Latitude/Longitude coordinate system (in degrees/minutes/seconds or decimal degrees) can be used.

It is imperative to resolve the issue of different agencies using different datum, projection, and tiling of their spatial data. This includes organizations at the state, local, tribal, private, and federal levels. Note that the Geographic Information Technology sub-committee of the Information Services Board (ISB) intends to review potential GIS technical standards by the end of 2002, after which final determination can be made.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
75	Medium	Adopt spatial data format	0	0

10. Data Transfer Protocols

By the end of 2003 all state natural resource agencies should export/download their data in one of the following formats:

Spatial data: XML, E00, DLG, DWG, SDTS, SHP (vector), ADRG, BIL, TIFF (raster).

Tabular data: XML, comma delimited ASCII.

Text: ASCII, HTML, PDF.

Graphics: PDF, HTML, jpg, gif, tif.

Data providers for state action agencies should offer multiple formats to make it easier for people with different software to access the data.

The Data Development Group of the WMC, or some other designated group, should continue to define recommended exchange data types and formats for commonly used fields, and distribute recommendations to all data collectors.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
74	Medium	Adopt data transfer protocols	0	0

Access to Monitoring Information

11. Data Licensing

Natural resource agencies should adopt an online data agreement process rather than requiring signed paper agreements. This will facilitate the distribution and exchange of data over the Internet.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
73	Medium	Develop online data sharing agreement	0	0

Summary of New Monitoring Information Costs

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
14	High	Data Coordinator Position	200	200
15	High	Build Phase 1 of Web Portal FY2003	200	48
12	High	Feasibility Study. FY2004	500	0
13	High	Design, develop, and implement pilot statewide universal interface for habitat and project data. FY 2005	500	0
21	High	Develop, maintain, and update Forest and Fish Information Systems	1,430	1,088
33	Medium	Build Phase 2 of Web Portal	450	220
38	Medium	Build Phase 3 of Web Portal *	0	0
23	Medium	Design, develop, and implement interface to habitat and project data. FY 2006	500	0
24	Medium	Design, develop, and implement interface to fish and barriers data. FY 2007	800	0
40	Medium	Design, develop, and implement interface to air/water/land data. FY 2009	500	0
43	Medium	Design, develop, and implement interface for data entry by local, tribal, and private agencies. FY 2008	800	0
34	Medium	PRISM update	223	0
48	Medium	Build on line HPA process	480	0
52	Medium	Adopt metadata standards	0	0
66	Medium	Ecology EIM grantee data entry	200	0
75	Medium	Adopt spatial data format	0	0
74	Medium	Adopt data transfer protocols	0	0
73	Medium	Develop online data sharing agreement	0	0
TOTAL			6,783	1,556

* costs included under Statewide Universal Interfaces.

Salmon Restoration

The fiscal investments made by state and others involved in watershed health and salmon recovery are considerable. They range from small scale habitat protection and restoration projects to large programs that manage land, water, or other resources within and across various jurisdictions and sectors. In nearly every case it is assumed that these programs and projects have the desired effect, but this assumption is rarely evaluated by effectiveness monitoring, and even less so by complementary (cause-effect) validation monitoring. This section specifically addresses the need to understand the effectiveness of watershed health and salmon recovery investments in terms of their stated objectives and the resulting effect on salmon populations.

With the listing of several west coast salmon species as threatened or endangered under the federal Endangered Species Act, governors, numerous legislators, and other leaders have sought to obtain funding to restore salmon populations and obtain economic relief for the region through recovery of species listed under the ESA. Washington's Salmon Recovery Funding Board (SRFB) and the Oregon Watershed Enhancement Board (OWEB) were established to evaluate projects and issue funds. Both funding boards work closely with a network of local watershed organizations.

The MOC has incorporated a system for determining which habitat projects are most effective. The Strategy addresses habitat project implementation monitoring, effectiveness monitoring, and the response of fish populations (validation monitoring) through intensively monitored watersheds.

Habitat restoration projects typically have a “nested hierarchy” of objectives and results. The nested hierarchy also typically has associated monitoring at each level. For example, a riparian vegetation project might have the following series of objectives and associated monitoring.

- Plant trees
(Implementation monitoring)

- Increase shading of stream
(Effectiveness monitoring)

- Reduce stream temperature
(Effectiveness monitoring)

- Increase salmon abundance
(Validation monitoring)

The Strategy has addressed habitat project implementation monitoring, effectiveness monitoring, and the response of fish populations (validation monitoring) through intensively monitored watersheds.

A complete description of habitat effectiveness monitoring can be found in Part VI (Obtaining Accountability for Effectiveness of State and Federal Investments) and in Part VIII (Intensively Monitored Watersheds) of the Comprehensive Monitoring Strategy (Volume 2).

Accountability for Restoration Investments

The Clean Water Act

Section 303(d) of the Clean Water Act requires Washington State to periodically prepare a list of all surface waters in the state for which beneficial uses of the water – such as for recreation and aquatic habitat, including salmon – are impaired by pollutants. Waters placed on the 303(d) list require the preparation of Total Maximum Daily Loads (TMDLs), a key tool in cleaning polluted waters. The TMDLs identify the maximum amount of a pollutant to be allowed to be released into a waterbody so as not to impair uses of the water, and allocate that amount among various sources. Funds have been appropriated to clean up polluted waters and to improve water quality and flow at various locations throughout the state. The Action Plan recommends actions that address water quality project implementation monitoring, effectiveness monitoring, and the response of fish populations (validation monitoring) to changes in water quality and flow through intensively monitored watersheds. A complete description of water quality effectiveness monitoring can be found in Part VII G (Monitoring for Clean Water) of the CMS Volume 2.

The following action items are designed to provide verifiable information through monitoring that will answer the question: “Are habitat improvement projects effective?”

Habitat – Essential Current Monitoring Activities:

1. Salmon Recovery Funding Board Project Implementation Monitoring
2. Aquatic Lands Enhancement Funds Project Implementation Monitoring
3. U.S. Forest Service Habitat Monitoring
4. Department of Natural Resources HCP Monitoring
5. Forest and Fish Agreement
6. Watershed Index Monitoring

Habitat – Recommended New Monitoring Activities

1. Habitat Restoration Project Effectiveness and Monitoring Protocols
2. Effects of Habitat Restoration Projects on Salmon Abundance (Intensive Monitoring)
3. Fish Passage Barrier Removal
4. Forest Lands Effectiveness and Compliance Monitoring
5. Effectiveness of Nearshore Marine Projects
6. Law Compliance
7. Tracking Funding Assistance
8. Habitat Restoration Project Prioritization
9. Standardized Definitions and Categories
10. Grant Contract Requirements
11. Clustering of Projects for Intensive Monitoring
12. Quality Assurance/Quality Control Plan

Water – Essential Current Monitoring Activities

1. Impaired Waters Compliance Monitoring
2. Effectiveness of Clean Water Programs

Water – Recommended New Monitoring Activities

1. TMDL Monitoring
2. Impaired Waters Monitoring
3. Effectiveness of Water Quality Improvement Projects
4. Water Quality Index
5. Law Compliance
6. Clean Water Plans

Accountability for Restoration Investments

Habitat

The key monitoring questions addressed in this portion of the Action Plan are:

- What is the progress of the State in restoring fish passage at barriers?
- What is the progress of the State in restoring connectivity of freshwater habitat?
- Are habitat improvement projects effective?

Habitat – Essential Current Monitoring Activities

The following ongoing monitoring actions for habitat restoration projects are considered essential and should continue as part of ongoing monitoring of watershed health and salmon recovery.

1. Salmon Recovery Funding Board Project Implementation Monitoring

The SRFB currently monitors 100% of funded projects for project implementation. Cost is estimated at \$14K/yr.

2. Aquatic Lands Enhancement Funds Project Implementation Monitoring

The DNR currently monitors projects for implementation. \$212K/yr. (est.)

3. U.S. Forest Service Habitat Monitoring

The USFS has committed funding to monitor the success of the Forest Plan in improving watersheds. It is currently using an EMAP approach in both eastern and western Washington. Their efforts complement recommended monitoring on non federal lands. For best success, the USFS should be encouraged to modify its sampling procedure in order to improve resolution to the state rather than regional level. Cost is \$2,600K/yr.

4. Department of Natural Resources Habitat Conservation Plan Monitoring

The DNR should continue to monitor the effectiveness of its adopted Habitat Conservation Plan in improving freshwater and riparian habitat on state forest lands. Cost is \$200K/yr.

5. Forests and Fish Agreement

Ongoing activities conducted by the interagency Cooperative Monitoring, Evaluation, and Research (CMER) Committee presently focus on Prescription monitoring, and on developing monitoring implementation tools. Prescription Monitoring evaluates the effectiveness of individual Forests and Fish Report prescriptions and evaluates alternative treatments for meeting resource objectives. This consists of tracking the performance of individual or groups of prescriptions by measuring input processes and/or habitat indicators. \$2.3 million/yr.

6. Watershed Index Monitoring

Joint monitoring by the ECY and WDFW of the abundance of juvenile migrant salmon, returning adult spawners, and water quality and habitat measures at 9 locations and currently funded by the SRFB. Cost is \$1,263K/yr.

Accountability for Restoration Investments

Habitat – Recommended New Monitoring Activities

Although the following recommendations directly address monitoring needs that will measure the effectiveness of habitat restoration projects, it should be noted that monitoring larger scale status and trends of habitat, see Section IV, is also a necessary element of determining whether the actions taken are collectively having a beneficial impact on the resource.

1. Habitat Restoration Project Effectiveness and Monitoring Protocols

Recommend the SRFB and Northwest Power Planning Council (NWPPC) set aside a specific amount of restoration project funds for independent monitoring of project effectiveness. Formal protocols should be adopted by the State Monitoring Council or other group convened in the coming year. As an interim measure, future habitat restoration projects should be required to employ the standard measurements developed by the US EPA for their EMAP where applicable.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
4	High	SRFB effectiveness monitoring	TBD	TBD
4	High	NWPPC effectiveness monitoring	TBD	TBD
4	High	EMAP interim protocols for Restoration Projects	0	0
TOTAL			TBD	TBD

2. Effects of Habitat Restoration Projects on Salmon Abundance (Intensive Monitoring)

Develop, in cooperation with Salmon Recovery Regions, selected intensively monitored watersheds where effectiveness of habitat improvement projects in producing more salmon can be validated.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
8	High	Develop intensively monitored watersheds	800	800

3. Habitat – Fish Passage Barrier Removal

WDFW will work in conjunction with Lead Entities and local project sponsors to monitor effectiveness of identified barrier removal projects in extending the geographic range of salmon.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
29	Medium	WDFW Conducts barrier removal effectiveness	500	0

4. Habitat – Forest Lands Effectiveness and Compliance Monitoring

DNR in cooperation with WDFW, ECY, and the tribes proposes a monitoring program for the recent Forests and Fish updates to the Forest Practice Rules. It would test how well land-owners are complying with the law, and how effective are the new rules in protecting watershed health. Without this monitoring the federal assurances under the DNR HCP and the 4(d) rule of the Endangered Species Act are at risk.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
20	High	Forest and Fish effectiveness and compliance monitoring	1,632	1,903

Accountability for Restoration Investments

5. Effectiveness of Nearshore Marine Projects

DNR will work in conjunction with Salmon Recovery Regions and Lead Entities to develop and implement nearshore effectiveness monitoring protocols, and collect, synthesize and communicate results from effectiveness monitoring from nearshore protection, restoration and mitigation projects.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
51	Medium	Monitor effectiveness of nearshore marine projects	1,100	1,100

6. Habitat – Compliance (Scorecard)

ECY and WDFW will develop compliance rate for each key habitat protection regulation.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
59	Medium	ECY Shoreline Mgmt Permit compliance	360	360
59	Medium	DFW Hydraulic Project permit compliance	150	150
Total			510	510

7. Tracking Funding Assistance (Scorecard)

The GSRO will coordinate tracking of status and trends in amount of funding and technical assistance provided to salmon recovery partners from the various cabinet agencies.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
65	Medium	Funding assistance tracking	0	0

8. Habitat Restoration Project Prioritization

Recommend that representatives from the SRFB, NWPPC, BPA, Corps of Engineers and other granting entities develop with input from the Salmon Recovery Regions and Lead Entities, regional criteria for prioritizing the types of projects funded in each region and in intensively monitored watersheds.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
71	Medium	Develop prioritized restoration project types	0	0

9. Standardized Definitions and Categories

Recommend funding entities adopt the standardized definitions and categories of projects used by the SRFB through the PRISM database so that a composite understanding of habitat restoration efforts and monitoring can be developed throughout Washington and the Pacific Northwest.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
70	Medium	Standardize habitat project definitions and categories	0	0

Accountability for Restoration Investments

10. Grant Contract Requirements

Recommend that each grant contract distributed to salmon recovery sponsors contain an attachment describing data and metadata content and format requirements.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
69	Medium	Grant contract metadata requirements	0	0

11. Clustering of Projects For Intensive Monitoring

The SRFB and the NWPPC/BPA should coordinate funding of habitat restoration projects with the Salmon Recovery Regions such that where intensively monitored watersheds have been identified, some projects can be clustered in a manner that will improve the probability of detecting a significant change in fish numbers.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
68	Medium	Project clustering	0	0

12. Quality Assurance/Quality Control Plan

A Quality Assurance (QA) Project Plan that will include integrated analysis and reporting mechanisms should be developed by each entity conducting intensive monitoring.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
67	Medium	QA/QC Plan Intensive Monitoring	0	0

Summary of Identified Costs for Tracking Implementation, and Effectiveness, of Habitat Restoration Projects

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
4	High	SRFB effectiveness monitoring	TBD	TBD
4	High	NWPPC effectiveness monitoring	TBD	TBD
4	High	EMAP interim protocols for Restoration Projects	0	0
8	High	Develop intensively monitored watersheds (validation monitoring)	800	800
20	High	Forest and Fish effectiveness and compliance monitoring	1,632	1,903
29	Medium	WDFW conducts barrier requirements study	500	0
51	Medium	Monitor effectiveness of nearshore marine projects	1,100	1,100
65	Medium	Funding assistance tracking	0	0
71	Medium	Develop prioritized restoration project types	0	0
70	Medium	Standardize habitat project definitions and categories	0	0
69	Medium	Grant contract metadata requirements	0	0
68	Medium	Project clustering	0	0
67	Medium	QA/QC Plan Intensive Monitoring	0	0
59	Medium	ECY Shoreline Mgmt Permit compliance	360	360
59	Medium	DFW Hydraulic Project permit compliance	150	150
TOTAL			4,542	4,313

Accountability for Restoration Investments

Water

The key monitoring questions addressed in this portion of the Action Plan are:

- How effective are Clean Water Programs at meeting water quality criteria?
- Where do the water quality conditions not support aquatic life and recreational uses?
- Where have standards for water quantity been established?
- How effective are the State’s water resource management programs for protecting and restoring instream flows?

Water – Essential Current Monitoring Activities

1. Water – Impaired Waters Compliance Monitoring

Every two years ECY compiles a list of “impaired waters” that do not meet the federal water quality standards of the Clean Water Act. The report is required by section 303(d) of the Clean Water Act. Sample site selection is based on a five year statewide rotating schedule. Monitoring is also conducted to establish TMDL and assess the safety of fin fish and shellfish consumption. These monitoring activities should be continued in order to meet federal law. Cost is \$5,124K/yr.

2. Water – Effectiveness of Clean Water Programs

ECY currently monitors effectiveness of several established TMDLs. State grant recipients are required to monitor effectiveness of actions specific to their project. The Water Quality Index is derived in each WRIA based on targeted locations representing cumulative effects of human caused impacts and natural conditions. The Department of Health (DOH) monitors fecal coliform in shellfish beds using the National Shellfish Sanitation Program. Cost is \$290K/yr.

Water – Recommended New Monitoring Activities

1. Water – TMDL Monitoring

ECY would establish targeted monitoring to assess effectiveness of implemented TMDLs.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
35	Medium	TMDL Effectiveness Monitoring	6,065	6,065

2. Water – Impaired Waters Monitoring

ECY would increase monitoring to support TMDLs in impaired watersheds that do not support aquatic life or recreational uses for selected indicators.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
39	Medium	Monitor only standards needed to meet TMDL Court Decree	6,330	6,330
61	Medium	Monitor all standards for TMDL support	25,800	25,800
TOTAL			32,130	32,130

Accountability for Restoration Investments

3. Water – Effectiveness of Water Quality Improvement Projects

ECY will require targeted monitoring to assess effectiveness of all State grant funded water quality improvement projects.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
53	Medium	Monitoring of projects Local funds	10,200	10,200

4. Water – Water Quality Index (Scorecard)

ECY will modify the statewide water quality index to allow for use with data collected by EMAP design.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
56	Medium	Update Water Quality Index in 2003	0	0

5. Water – Rules Compliance (Scorecard)

ECY will develop a compliance rate for each key habitat protection regulation.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
59	Medium	ECY Water Quality certification compliance	180	180

6. Water – Clean Water Plans (Scorecard)

ECY will develop percentage of salmonid listed waters with polluted water for which clean water plans have been developed.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
60	Medium	Develop clean water plan report	0	0

Summary of Identified Costs for Tracking Implementation, Effectiveness, and Validity of Water Quality Restoration Projects

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
35	Medium	TMDL Effectiveness Monitoring	6,065	6,065
39	Medium	Monitor only standards needed to meet TMDL Court Decree	6,330	6,330
53	Medium	Monitoring of projects Local funds	10,200	10,200
56	Medium	Update Water Quality Index in 2003	0	0
59	Medium	ECY Water Quality certification compliance	180	180
60	Medium	Develop clean water plan report	0	0
61	Medium	Monitor all standards for TMDL support	25,800	25,800
		TOTAL	48,575	48,575

Determine Trends in Fish, Water & Habitat Conditions

Section IV

Section III addressed monitoring needs at the individual project and management action scale. This Section addresses monitoring questions that are best answered with extensive monitoring (status and trends). The spatial scale is large, varying from Evolutionary Significant Unit (ESU) for fish population estimates to statewide (potentially) for some water quality indicators, and will depend upon the questions being asked. Status and trend monitoring will not directly demonstrate cause-effect relationships between actions and outcomes, but is an effective means of assessing the actual condition of the variable of interest. For example, the distribution of large wood or pool depth within a salmon recovery region could be assessed and tracked over time to determine the net impact of natural events and management actions.

The recommended monitoring actions, current and new, to track and determine trends in the HABITAT, WATER, and FISH resources in our watersheds include the following:

For HABITAT:

Essential Current Monitoring Activities

Recommended New Monitoring Activities

1. Freshwater Status and Trend Monitoring
2. Nearshore Marine Habitat Status and Trend Monitoring
3. Fish Passage Barrier Census
4. Connectivity
5. Monitoring Hydropower Facilities
6. Nearshore Bathymetry
7. Marine and Estuarine Quality
8. Federal Guideline Implementation

For WATER:

Essential Current Monitoring Activities

1. Monitoring of Water Quality Trends
2. Stream Gauging
3. Monitoring Habitat to Establish Instream Flow Studies
4. Status of Freshwater Quality
5. Marine Sediment Monitoring
6. Pesticide Residues
7. Salmon Index Watershed Monitoring

Recommended New Monitoring Activities

1. Status and Trend of Surface Water Quality
2. Instream Flow Requirements
3. Stream Flow Gauging
4. Development of Benchmark Indicators

For FISH:

Essential Current Monitoring Activities

1. Spawner Abundance
2. Juvenile Migrant Production
3. Harvest Monitoring
4. Mass Marking of Steelhead, Coho, and Chinook Salmon
5. Coded Wire Tag Program
6. Fish Aging Laboratory
7. Genetics Laboratory

Recommended New Monitoring Activities

1. SaSI Enhancement
2. Meeting Spawner Objectives
3. Harvest Impact Reporting
4. Estimates of Juvenile Migrant Abundance
5. Improve Salmon Data Precision
6. Spawner Abundance Quality Control Quality Assurance
7. DNA Monitoring
8. Monitoring with Volunteers
9. Salmon Harvest Regulations Compliance Monitoring
10. Mass Marking of Coho and Chinook Salmon
11. Quality Control for Puget Sound Chinook Estimates
12. Hooking Mortality
13. Commercial Net Dropout Mortality

Determine Trends in Fish, Water & Habitat Conditions

Habitat

The key monitoring questions addressed in this portion of the Action Plan are:

- What are the overall impacts of human related activities on freshwater habitat and landscape processes as they relate to watershed health and salmon recovery?
- What are the areas of crucial salmon habitats in nearshore marine and estuary areas, and what is the relationship of those areas to watershed health and salmon?

Habitat – Essential Current Monitoring Activities

Nearshore Marine Habitat Status and Trend Monitoring

Ongoing DNR monitoring of status and trends of nearshore habitats and processes. Currently proviso ALEA monies leverage matching money from the Army Corp of Engineers. **ALEA contribution: \$450K/yr.**

Habitat – Recommended New Monitoring Activities

A complete description of the various categories of habitat status and trend monitoring can be found in Part VII B-E and H of the CMS Volume 2.

1. Habitat – Freshwater Status and Trend Monitoring

Measure condition of freshwater habitat and selected water quality indicators for streams, lakes and marine, and the presence of resident trout using EMAP-type sampling.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
6	High	EMAP sampling of freshwater habitat, water quality, and trout	2,060	2,060
		Lakes	300	700
		Marine	300	700
		TOTAL	3,060	3,060

2. Habitat – Nearshore Marine Habitat Status and Trend Monitoring

ECY, DNR and WDFW will cooperatively monitor status and trends of nearshore habitats and processes by monitoring eelgrass, floating kelp, infaunal biota (EMAP-type sampling), vegetation, substrate, water quality and land use/land cover (EMAP-type sampling).

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
22	High	Intensification of current Puget Sound nearshore sampling	300	300
25	Medium	Statewide sampling of nearshore marine habitats Phase 1	2,400	2,400
41	Medium	Phase 2 of nearshore EMAP monitoring	1,200	1,200
		TOTAL	3,900	3,900

Determine Trends in Fish, Water & Habitat Conditions

3. Habitat – Fish Passage Barrier Census

Phase 1: Through a joint program of DNR, WDFW, and the Washington Farm Forestry Association, fish blockages on state and private lands will be inventoried and prioritized to establish timely, effective repair strategies. Family forest landowners will be able to receive technical and financial assistance to repair fish blockages on their lands. As hundreds of barriers are strategically repaired, fish will regain important access to stream reaches, fulfilling the intent of the Forests and Fish Report and the Salmon Recovery Act. (Parallel legislation directed at the Forest Practices Board, DNR and WDFW would authorize the program this package funds.)

Phase 2: WDFW, as lead, will work with the Department of Transportation (WSDOT), DNR, SRFB and local governments and organizations to establish a phased census of all remaining fish passage barriers and fish screens in watersheds prioritized by the Statewide Salmon Recovery Strategy (SSRS) or for specific ownerships. Legal mandates: Interagency Commitments with agencies, local governments, tribes and contractual obligations.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
19	High	Conduct barrier census on state and private lands	1,820	0
76	Medium	Conduct barrier census on all remaining lands	3,180	0
TOTAL			5,000	

4. Habitat – Connectivity

Salmon habitat areas isolated by diking, ditching, and other human activities and no longer attach to a natural river or estuary are considered disconnected habitat. WDFW will work with existing data sources (SSHIAP and Lead Entities) and existing local efforts to establish a phased census of habitat connectivity issues with highest priority areas for fish recovery to be inventoried first; report to funding entities and watershed groups. Legal mandate: RCW 77.85 Salmon Recovery Act.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
37	Medium	Conduct habitat connectivity census	200	0

5. Habitat – Monitoring Hydropower Facilities (Scorecard)

WDFW and ECY will monitor salmon friendly practices at major hydropower facilities and report on their status and trends. Legal mandates: Federal Energy Regulatory Commission (FERC) license requirements; ESA Section 7 and 10 authorities; HCP commitments; contractual obligations.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
57	Medium	WDFW will conduct status monitoring of hydro	340	340

6. Habitat – Nearshore Bathymetry

DNR will inventory and assess nearshore (intertidal and shallow subtidal) bathymetry.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
58	Medium	Conduct inventory of nearshore bathymetry	2,000	0

Determine Trends in Fish, Water & Habitat Conditions

7. Habitat – Marine and Estuarine Quality (Scorecard)

Accurate measures of nearshore depth and changes to shorelines and bottom conditions are not known. The DNR in cooperation with PSAT will develop the percentage of marine and estuarine habitats with high, medium, low and unknown quality every two years.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
63	Medium	Provide estuarine habitat quality report	0	0

8. Habitat – Federal Guideline Implementation (Scorecard)

WDFW, ECY and DNR will track the number of key guidelines implemented for projects and activities affecting habitat and submitted to NMFS/USFWS.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
64	Medium	Agencies report on federal guidelines implemented	0	0

Summary of Identified Costs for Establishing Baseline Surveys and Tracking Status and Trends of Freshwater and Marine Habitat

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
6	High	EMAP sampling of freshwater habitat, water quality, and trout	2,060	2,060
		Lakes	300	700
		Marine	300	700
19	High	Conduct barrier census on state and private lands	1,820	0
22	High	Intensification of current Puget Sound nearshore sampling	300	300
25	Medium	Sampling of nearshore marine habitats Phase 1	2,400	2,400
37	Medium	Conduct habitat connectivity census	200	0
41	Medium	Phase 2 of nearshore EMAP monitoring	1,200	1,200
57	Medium	DFW will conduct effectiveness monitoring of hydro	340	340
58	Medium	Conduct inventory of nearshore bathymetry	2,000	0
63	Medium	Provide estuarine habitat quality report	0	0
64	Medium	Agencies report on federal guidelines implemented	0	0
76	Medium	Conduct barrier census on all remaining lands	3,180	0
TOTAL			14,500	7,300

Determine Trends in Fish, Water & Habitat Conditions

Water

The key monitoring questions addressed in this portion of the Action Plan are:

- What is the quality condition of surface waters?
- How are surface water quality conditions changing over time?
- What are the trends in water quantity and flow characteristics?
- Where do the water quantity and flow characteristics limit salmon productivity?

Water – Essential Current Monitoring Activities

1. Water – Monitoring of Water Quality Trends

ECY monitors the status of water quality at specific watersheds. Contains long-term database of water quality conditions in streams, marine waters and marine sediments. \$1,136K/yr.

2. Water – Stream Gauging

There are currently 242 sites in the state where flow is measured using a stream gauging station. Most of these are U.S. Geological Survey (USGS) long term monitoring sites. The USGS should be encouraged and supported in maintaining these sites. Recently the state legislature, the BPA, and the SRFB have provided some funding to the ECY for additional gauging. Ecology O&M costs= \$1,041/yr.

3. Water – Monitoring Habitat to Establish Instream Flows

Setting of instream flows has occurred in the past at 110 locations by the ECY. There currently is no existing funding dedicated to instream flow monitoring. Ecology is currently assisting local watersheds in establishing instream flow habitat requirements. This function should be expanded.

4. Water – Status of Freshwater Quality

ECY currently monitors status in stream water quality statewide using USEPA EMAP design and protocols. This monitoring ends in 2004 when the contract with USEPA expires. \$447K/yr.

5. Water – Marine Sediment Monitoring

ECY conducts marine sediment sampling in conjunction with the Puget Sound Ambient Monitoring Program (PSAMP). From this sampling, a baseline of sediment chemistry, toxicity, and invertebrate diversity data is being compiled for Puget Sound. \$397K/yr.

6. Water – Pesticide Residues

The Department of Agriculture (WSDA) has begun measuring pesticide residue levels in surface waters that provide habitat for ESA listed salmon in agricultural lands. Current monitoring data does not provide accurate magnitude or frequency of pesticide residues in salmonid habitat. Sampling has been contracted to the ECY and began in 2002. \$290K/yr.

7. Water – Salmon Index Watershed Monitoring

ECY conducts stream flow and water quality monitoring of 5 watersheds. The activity is designed to answer Scorecard item D-2 “the percentage of streams with flows that mimic natural conditions.” \$163K/yr.

Determine Trends in Fish, Water & Habitat Conditions

Water – Recommended New Monitoring Activities

A complete description of water quality and flow status and trend monitoring can be found in Part VII F (Monitoring Stream Flow) and G (Monitoring for Clean Water) of the CMS Volume 2.

1. Water – Status and Trend of Surface Water Quality

ECY proposes to monitor the status and trends in surface water quality statewide using the EMAP sampling design in conjunction with habitat monitoring and trout monitoring statewide, by salmon recovery region and by WRIA. Please see the “Habitat - Recommended New Monitoring Activities” section on page 33, for costs and details.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
6	High	EMAP status and trend monitoring	See habitat	See habitat

2. Water – Instream Flow Requirements

ECY will monitor quantity of flow needed for salmon in main-stem rivers and major tributaries.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
7	High	Conduct instream flow studies for critical watersheds	1,050	0
28	Medium	Conduct instream flow studies in remaining watersheds	6,300	0
TOTAL			7,350	0

3. Water – Stream Flow Gauging

ECY will increase number of locations where flow status and trend is measured for main-stem rivers and major tributaries with insufficient gauges identified by Ecology.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
17	High	Install gauging stations in priority watersheds	4,620	0
27	Medium	Install gauging stations in remaining watersheds	17,850	0
TOTAL			22,470	0

Determine Trends in Fish, Water & Habitat Conditions

4. Water – Development of Benchmark Indicators

ECY will develop performance benchmarks for indicators of biological health in estuaries in both unwadeable streams and rivers and wadeable streams and rivers. Develop performance benchmarks for indicators of wildlife health from fish tissue consumption. Develop performance benchmarks for indicators of biological health in lakes.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
44	Medium	Performance benchmarks for indicators of biological health in estuaries	220	0
45	Medium	Performance benchmarks for indicators of biological health in unwadeable streams and rivers	220	0
46	Medium	Performance benchmarks for indicators of biological health in wadeable streams and rivers	220	0
47	Medium	Performance benchmarks for indicators of wildlife health from fish tissue consumption	220	0
49	Medium	Performance benchmarks for indicators of biological health in lakes	220	0
TOTAL			1,100	0

Summary of Identified Costs for Establishing Baseline Surveys and Tracking Status and Trends of Water Quality and Flow

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
6	High	EMAP status and trend monitoring	See habitat	See habitat
7	High	Conduct instream flow studies for critical watersheds	1,050	0
17	High	Install gauging stations in priority watersheds	4,620	0
27	Medium	Install gauging stations in remaining watersheds	17,850	0
28	Medium	Conduct instream flow studies in remaining watersheds	6,300	0
44	Medium	Performance benchmarks for indicators of biological health in estuaries	220	0
45	Medium	Performance benchmarks for indicators of biological health in unwadeable streams and rivers	220	0
46	Medium	Performance benchmarks for indicators of biological health in wadeable streams and rivers.	220	0
47	Medium	Performance benchmarks for indicators of wildlife health from fish tissue consumption	220	0
49	Medium	Performance benchmarks for indicators of biological health in lakes	220	0
TOTAL			30,920	0

Determine Trends in Fish, Water & Habitat Conditions

Fish

The key monitoring questions addressed in this portion of the Action Plan are:

- How are the annual abundance and productivity of salmon by species, ESU, and life stage changing over time?
- What improvements are occurring in restoring the geographic distribution of salmon by ESU, species, and life stage to their historic range?
- Are the unique life history characteristics of salmon within a Salmon Recovery Region changing over time because of human activities?
- What is the impact of harvest upon the recovery of wild salmon populations?

Fish – Essential Current Monitoring Activities

1. Fish – Spawner Abundance

Spawning surveys of 323 SaSI stocks of salmon and trout are conducted annually by the WDFW and the treaty tribes. The information obtained is essential for determining the status of salmon and trout populations as identified by the NMFS document “*Viable Salmonid Populations and the Recovery of Evolutionarily Significant Units.*” **Cost is \$4,900K/yr.** Legal mandates: U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; USFWS Section 6 Cooperative Agreement; Section 7 and 10 ESA authorities; Interagency Contracts.

2. Fish – Juvenile Migrant Production

WDFW and the treaty tribes trap juvenile salmon and trout at 34 locations statewide to determine the total number of juveniles produced within the watershed. **Cost is \$1,200K/yr.** Legal mandates: U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; USFWS Section 6 Cooperative Agreement; Section 7 and 10 ESA authorities; Interagency Contracts.

3. Fish – Harvest Monitoring

WDFW participates in harvest monitoring through the Pacific Salmon Commission, Pacific Fisheries Management Council, North of Falcon Process, and Columbia River Compact. **Cost is \$11,150K/yr.**

4. Fish – Mass Marking of Steelhead, Coho, and Chinook Salmon

There are an estimated 340 million hatchery salmon planted yearly into Washington waters. Returning hatchery fish not harvested in fisheries often co-mingle with wild populations on the spawning grounds. Without external identification it is difficult to identify wild salmon production. **Cost is \$2,450K/yr.**

5. Fish – Coded Wire Tag Program

The coded wire tagging program allows estimates of the percent contribution of Washington origin salmon in the national and international fisheries of the North Pacific Ocean. Without this tool, estimates of marine survival and overall salmon productivity cannot be made. **Cost is \$2,700K/yr.** U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; Section 7 and 10 ESA authorities.

Determine Trends in Fish, Water & Habitat Conditions

6. Fish – Fish Age Laboratory

The ability to calculate production of adult salmon from any one migration of juveniles is dependent upon knowledge about the various age groups that return after 1, 2, 3, or 4 years at sea. Without adequate age information, it is not possible to calculate production accurately. Cost is \$80K/yr.

7. Fish – Genetics Laboratory

WDFW currently operates a genetics laboratory that provides information about a wide variety of stocks both in Washington and in neighboring states. Cost is \$520K/yr.

Fish – Recommended New Monitoring Activities

A complete description of salmon abundance status monitoring can be found in Part VII-I (Salmon Abundance, Productivity, Distribution, and Diversity) Part VII-J (Harvest), Part VII-K (Hatcheries) of the CMS Volume 2.

1. Fish – SaSI Enhancement

Designate SaSI as the prime data repository for summarized salmon status information by stock. Update SaSI annually for selected indicators and make it Internet available through the portal. Update all other indicators every 5 years. The WDFW is working on Web-enabled site for public access and data viewing.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
5	High	Update annually specific components of SaSI	165	65

2. Fish – Meeting Spawner Objectives (Scorecard)

WDFW and the treaty tribes will develop an annual report showing percentage of wild stocks meeting spawner objectives.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
10	High	Wild Stock spawner report	0	0

3. Fish – Harvest Impact Reporting

Provide annual analysis of impact of harvest on rate of wild salmon recovery and de-listing. This is necessary for Effectiveness Monitoring.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
9	High	Develop annual harvest impact analysis	300	300

4. Fish – Estimates of Juvenile Migrant Abundance

Restore juvenile migrant traps cut in 2002 supplemental budget and funded on a one time basis by the SRFB. Necessary for Status and Trend Monitoring. Increase number of locations where status and trend in juvenile migrant salmon are counted.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
11	High	Restore 9 juvenile trapping sites	1,200	1,200
18	High	Implement 5 additional trapping sites	1,000	1,000
TOTAL			2,200	2,200

Determine Trends in Fish, Water & Habitat Conditions

5. Fish – Improve Salmon Data Precision

WDFW and the tribes will improve the quality of their spawner abundance information by calculating variances and developing precision estimates for salmon spawner abundance.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
16	High	Development of precision and variance estimates	800	0

6. Fish – Spawner Abundance Quality Control/Quality Assurance

Develop written quality control/quality analysis procedures for salmon spawner abundance information.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
26	Medium	Develop QA/QC procedures	150	0

7. Fish – DNA Monitoring

Develop DNA profile for each ESA listed salmon stock, Phase 1. Develop DNA profile for all other salmon stock, Phase 2.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
30	Medium	sample ESA stocks for DNA profile phase 1	1,268	0
62	Medium	Sample remaining stocks for DNA profile phase 2	80	0
TOTAL			2,100	0

8. Fish – Monitoring With Volunteers

Develop volunteer program for enumerating salmon presence/absence for watersheds (i.e., an annual “fish census”). Relates to Status and Trend Monitoring. Update the Nature Mapping database system to support quality control review of data collected by volunteers.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
31	Medium	Develop volunteer program	200	0
42	Medium	Update nature mapping database	80	0
TOTAL			280	0

9. Fish – Salmon Harvest Regulations Compliance Monitoring

A statistically valid approach to measuring compliance with salmon harvest laws and an estimate of the total loss of wild salmon due to poaching should be developed and incorporated into estimates of harvest.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
32	Medium	Conduct harvest compliance monitoring annually	100	100

10. Fish – Mass Marking of Coho and Chinook Salmon

To improve precision of spawner abundance counts, the WDFW and treaty tribes will complete external marking of hatchery production of coho and chinook salmon.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
36	Medium	Mass mark remaining coho and chinook production	2,850	2,850

Determine Trends in Fish, Water & Habitat Conditions

11. Fish – Quality Control for Puget Sound Chinook Estimates

WDFW, in cooperation with the applicable treaty tribes, will use ongoing mark recapture research to check quality of both a pilot EMAP assessment of adult chinook spawner escapement and the current spawner escapement methods in the Skagit River.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
50	Medium	Establish quality of chinook spawner escapement estimates	400	0

12. Fish – Hooking Mortality

Develop and publish more precise estimates of wild salmon hooking mortality rate for recreational selective fisheries and incorporate into harvest estimates.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
54	Medium	conduct recreational fishing mortality estimates	260	0

13. Fish – Commercial Net Dropout Mortality

Develop and publish more precise estimates of net drop out mortality rate for commercial salmon nets and incorporate into wild salmon harvest estimates.

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
55	Medium	Conduct commercial net dropout estimates*	400	0

Summary of Identified Costs for Establishing Baseline Surveys and Tracking Status and Trends of Salmon and Trout

Line Item	Priority Ranking	Proposed Action	Biennium Cost	Carry Forward
5	High	Update annually specific components of SaSI	165	65
9	High	Develop annual harvest impact analysis	300	300
10	High	Wild Stock spawner report	0	0
11	High	Restore 9 juvenile trapping sites	1,200	1,200
16	High	Development of precision and variance estimates	800	0
18	High	Implement 5 additional trapping sites	1,000	1,000
26	Medium	Develop QA/QC procedures	150	0
30	Medium	Sample ESA stocks for DNA profile - Phase 1	1,268	0
31	Medium	Develop volunteer program	200	0
32	Medium	Conduct harvest compliance monitoring annually	100	100
36	Medium	Mass mark remaining coho and chinook production	2,850	2,850
42	Medium	Update nature mapping database	80	0
50	Medium	Establish quality of chinook spawner escapements	400	0
54	Medium	Conduct recreational fishing hooking mortality estimates	260	0
55	Medium	Conduct commercial net dropout estimates	400	0
62	Medium	Sample remaining stocks for DNA profile Phase 2	832	0
		TOTAL	10,005	5,515

Implementation Schedule

The action items developed in response to SSB 5637 were prioritized using the following six monitoring criteria.

- (1) Does the proposed action build a monitoring foundation (protocols, data, etc.)?
- (2) Is it necessary for federal assurances under ESA and CWA?
- (3) Is it an efficient use of existing monitoring?
- (4) Does it give the highest return on the investment (cost/benefit)?
- (5) Does the monitoring relate to agency mandates?
- (6) Does the proposed monitoring fill a monitoring gap/baseline?

Each monitoring action proposed received a numeric score for each of the six categories. The highest priority action items shown below received the highest combined score for all of the six categories and are ranked as High. The items occur essentially in the order they were ranked from 1-76.

High Priority Action Items

Line Item	Priority	Action Proposed	Action Agency	Annual FTE's	General Fund State	Other Funds	Total Funds
1	High	Create Watershed Monitoring Council	TBD	1.0	250	0	250
2	High	Combine status reports into Watershed Health report card	TBD	0.0	50	0	50
3	High	Continue State Agency Action Plan	TBD	0.0	0	0	0
4	High	SRFB/NWPPC effectiveness monitoring and EMAP interim protocols for Restoration Projects	SRFB, NWPPC	TBD	0	TBD	TBD
5	High	Update annually specific components of SaSI	WDFW	?	165	0	165
6	High	EMAP sampling of freshwater habitat, water quality, and trout Lakes Marine	ECY, WDFW	11	2,060 300 700	0	2,060 300 700
7	High	Conduct instream flow studies for critical watersheds	ECY	5.5	1,050	0	1,050
8	High	Develop intensively monitored watersheds	WDFW	?	800	0	800
9	High	Develop annual harvest impact analysis	WDFW	?	300	0	300
10	High	Wild Stock spawner report	WDFW	0.0		0	0
11	High	Restores 9 juvenile trapping sites	WDFW	?	1,200	0	1,200
12	High	Universal Data Interface Feasibility Study. FY 2004	IAC/SRFB	0.0	500	0	500
13	High	Design, develop and implement pilot interface for habitat and project data. FY2005	IAC/SRFB, WSDOT	0.0	500	0	500
14	High	Data coordinator position	IAC/SRFB	1.0	200	0	200

Implementation Schedule

High Priority Action Items Continued

Line Item	Priority	Action Proposed	Action Agency	Annual FTE's	General Fund State	Other Funds	Total Funds
15	High	Build Phase 1 of Web Portal	IAC/SRFB	0.0	200	0	200
16	High	Development of precision and variance estimates	WDFW	?	800	0	800
17	High	Install gauging stations in priority watersheds	ECY	5	4,620	0	4,620
18	High	Implement 5 additional trapping sites	WDFW	?	1,000	0	1,000
19	High	Conduct barrier census on state and private lands	DNR	4.0	1,820	0	1,820
20	High	Forest and Fish effectiveness and compliance monitoring	DNR, WDFW, ECY, Tribes	10.2	1,632	0	1,632
21	High	Forest and Fish information systems	DNR	5.6	1,430	0	1,430
22	High	Intensification of nearshore sampling	DNR	0	0	300	300
		TOTAL		43.3	19,577	300	19,877

TBD= To Be Determined

The following table indicates the implementation priority order for funding and implementation of remaining monitoring activities in order to implement comprehensive monitoring in accordance with SSB 5637.

Medium Priority Action Items

Line Item	Priority	Action Proposed	Action Agency	Annual FTE's	General Fund State	Other Funds	Total Funds
23	Medium	Design, develop and implement interface to habitat and project data. FY 2006	IAC	0.0	500	0	500
24	Medium	Design, develop and implement interface to fish and barriers data. FY 2007	WDFW, DOT, DNR, IAC	0.0	800	0	800
25	Medium	Statewide sampling of nearshore marine habitats Phase 1	DNR	?	2,400	0	2,400
26	Medium	Develop QA/QC procedures	WDFW	?	150	0	150
27	Medium	Install gauging stations in remaining watersheds	ECY	10	17,850	0	17,850
28	Medium	Conduct instream flow studies in remaining watersheds	ECY	32	6,300	0	6,300
29	Medium	Conducts barrier requirements study	WDFW	?	500	0	500
30	Medium	Sample ESA stocks for DNA profile - Phase 1	WDFW	?	1,268	0	1,268
31	Medium	Develop volunteer program	WDFW	?	200	0	200
32	Medium	Conduct harvest compliance monitoring annually	WDFW	?	100	0	100
33	Medium	Build Phase 2 of Web Portal	IAC, DIS	?	450	0	450
34	Medium	PRISM update	IAC	?	223	0	223
35	Medium	TMDL Effectiveness Monitoring	ECY	51	6,065	0	6,065

Implementation Schedule

Medium Priority Action Items Continued

Line Item	Priority	Action Proposed	Action Agency	Annual FTE's	General Fund State	Other Funds	Total Funds
36	Medium	Mass mark remaining coho and chinook production	WDFW	?	2,850	0	2,850
37	Medium	Conduct habitat connectivity census	WDFW, Tribes, DNR, DOT, IAC	?	200	0	200
38	Medium	Build Phase 3 of Web Portal	IAC, DIS	?	0	0	0
39	Medium	Monitor only standards needed to meet TMDL Court Decree	ECY	24	6,330	0	6,330
40	Medium	Design, develop and implement interface to air/water/land data. FY 2009	ECY, DIS, IAC	?	500	0	500
41	Medium	Phase 2 of nearshore EMAP monitoring	DNR	?	1,200	0	1,200
42	Medium	Update nature mapping database	WDFW, UW	1.0	80	0	80
43	Medium	Design, develop, and implement interface for data entry by local, tribal, and private agencies. FY 2008	DNR	0.0	800	0	800
44	Medium	Performance benchmarks for indicators of biological health in estuaries	ECY	2	220	0	220
45	Medium	Performance benchmarks for indicators of biological health in unwadeable streams and rivers	ECY	2	220	0	220
46	Medium	Performance benchmarks for indicators of biological health in wadeable streams and rivers.	ECY	2	220	0	20
47	Medium	Performance benchmarks for indicators of wildlife health from fish tissue consumption	ECY	2	220	0	220
48	Medium	Build on line HPA process	WDFW	?		480	480
49	Medium	Performance benchmarks for indicators of biological health in lakes	ECY	2	220	0	220
50	Medium	Establish quality of chinook spawner escapements	WDFW, Tribe	?	400	0	400
51	Medium	Monitor effectiveness of Nearshore Marine Projects	DNR, PSAT, PSAMP	?	1,100	0	1,100
52	Medium	Adopt metadata standards	All agencies	?	0	0	0
53	Medium	Monitoring of projects local funds	Local Govt	0	0	10,200	10,200
54	Medium	Conduct recreational fishing hooking mortality estimates	WDFW	?	260	0	260
55	Medium	Conduct commercial net dropout estimates	WDFW, Tribes	?	400	0	400

Implementation Schedule

Medium Priority Action Items Continued

Line Item	Priority	Action Proposed	Action Agency	Annual FTE's	General Fund State	Other Funds	Total Funds
56	Medium	Update Water Quality Index in 2003	ECY	0.1	0	0	0
57	Medium	WDFW and ECY will conduct effectiveness monitoring of hydro	ECY, WDFW	?	340	0	340
58	Medium	Conduct inventory of nearshore bathymetry	PSAMP, DNR, PSNERP, USGS	?	2,000	?	2,000
59	Medium	ECY Water Quality certification compliance ECY Shoreline Mgmt Permit compliance DFW Hydraulic Project permit compliance	ECY, WDFW, PSAT, CTED, DOT	?	690	0	690
60	Medium	Develop clean water plan report	ECY	0	0	0	0
61	Medium	Monitor all standards for TMDL support			25,800		25,800
62	Medium	Sample remaining stocks for DNA profile Phase 2	WDFW	?	832	0	832
63	Medium	Provide estuarine habitat quality report	PSAT, DNR	?	?	?	?
64	Medium	Agencies report on federal guidelines implemented	ECY, WDFW, DNR	0	0	0	0
65	Medium	Funding assistance tracking	IAC, WDFW, CC, DNR, OFM, DOT	?	?	?	?
66	Medium	Ecology EIM Grantee Data Entry			200		200
67	Medium	QA/QC Plan Intensive Monitoring	ECY, WDFW	0	0	0	0
68	Medium	Project clustering	SRFB, NWPPC	0	0	0	0
69	Medium	Grant contract metadata requirements	SRFB, NWPPC	0	0	0	0
70	Medium	Standardize habitat project definitions and categories	SRFB, NWPPC	0	0	0	0
71	Medium	Develop prioritized restoration project types	SRFB, NWPPC	0	0	0	0
72	Medium	EMAP interim protocols for Restoration Projects	SRFB, NWPPC	0	0	0	0
73	Medium	Develop online data sharing agreement	Natural Resource Agencies	0	0	0	0
74	Medium	Adopt data transfer protocols	Natural Resource Agencies	0	0	0	0
75	Medium	Adopt spatial data format	Natural Resource Agencies	0	0	0	0
76	Medium	Conduct barrier census on all remaining lands	DNR	0	3,180		3,180
TOTAL				45.4	85,068	10,680	95,748

Implementation Schedule

Current Monitoring Expenditures and Gaps

The following table provides an overview of current state agency monitoring expenditures (all funds) per biennium in thousands of dollars. Shading indicates a significant gap in monitoring effort as evidenced by the lack of expenditures and activity by the various agencies.

Monitoring Action	Climate		Habitat Processes				Hydro	Stream/Water			Marine	Fish Populations		Diver- sity	Harvest	Hatchery	Pred. Comp.
	Ocean Climate	Forest Lands	Ag Lands	Urban Lands	Habitat Projects	Fish Passage		Habitat Connect	Flow	Quality		Near- Shore	Abund- ance				
Baseline/ Assessments		1,380	400	400	400		180			55	51		1,040				
Status/Trend					22			54	2,959	4,360	1,200	23,600		11,200	3,100	270	
Implementation		1	1	1	28	28	NP	30	part of status						64		
Effectiveness		938	38	38	94	94	2,000		580								
Validation									234	600					2,140		
Compliance					NA	NA		1,002	9,396			NA	NA				
Data QA/QC																	
Accessible Data																	
Adaptive Management																	
TOTAL	0	2,318	438	438	544	122	180	2,054	3,991	14,570	1,855	23,651	0	1,040	11,200	5,304	270

Grand Total = \$67,975,000 per biennium

NA=Not Applicable

This chart was derived from information obtained from the agencies and contained in the "Summary of Current Watershed Health and Salmon Monitoring" found at the end of this document.

Implementation Schedule

How Proposed New Monitoring Fills Monitoring Gaps

The table below is an overview of how Action Item priorities address the various kinds of monitoring needs to be comprehensive. Shaded areas are considered gaps and the shading is carried forward from the previous table "Current Monitoring Expenditures"

Monitoring Action	Habitat Processes			Habitat Projects	Fish Passage	Habitat Connect	Hydro-Power	Stream/Water			Fish Population			Harvest	Hatchery	Pred. Comp
	Forest Lands	Ag Lands	Urban Lands					Flow	Quality	Near-Shore	Abundance	Distribution	Diversity			
Baseline/ Assessments \$17,150					19,76,29 \$5,500	37 \$200		7,28 \$7,350		58 \$2,000			30,62 \$2,100			
Status/Trend \$35,475	6 \$510	6 \$510	6 \$510	29 \$250	4 TBD	4 TBD	57 \$170	17,27 \$22,470	6 \$510	22,25, 41,63 \$3,900	5,6,11, 18,36 \$3,587	5,6,31, 36,42 \$1,535	5 \$33	5,36 \$745	5,36 \$745	
Implementation \$490	3 \$0	3 \$0	3 \$0	3,29,48, 65 \$490	3 \$0	3 \$0	3 \$0	3 \$0	3,60,64 \$0	3 \$0	3 \$0	3 \$0	3,64 \$0	3,64 \$0	3 \$0	
Effectiveness \$25,081	20 \$816			4,29 \$250			57 \$170		35,39, 53,56 \$22,595	51 \$1,100				9 \$150		
Validation \$1,950	8,18 \$300	8,18 \$300	8,18 \$300	8,18 68,69, 70,71,72 \$300	8 \$50	8 \$50	8 \$50	8 \$50	8 \$50	8 \$50	8,10 \$50	8 \$50	8 \$50	8,9 \$200	8 \$50	8 \$50
Compliance \$27,404	20 \$816			59 \$172	NA	59 \$172			59,61,67 \$25,972	59 \$172		NA	NA	32 \$100		
Data QA/QC \$3,110	67 \$0	67 \$0	67 \$0	67 \$0	67 \$0	67 \$0	67 \$0	67 \$0	44,45,46, 47,49,67 \$1,100	67 \$0	16,26, 50,67 \$1,350	67 \$0	67 \$0	54,55,67 \$660	67 \$0	67 \$0
Accessible Data \$6,145	12,13, 21, 23 14,15, 33,38, 40,43 52,71, 72,73 \$553	12,13, 23, 14,15, 33,38, 40,43, 52,71, 72,73 \$553	12,13, 23, 14,15, 33,38, 40,43, 52,71, 72,73 \$553	12,13, 23,21, 14,15, 33,34, 38,40, 43,52, 71,72, 73 \$876	12,13, 23,14, 15,33, 21, 24,38, 43,52, 71,72, 73 \$719	12,13, 23,14, 15,33, 21,38, 43,52, 71,72, 73 \$605	12,14, 15,33, 38,43, 52,71, 72,73 \$134	12,14, 15,33, 38,40, 43, 52,71, 72,73 \$165	12,14, 15, 33,38, 40,43, 52,66, 71, 72,73 \$365	12,14, 15,33, 38,43, 52,71, 72,73 \$134	12,14, 15,24, 33, 38,43, 52,71, 72,73 \$248	12,14, 15,24, 33, 38,43, 52,71, 72,73 \$248	12,14, 15,24, 33, 38,43, 52,71, 72,73 \$248	12,14, 15,24, 33, 38,43, 52,71, 72,73 \$248	12,14, 15,24, 33, 38,43, 52,71, 72,73 \$248	12,14, 15,24, 33, 38,43, 52,71, 72,73 \$248
Adaptive Management \$304	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19	1,2 \$19
TOTAL \$117,109*	\$3,014	\$1,382	\$1,382	\$2,357	\$6,288	\$1,046	\$543	\$30,054	\$50,611	\$7,375	\$5,254	\$1,852	\$2,450	\$2,122	\$1,062	\$317

*Total off by 1,484 due to rounding of costs
 The Ocean Conditions section is not included as it is National Oceanic and Atmospheric Administration's (NOAA) responsibility. Numbers indicate the specific line item of a particular action item. Numbers with \$ indicate the total funds, in thousands of dollars, identified by the applicable actions listed. Where an activity applies to more than one column, the activity cost has been distributed.

Summary of Current Watershed Health & Salmon Monitoring

How to Interpret the Matrix Summary of Current Monitoring of Watershed Health and Salmon Recovery

The intent of the law is to promote “a framework of greater coordination of existing monitoring activities; [...] monitoring activities most relevant to adopted local, state, and federal watershed health objectives; and [...] the exchange of monitoring information with agencies and organizations carrying out watershed health, salmon recovery, and water resources management planning and programs.” We are specifically asked to: “Identify and evaluate monitoring activities for inclusion in the framework, while ensuring data consistency and coordination and the filling of monitoring gaps.” To accomplish this task, the activities of federal, state, and local government were evaluated in order to obtain a picture of current monitoring activities. This matrix is a condensation of detailed monitoring descriptions found in the respective longer versions of the Comprehensive Monitoring Strategy and the Summary.

In the matrix, monitoring activities are categorized by broad Monitoring Components such as “Freshwater Habitat.” Under Monitoring Component, each agency or entity that is known to be conducting monitoring and the kind of monitoring in Washington is listed. Many agencies perform more than one kind of monitoring activity. The last column Comments is an attempt to summarize the monitoring gaps and overlaps identified in the review of current monitoring activities. These gaps are actions that should or could be done to either improve precision, enhance quality control, improve coordination or to expand monitoring toward developing a comprehensive monitoring program. Overlaps are areas where there appears to be duplication of effort and where possible deficiencies can be found.

This matrix continues to be a work in progress as agencies review and critique the contents. As a refresher, the following definitions are provided for the various kinds of monitoring.

Inventory and Assessments: The starting place to initiate an adaptive management approach for watershed health and salmon recovery is to compile what we know and do not know about species of interest and their environments. For watershed health and salmon recovery, this includes watershed or other technical assessments, resource inventories, and other diagnostic analyses.

Status Monitoring: Characterizes existing conditions, a starting point for future comparison, and a reference point for “desired future condition.” Sampling requires enough random data points to obtain the desired level of certainty and precision.

Trend Monitoring: Measurements are taken at regular intervals. Describes characteristics of indicators over time. Must take into consideration natural variation between years in developing the validity of an inferred trend.

Effectiveness Monitoring: Was the action implemented effective in accomplishing its desired outcome? Example: Is the replaced culvert effective in passing fish?

Validation Monitoring: Monitoring that validates whether the original hypotheses about the causes and effects upon salmon production and watershed health are accurate.

Implementation Monitoring: Was the proposed action actually implemented? Usually a yes/no answer.

Compliance Monitoring: Is the activity being conducted in compliance with established standards or statutes?

Summary of Current Watershed Health & Salmon Monitoring

Glossary of Acronyms

ALEA	– Aquatic Lands Enhancement Account	PSAMP	– Puget Sound Ambient Monitoring Program
AREMP	– Aquatic and Riparian Effectiveness Monitoring Program (U.S. Forest Service)	PSMFC	– Pacific States Marine Fisheries Commission
BPA	– Bonneville Power Administration	SASSI	– Salmon and Steelhead Stock Inventory
CC	– Conservation Commission	SaSI	– Salmonid Stock Inventory
CWT	– Coded Wire Tag	SRFB	– Salmon Recovery Funding Board
DNR	– Department of Natural Resources	SRR	– Salmon Recovery Region
DOH	– Department of Health	SSHEAR	– Salmonid Screening, Habitat Enhancement and Restoration
ECY	– Department of Ecology	SSHIAIP	– Salmon and Steelhead Habitat Information and Assessment Project
EMAP	– Environmental Monitoring and Assessment Program	TMDL	– Total Maximum Daily Load
ESA	– Endangered Species Act	UEPRS	– Uniform Environmental Project Reporting System
FERC	– Federal Energy Regulatory Commission	USCG	– United States Coast Guard
FPA	– Forest Practices Act	USEPA	– United States Environmental Protection Agency
GIS	– Geographic Information System	USFS	– United States Forest Service
GSRO	– Governor’s Salmon Recovery Office	USFWS	– United States Fish and Wildlife Service
HCP	– Habitat Conservation Plan	USGS	– United States Geological Survey
IAC	– Interagency Committee for Outdoor Recreation	WAGIC	– Washington Geographic Information Council
LFA	– Limiting Factors Analysis	WDFW	– Washington Department of Fish and Wildlife
NMFS	– National Marine Fisheries Service	WEMAP	– Western Environmental Monitoring and Assessment Program
NOAA	– National Oceanic and Atmospheric Administration	WRIA	– Water Resource Inventory Area
NPDES	– National Pollutant Discharge Elimination System	WSDA	– Washington State Department of Agriculture
NWIFC	– Northwest Indian Fisheries Commission	WSDOT	– Washington State Department of Transportation
NWPPC	– Northwest Power Planning Council		
PRISM	– Project Information System		

Summary of Current Watershed Health & Salmon Monitoring

Current Watershed Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
Freshwater Habitat/Landscape Forming Processes	WDFW		SSHAP habitat database and GIS designed to contain coarse scale data on fish distribution, fish passage barriers and hydro layers. Not currently designed for status and trend monitoring in the form of EMAP. No federal or state funds allocated to SSHAP at the present time. RCW 77.85 Salmon Recovery Act	Ability to assess implication of some SSHEAR projects \$110-375K/yr RCW 77.85 Salmon Recovery Act		Monitoring of SSHEAR projects, ALEA projects, Salmon Recovery Scorecard C-1, K-2, L-4. \$100 300K/yr Contractual obligation	Monitor compliance with Hydraulic Project Permits. \$545K/yr Interagency - Commitment/ Salmon Scorecard	No status & trend habitat information for WDFW owned lands.
ECY			EMAP approach for select water quality, habitat, and biological indicators at the statewide scale only. Funding ends 2004. Costs= See Clean Water			(Scorecard C-1 is assigned to WDFW, Scorecard K-2 is assigned to IAC).		Funding ends 2004 Monitoring required for reporting under federal Clean Water Act Section 305(b).

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
DNR		Natural Heritage Program inventories rare species and habitats. \$350K/yr	None	Monitoring effectiveness of riparian silviculture, forest integrity, and instream aquatic conditions under HCP \$200K/yr		Salmon Recovery Scorecard C-1, K-2	DNR responsible for monitoring compliance with FPA. Salmon Recovery Scorecard H-2.	No status & trend monitoring on DNR lands. Coordination of fish passage barrier information with other agencies can be improved.
CC		Establishing baseline assessment of limiting factors by WRIA. \$800K/yr	N/A	N/A	N/A	Salmon Recovery Scorecard C-1, K-2, L-4		No effectiveness monitoring designed or funded for agricultural lands
WSDOT						Salmon Recovery Scorecard C-1, K-2	Monitors effectiveness of wetland mitigation projects. \$580K/yr	Monitors effectiveness of wetland mitigation projects. \$580K/yr
Parks		Salmon habitat assessments \$140K/yr			N/A	Salmon Recovery Scorecard, K-2		No status & trend monitoring on Parks lands.

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
Fish Passage Barriers	WDFW, WSDOT, DNR, USFWS, USFS, NWPPC, IAC, SFRB & Tribes	Some agencies have made partial inventories of their lands. \$260K/yr (Completed in 2007). Interagency commitments with agencies, local governments, tribes.	Developing status and trend monitoring on private timberlands. Not funded.	Developing monitoring of forest practice prescriptions on private timberlands. \$250K/yr	Developing intensive monitoring of cause and effect relationships between prescriptions and habitat and fish indicators. Not funded.	Private industry responsible for implementation of prescriptions.	DNR responsible for monitoring compliance with FPA, Salmon Recovery Scorecard H-2. No program in place.	No comprehensive inventory of barriers and screens.
								Some individual projects are determining the effectiveness of their project in passing fish and in creating additional miles of habitat. SFRB = \$47K/yr est. Contractual obligations.
Habitat Connectivity	WDFW & Tribes	Some information exists in SSHIAP database. No federal or state funds allocated to SSHIAP at the present time. RCW 77.85 Salmon Recovery Act.						No comprehensive inventory of habitat connectivity. No statewide approach to determining effectiveness of money spent. No comprehensive analysis of barriers projects implemented as a whole.

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
Hydropower	State			<p>Some projects have funded evaluation of the effectiveness of habitat restoration mitigation requirements.</p> <p>\$1,000K/yr fed/local dollars WDFW</p> <p>FERC license requirements; ESA Section 7 and 10 authorities; HCP commitments; contractual obligations.</p>		<p>Individual agencies review individual projects for implementation of mitigation requirements associated with the project.</p> <p>Negotiations and direct interactions with FERC. \$158K/yr</p> <p>FERC license requirements; ESA Section 7 and 10 authorities; HCP commitments; contractual obligations.</p>		<p>No status or trend information on the overall progress of hydropower in improving performance.</p> <p>No comprehensive inventory of performance of hydropower and dams.</p>
Stream flow	USGS		Over 200 gauging stations maintained over many decades.					

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
	ECY		<p>Base Program - Maintain array of 13 continuous and 12 instantaneous flow gauging stations. \$127.5K/yr</p> <p>2002 Legislative Add - install 40 continuous and 30 instantaneous flow gauging stations in 5 priority watersheds. \$631K/yr</p> <p>BPA Contract - install 40 continuous and 30 instantaneous flow gauging stations in 5 priority watersheds. \$388K total for FY02</p> <p>SREB grant - install 48 continuous and 24 instantaneous flow gauging stations in 4 priority watersheds. \$333K/yr</p>		<p>Salmon Index Watershed Project - Monitors surface waters in specific watersheds. \$46K/yr</p>	<p>Scorecard D-1 <\$15K/yr</p>	<p>Monitor instream flow compliance and metering compliance. \$316K/yr</p> <p>Flow monitoring to support IFM work \$66.5K</p> <p>Flow monitoring to support TMDLs \$118.5K</p>	<p>Numerous mainstem rivers and tributaries do not have stream flow gauging stations or instream flow requirements.</p> <p>Most water with-drawals are not metered.</p> <p>Streamflow monitoring is conducted under direction of the following authorities: Federal Clean Water Act – Delegation: 90.48.260; Puget Sound Water Quality Mgt Plan: Chapters 90.70.055, 90.70.060 & 90.70.065 RCW; Stream flow enhancement in 5 critical basins: ESSB 6153</p> <p>Monitoring to support instream flow setting: Chapters 43.231A.080, 90.22.90.54, 90.82 & 77.5.RCW.</p>
Clean Water	USEPA		<p>Evaluates national and regional (Pacific Northwest) status and trends of water quality using EMAP sampling protocol. Western Region work expires in 2004.</p> <p>Monitors whether grants provided to the state for water quality improvements and monitoring were implemented.</p> <p>Monitors State compliance with the Clean Water Act.</p>					

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
	ECY		Uses EMAP design to monitor status of biological, chemical, and physical indicators in wadeable streams and marine waters. Funding by USEPA expires in 2004. \$447K/yr	Measures and evaluates surface waters to determine if pollutant load reductions required under TMDLs result in meeting standards. \$290K/yr	Salmon Index Watershed Project - Monitors surface waters in specific watersheds. \$117/yr	Scorecard E-2 Monitoring costs shown under "Status and Trends Monitoring".	Monitors State compliance with the Clean Water Act. Investigative monitoring of impaired waters. \$4,698K/yr	Periodic measurements of water quality indicators are not made for many management activities (TMDLs, state grant projects). Water Quality Index cannot be extrapolated to provide statewide estimates as described in Scorecard E-2. Most of the 350 indicators identified are not measured using the EMAP sampling design. Periodic measurements of most water quality indicators in standards are not made. Monitoring required under Federal Clean Water Act Sections 305(b) & 303(d), USC 33.1254, USC 33.1313, Chapters 90.48.260 RCW, Federal Clean Water Act - Delegation, 90.48.260, Puget Sound Water Quality Mgt Plan: Chapters 90.70.055, 90.70.060 & 90.70.065 RCW

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
	WSDA		Measure pesticide residue levels in surface waters that provide habitat for ESA listed salmon 290K/yr sampling contracted to ECY					Current monitoring data does not provide accurate magnitude or frequency of pesticide residues in salmonid habitat.
	DOH						Monitors status of shellfish harvest safety. \$456K/yr	
							Monitors for fish tissue consumption safety.	
	WDFW		Measures liver disease in English sole in Puget Sound. Measures contaminants in tissues of English sole, coho salmon, Pacific herring and demersal rockfish in Puget Sound. Monitors alterations in reproductive health in English sole and demersal rockfish. \$357K/yr					
								Intergency Commitment /PSAMP; Legislative Proviso
Nearshore Marine Habitat	ECY					Scorecard C-4 is assigned to PSAT.		No comprehensive monitoring of habitat in nearshore waters.

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
Salmon Recovery Funding Entities	SRFB, IAC	Requests use of assessments for project lists.	Some projects identify effectiveness monitoring.	Currently tracking implementation of habitat restoration projects. Scorecard C-2, K-2.	No follow-up to effectiveness monitoring that occurs, and the results are not tracked. No validation, or cause-effect monitoring.			
		Statewide inventory of marine and estuarine nearshore habitats for vegetation, substrate, shoreline modifications, structures, energy levels; includes subtidal and intertidal kelp and eelgrass, salt marshes, bulkheads (PSAMP component).	Monitors status and trends of nearshore eelgrass, kelp and intertidal biota using rotational random stratified sampling design, \$600K/yr (PSAMP Component, provisory funding)	Monitoring of all ALEA restoration projects; compensatory mitigation on state owned aquatic lands. \$212K/yr	Monitors dredged material sites \$300K/yr Part of eelgrass status and trend monitoring program to link stressors to change in eelgrass abundance and distribution (PSAMP Component)	Monitoring of all ALEA restoration projects.	All use authorizations; all ALEA restoration projects.	
			Ongoing monitoring of status and trends of nearshore habitats and processes. Currently proviso ALEA monies that leverage matching money from the Army Corp of Engineers. ALEA contribution: \$450K/yr					

Summary of Current Watershed Health & Salmon Monitoring

Current Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
Spawner Abundance (Escapement)	WDFW & Tribes	SASI Document updated every 10 years \$51K/yr	Estimated annually for 323 stocks. Spawner survey \$4,900K/yr Mass marking \$2,450K/yr Total = \$7,350K/yr U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; USFWS Section 6 Cooperative Agreement; Section 7 and 10 ESA authorities; Interagency Contracts	N/A	N/A	Spawner abundance tracked in Salmon Recovery scorecard A-1, A-2 and Action Plan. U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; USFWS Section 6 Cooperative Agreement; Section 7 and 10 ESA authorities; Interagency Contracts	N/A	212 anadromous stocks not monitored. Majority of chinook, coho, pink, chum, and sockeye stocks are monitored.

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
Juvenile Migrant Salmon (smolt trapping)	WDFW & Tribes	SaSI Document updated every 10 years	Trapping occurs at 34 sites statewide. Need more trap sites such that 10% of stocks in SRR are monitored. \$1,200K/yr of which \$454K is GF State U.S. v. Washington U.S. v. Oregon: Pacific Salmon Treaty: USFWS Section 6 Cooperative Agreement: Section 7 and 10 ESA authorities: Interagency Contracts		N/A	Smolt Trapping tracked in Salmon Recovery Scorecard A-2 and State Action Plan. \$166K/yr of which \$84K GF State U.S. v. Washington: U.S. v. Oregon: Pacific Salmon Treaty: USFWS Section 6 Cooperative Agreement: Section 7 and 10 ESA authorities: Interagency Contracts	N/A	393 anadromous stocks not monitored.
Resident Trout Abundance	WDFW & Tribes		Some spawner and juvenile density data. Cost = \$470K/yr USFWS Section 6 Cooperative Agreement: Interagency Contracts					No comprehensive approach to monitoring bull trout or cutthroat trout.

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
Production & Productivity	WDFW & Tribes		Productivity is estimated for chinook, coho, sockeye at juvenile migrant index sites. Marine survival estimates at 3 sites CWT program is essential tool for run reconstruction. CWT = \$2,700K/yr of which 30K is GF State Fish Aging = \$80K/yr U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; Section 7 and 10 ESA authorities.		Hatchery U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; Section 7 and 10 ESA authorities.	Scorecard A-2 Included under Juvenile Migrant Salmon U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; Section 7 and 10 ESA authorities.		Run reconstruction not available for many stocks, and not available for independent scientific review and scrutiny.
Geographic distribution	WDFW & Tribes	Currently integrating fish distribution information from LFA, SSHAP, and Streamnet. Data will be linked to 1:24000 hydro in SSHAP. \$17K/yr Interagency Contract						No statewide systematic approach.

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
Salmon Diversity	WDFW, NMFS, & Tribes	SASI document updated every 10 years. Stock reports every 3 years \$149K/yr U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty	Baseline levels of genetic diversity for most stocks have been established using protein allozyme analysis. \$520K/yr mixed funds					Status of existing populations, gene diversity units, and major ancestral lineages need to be evaluated using DNA analysis.

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
Harvest	WDFW & USFWS, NMFS Tribes		Estimates annual total harvest for identified indicator salmon stocks statewide by user type.		Selective fishery research. 338K/yr U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; Section 7 and 10 ESA authorities; NMFS 4(d) Rule/FMEPs; U.S. District Court Stipulation and Order Concerning Comanagement and Mass Marking (1997).	Monitored annually by the NMFS and the Salmon Recovery Scorecard G-1. U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; Section 7 and 10 ESA authorities; NMFS 4(d) Rule /FMEPs; U.S. District Court Stipulation and Order Concerning Comanagement and Mass Marking (1997).	Enforcement provides compliance actions by monitoring compliance rate Scorecard H-1 USFWS & NMFS monitor ESA compliance U.S. v. Washington; U.S. v. Oregon; Pacific Salmon Treaty; Section 7 and 10 ESA authorities; NMFS 4(d) Rule/FMEPs; U.S. District Court Stipulation and Order Concerning Comanagement and Mass Marking (1997).	Not all populations are monitored and modeled for harvest impacts. Compliance monitoring not done with statistical precision or in a consistent manner. Effectiveness of harvest restrictions not formally evaluated and reported post season.

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
Hatcheries	WDFW & Tribes, USEWS NMFS		<p>Future brood document tracks number of fish released: \$80-100K/yr</p> <p>Also track trends in number of spawners returning to hatchery: \$350-550K/yr - State \$800-1000K/yr- Mitigation Funds</p> <p>U.S. v. Washington: U.S. v. Oregon: HCP commitments: Lower Snake River Compensation Plan: Mitchell Act Mitigation: General Hydropower Management Agreements: ESA Section 7 and 10 authorities: NMFS 4(d) Rule/HGMPs.</p>		<p>Supplementation research. Hatchery vs. wild interactions research. Selected projects mostly funded by federal dollars exploring the effect of hatchery salmon on wild populations.</p> <p>\$3,213K/yr of which \$151K are GF State</p> <p>U.S. v. Washington: U.S. v. Oregon: HCP commitments: Lower Snake River Compensation Plan: Mitchell Act Mitigation: General Hydropower Management Agreements: ESA Section 7 and 10 authorities: NMFS 4(d) Rule/HGMPs.</p>	<p>Current policies in existence for disease, passage, marking, etc. for best management practices: \$32K/yr</p> <p>Salmon Recovery Scorecard F-1 State Action Plan.</p> <p>\$267K/yr of which \$140K is GF State</p> <p>U.S. v. Washington: U.S. v. Oregon: HCP commitments: Lower Snake River Compensation Plan: Mitchell Act Mitigation: General Hydropower Management Agreements: ESA Section 7 and 10 authorities: NMFS 4(d) Rule/HGMPs.</p>	<p>Per hatchery genetic management plans under 4(d).</p> <p>See Implementation Monitoring: U.S. v. Washington: U.S. v. Oregon: HCP commitments: Lower Snake River Compensation Plan: Mitchell Act Mitigation: General Hydropower Management Agreements: ESA Section 7 and 10 authorities: NMFS 4(d) Rule/HGMPs.</p>	

Summary of Current Watershed Health & Salmon Monitoring

Monitoring Component	Agency	Inventory & Assessments	Status and Trend Monitoring	Effectiveness Monitoring	Validation Monitoring (Cause and Effect Monitoring)	Implementation Monitoring	Compliance Monitoring	Comments
Predation/Competition	WDFW		Monitors the extent of the range of the green crab, mitten crab, zebra mussel, Spartina, purple loosestrife, and other exotic species in competition with salmon. \$135K/yr (Note: the cost for monitoring Spartina and purple loosestrife are not available.) Conducts Hood Canal seal predation study RCW 77.60.130: Interagency Aquatic Nuisance Plan Legislative Proviso		Species interaction research. RCW 77.60.130: Interagency Aquatic Nuisance Plan. Legislative Proviso			

Summary of Current Watershed Health & Salmon Monitoring

Current State Agency Data Bases, Proposed Uses

Database	Agency	Monitoring Component	Current Use	Updated	Data Access	GIS Coverage	Proposed Use	Comments
SASI	WDFW & Tribes	Salmon abundance, harvest, stock identification, production, diversity, distribution. 51K/yr.	Used as a reference document by State and local governments for mgmt and recovery planning.	Status and reports every 3 years.	Email will be available on Web by end of 2002.	No Currently tabular, but GIS by 2003	Update spawner abundance, juvenile migrants, run reconstructions annually. Will be available through Web Portal and WDFW websites as downloadable, viewable.	Stock assessment Data (such as escapement, run size, juvenile abundance) collected annually. Analysis and Assessment updated as resources are available.
SSHAP	WDFW & Tribes	Riparian habitat, landscape forming processes, in-stream habitat, channel connectivity at coarse spatial scales. Not designed as a monitoring program but could be used as a spatial template onto which data can be attached.	Use limited to specific areas where data are complete and certain agencies.	As can, given staff and information available.	Portions of state are Web downloadable. Rest of state Hard copy.	Yes	<p>Accessible through Web Portal.</p> <p>Update key indicators annually and statewide.</p> <p>Consolidate into one universal habitat inventory with user friendly interface.</p> <p>Improve coordination between WDFW and NWIFC data collection efforts.</p> <p>Complete statewide data collection of confinement, modeling width and flow, and fish distribution update.</p> <p>Enable direct data entry from selected watershed groups, counties, etc. Collecting local information for the GIS data layers.</p>	<p>Currently completed for only a few watersheds.</p> <p>Inconsistent funding has hampered efforts to complete database in a timely manner.</p> <p>Multiple versions exist, with different methods of deriving and storing data.</p>

Summary of Current Watershed Health & Salmon Monitoring

Database	Agency	Monitoring Component	Current Use	Updated	Data Access	GIS Coverage	Proposed Use	Comments
HPA	WDFW	Habitat restoration projects. \$110K/yr	Processes applications for permits and stores data about projects in state waters.	Continuous	Email, hard copy	No	Accessible through Web Portal. Use new web enabled permit application and tracking process. Consolidate into one universal project inventory that will include information about implementation and effectiveness.	Funding limitations preclude implementation and effectiveness monitoring. Does not include upland projects designed to improve instream conditions.
CWT Recoveries	WDFW & Tribes	Harvest Distribution and Salmon Production \$72K/yr	Used to track recoveries of coded wire tags from harvested fish worldwide.	Continuous	Web download, web viewable. Email, hard copy	No	Accessible through Web Portal.	
Smolt Monitoring	WDFW	Salmon abundance and production	Used to track trends in smolt production for selected watersheds.	Annual	Email, hard copy Web access provided by 2003	No	Accessible through Web Portal.	
Video Acoustic Surveys	WDFW	Salmon Abundance \$105K/yr	Monitors fish passage of adult salmon.	Annual	Email	Yes	Accessible through Web Portal.	
Puget Sound Bottom Trawl	WDFW	Salmon abundance, water quality \$98K/yr	Picks up individual salmon as part of food chain, and disease.	Annual	Email	Yes	Accessible through Web Portal.	
SSHARBase	WDFW	Fish passage barriers, habitat restoration projects \$397K/yr	Provides information on habitat projects implemented and some information of those that were effective. Contains information from DOT, IAC, and WDFW.	Annual	Email	No	Accessible through Web Portal. Feeder database to new universal barrier inventory. Integrate DNR 1998 inventory.	Includes only 10-15% of culvert crossings in state. Doesn't include DNR 1998 inventory due to volume of records and limited staffing. Public interest in barrier data is huge.
PSAMP Fish	WDFW	Fish abundance and water quality	Provides information on incidence of PCBs and other toxins in Puget Sound fish.	Annual	Email	Yes	Accessible through Web Portal.	

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Commercial Fish Landings LIFT	WDFW & Tribes	Commercial Harvest \$72K/yr	Used to document harvest in all commercial fisheries statewide.	Episodic	Email Hard copy	No	Accessible through Web Portal.	
Sport Catch Record Card	WDFW	Sport harvest \$316K/yr	Used to document harvest in all sport salmon fisheries statewide.	Annual	Web downloadable, Email	No	Accessible through Web Portal.	
Ocean sampling	WDFW	Sport and Commercial harvest	Used to document ocean sport fisheries along the coast and Puget Sound, and commercial ocean troll fisheries and mouth of Columbia sport fisheries.	Annual	Web downloadable, email	No	Accessible through Web Portal.	
Hatcheries	WDFW	Hatcheries \$350K/yr	Used to document fish planted, fish marked, adult returns, etc.	Varies	Web viewable, email, hardcopy	No	Accessible through Web Portal.	
Salmonid Spawning Ground	WDFW	Salmon abundance \$10K/yr	Database is built from seasonal systematic surveys of index areas and supplemental stream sections for evidence of adult spawning activity for Puget Sound, Strait of Juan de Fuca and Washington coast.	Seasonal	Email, Hardcopy Data currently being migrated into a PC database	No	Accessible through Web Portal.	
PSAMP Sediment	ECY	Water Quality	Detects sediment composition of marine waters.	Annual	Web Downloadable, Web viewable, Web requested, Email, Hardcopy	No	Accessible through Web Portal.	
WEMAP	ECY	Water Quality	Used to detect status of marine water quality. Funded by USEPA as part of coastal project.	Annual	Web Downloadable, Email	Yes	Accessible through Web Portal.	

Summary of Current Watershed Health & Salmon Monitoring

Database	Agency	Monitoring Component	Current Use	Updated	Data Access	GIS Coverage	Proposed Use	Comments
PSAMP Marine	ECY	Water Quality	Used to create status of Puget Sound water quality.	Monthly	Web Downloadable, Web viewable, Web requested, Email, Hardcopy	Yes	Accessible through Web Portal.	
Stream Flow	ECY	Flow	Used to determine status trends and effectiveness of instream flow requirements.	Continuous	Web Downloadable, Web viewable, Web requested, Email, Hardcopy	Yes	Accessible through Web Portal.	
Freshwater River and Stream	ECY	Water Quality	Used to determine status trends and effectiveness of water quality requirements.	Monthly	Web Downloadable, Web viewable, Web requested, Email, Hardcopy	Yes	Accessible through Web Portal.	
Freshwater Bioassessment	ECY	Water Quality	Used to assess biological health from stream benthic macroinvertebrates.	Annual	Email, Hard copy	Yes		
Environmental Information Management (EIM)	ECY	Water Quality	Used for water quality assessments of surface and ground waters.	Episodic	Web Downloadable, Email, Hardcopy	No	Accessible through Web Portal.	
Hydrography	DNR	Freshwater Habitat/Landscape Forming Activities \$75K/yr	Used as overlay for GIS based information for watershed assessments, fish distribution, water quality. Serves as official repository of Forest Practices Water Typing System.	Varies	Email	Yes	Accessible through Web Portal. Foundation coverage for many systems. Complete WA hydro framework and integrate with barrier, and project inventories.	Major data development work funded federally in FY 02-03. Complete statewide at 1:24,000 scale.
Northwest Hydrography Framework	WAGIC OR/WA Hydrography Framework Group (Interagency)	Freshwater Habitat Landscape Forming Activities	Use as overlay for GIS based information for watershed assessments, fish distribution, water quality.	Varies	Web Downloadable WDFW will complete 1:24,000 scale layer in fall 2002.	Yes	Accessible through Web Portal. Foundation coverage for many systems. Integrate with habitat, barrier, fish, project, and air/water/land data.	Currently completed only for 1:100,000 scale Needs to be completed to 1:24,000 scale for adequate accuracy.

Summary of Current Watershed Health & Salmon Monitoring

Database	Agency	Monitoring Component	Current Use	Updated	Data Access	GIS Coverage	Proposed Use	Comments
Transportation	DNR	Fish passage barriers Freshwater Habitat/ Landscape Forming Activities \$55K/yr	GIS layer identifies bridges, culverts, gates, and fish passage barriers on state forest lands.	Varies	Email, Hardcopy	Yes	Accessible through Web Portal.	Major data development work funded federally in FY 02-03.
Hazard Zonation-Landslide Inventory	DNR	Freshwater Habitat/ Landscape Forming Activities \$2.195m through 2006.	Provides GIS overlay of status of all available landslide inventories.	Varies	Email	Yes	Accessible through Web Portal.	
Aquatic Lands enhancement	DNR	Freshwater Habitat/ Landscape Forming Activities \$119K/yr	Used to track projects funded with ALEA money.	Varies	Not Available	No	Should be associated with other databases for testing implementation and effectiveness of habitat restoration projects.	
Dredged Material Management	DNR	Freshwater Habitat/ Landscape Forming Activities \$26K/yr	Used to track open water dredged material disposal sites.	Varies	Email hard copy	No		
Nearshore Habitat Program	DNR	Nearshore marine habitats \$600K/yr	Inventories intertidal and shallow subtidal habitats. Inventories eelgrass abundance, canopy forming kelp, intertidal resident biotic communities.	Varies	Web Downloadable Email hard copy	Yes	Accessible through Web Portal.	
Natural Heritage Info System	DNR	Freshwater Habitat/ Landscape Forming Activities \$350K/yr	Maintains GIS and tabular data on the state's significant ecological features including rare species and high quality terrestrial and aquatic communities.	Varies	Not available	Yes	Accessible through Web Portal.	

Summary of Current Watershed Health & Salmon Monitoring

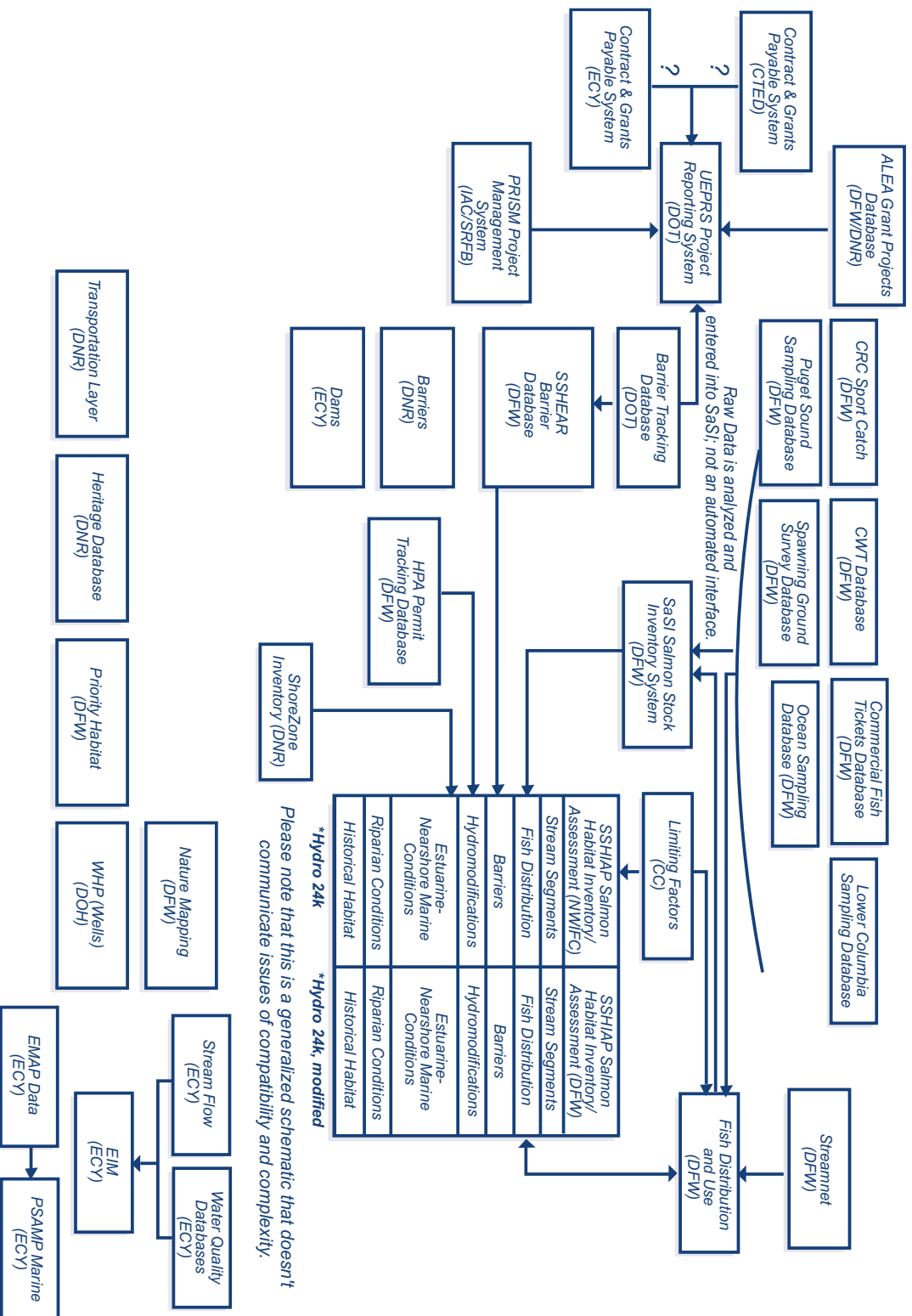
Database	Agency	Monitoring Component	Current Use	Updated	Data Access	GIS Coverage	Proposed Use	Comments
Prism	IAC/SRFB	Habitat Restoration Projects	Tracks applications and implementation of habitat restoration projects funded by the Salmon Recovery Funding Board.	Continuous	Email Hardcopy	Yes	Expand database to include tracking effectiveness of restoration projects.	Does not contain data about project effectiveness.
Salmon Habitat Limiting Factor Analysis	CC	Freshwater Habitat/Landscape Forming Activities \$800K/yr	Inventory of factors identified as limiting salmon production for each watershed (WRIA).	Episodic	Web downloadable, Web viewable email	Yes	Accessible through Web Portal.	
Salmon recovery - Resource stewardship	Parks	Freshwater Habitat/Landscape Forming Activities \$113K/yr	Assessment of quality of salmon habitat within state parks.	Episodic	Email, hard copy	Yes		
Wetland Monitoring Program	WSDOT	Freshwater Habitat/Landscape Forming Activities \$585K/yr	Tracks effectiveness of wetland mitigation projects associated with road building.	Episodic	Hard copy, Web viewable	Yes		
UEPRS	WSDOT	Habitat Restoration Projects	Intended to be used by multiple agencies to encourage partnering and to track status of environmental projects including wetland mitigation effectiveness projects.	Varies	Web downloadable Web viewable Email hard copy	Yes	Utilize components of UEPRS to develop universal project inventory.	Contains only state funded projects. Does not track effectiveness.

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Database	Agency	Monitoring Component	Current Use	Updated	Data Access	GIS Coverage	Proposed Use	Comments
Nature mapping	WDFW, UW, ECY	Currently monitors some water quality components.	Has received over 200,000 wildlife observations for 419 species reported in Washington State and 18 records from Oregon as part of gap analysis in cooperation with USGS.	Varies	Web viewable	Yes	Increase usage to reduce costs involved in tracking the distribution of salmon species and conventional water quality measures.	Has potential for use as a cost saving tool, with clear guidelines for its use.
			Volunteers also collect water quality data.				Establish strategies and guidelines for use of data. Accessible through Web Portal.	

Summary of Current Watershed Health & Salmon Monitoring

Current Interfaces



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