

VII. MONITORING AND ADAPTIVE MANAGEMENT

Monitoring is a key element in fulfilling the Washington Department of Fish and Wildlife's mission of preserving and perpetuating Washington's fish and wildlife resources. This is directly reflected in the 94 detailed performance measures included within WDFW's biennial strategic plan. An example of a performance measure is the number of Western pond turtles hatched in captivity and released to the wild. The performance measures are updated quarterly or annually, making the strategic plan a coarse-level tool for tracking progress of agency priorities. It summarizes data developed from more in-depth monitoring of fish, wildlife and habitat resource conditions.

WDFW engages in four general types of monitoring activities as defined below:

- *Status and Trends (extensive) monitoring* to track changes in wildlife and fish populations and their associated habitats over time, such as tracking the population status of four target species in a bioreserve.
- *Research (intensive) monitoring* to identify cause-and-effect relationships between physical habitat conditions, ecological processes, land use practices and/or conservation strategies and the animal populations of interest, such as identifying the factors contributing to a population decline in one of the target species in a bioreserve.
- *Effectiveness monitoring* to document the success of conservation actions in achieving the desired resource condition, such as determining whether a prescribed burn on the bioreserve achieved the desired result of maintaining a plant community of native prairie grasses.
- *Implementation monitoring*, or compliance monitoring, to confirm that planned conservations were implemented, such as documenting that a bioreserve was created to preserve habitat for four target species.

While the state Comprehensive Wildlife Conservation Strategy is required only to address status and trend monitoring and effectiveness monitoring, WDFW believes that research and implementation monitoring are also important in achieving success in our conservation actions. WDFW monitoring activities are therefore described by each of these four categories in turn. Monitoring programs are designed to answer specific research questions. The sampling protocols and design, including the spatial and temporal scale of the monitoring effort and the timeframe for reviewing the adequacy of the monitoring program, are thus driven by traits of the species or species group being studied, such as size and home range, reproductive strategy, life history, etc. Because of the unique methodology often required to answer specific research questions, monitoring can be very costly. Where feasible, new WDFW monitoring programs incorporate existing data and surveys and collaborate with monitoring partners.

The sections that follow provide an overview of WDFW monitoring program highlights and refer the reader to more detailed plans and programs described in the CWCS appendices. Agency tools employed to conduct monitoring programs are also described. To enhance monitoring capabilities, WDFW has relied on a great number of partnerships, which are outlined in this chapter. Finally, this chapter identifies future directions for monitoring and outlines a plan for adaptive management and future revisions of the monitoring component of the CWCS.

A. Status and Trends

Various fish and wildlife species, groups of species, and their associated habitats are currently monitored by WDFW and other conservation partners to determine changes and trends in their status over time. Development of the Comprehensive Wildlife Conservation Strategy (CWCS) in 2005 resulted in a new Species of Greatest Conservation Need (SGCN) list for Washington (Appendices 1 and 2). This also led to WDFW reexamining how it classifies and prioritizes wildlife species and associated habitats in light of new funding requirements and expectations of the State Wildlife Grants program. Monitoring activities are currently in place for some of the roughly 200 species included in the SGCN. Specific monitoring activities for each species are listed in the SGCN Population, Distribution, Problems, Strategies and Actions matrices (see Chapter IV, Species of Greatest Conservation Need). For the species for which monitoring is not currently underway, an explanation is also included in the above referenced appendices. WDFW will rely on the monitoring information compiled in Chapter IV to identify species that are currently inadequately monitored and to develop a strategy for developing a monitoring program for those species.

Species of Greatest Conservation Need and Associated Habitat

WDFW categorizes wildlife species into two broad groups to determine monitoring objectives, methods, outcomes and use of survey data. Wildlife diversity species include those species that are not hunted within the state; game wildlife is the traditional group of species that are hunted and provide consumptive recreation.

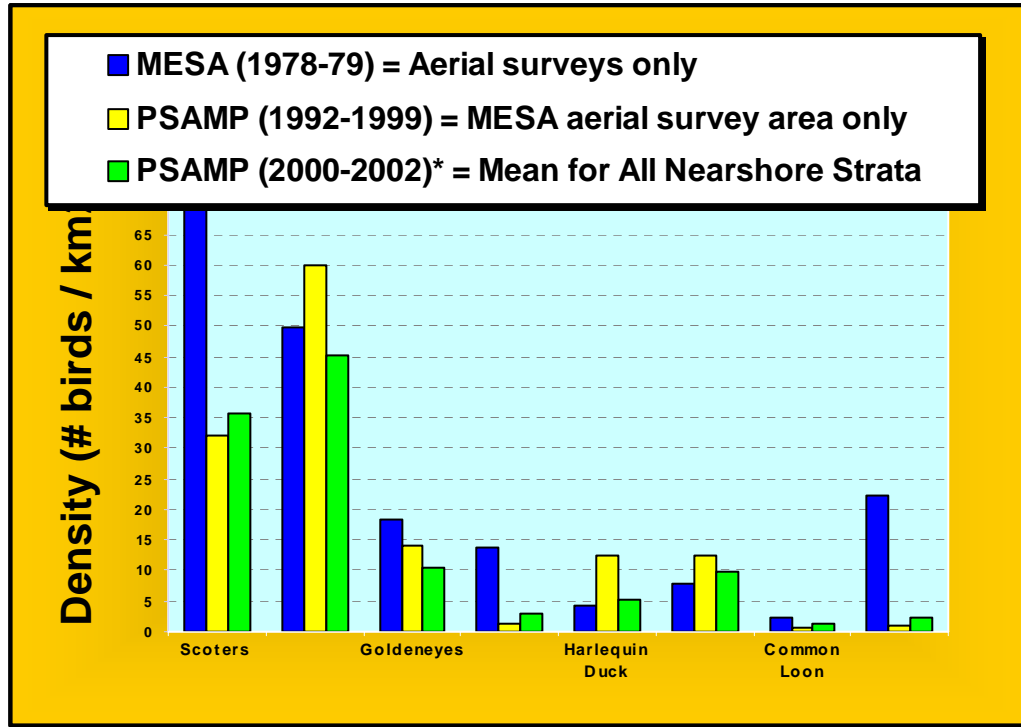
Wildlife Diversity Species Monitoring

Monitoring activities for wildlife diversity species were initiated in the 1970s within the former Washington Department of Game when interest in non-hunted species gained momentum, and the Wildlife Diversity Division was created (<http://wdfw.wa.gov/wlm/diversty/diversty.htm>). Baseline surveys or complete inventories are conducted to determine population numbers and distribution of wildlife species. Monitoring is structured as an annual activity or at periodic intervals of multiple years. Most of the surveys to date have concentrated on Washington species of concern—the endangered, threatened and candidate species. The objectives have been to determine status and trends of those species for the development of status review documents, recovery plans and landscape management plans such as Habitat Conservation Plans.

Population status monitoring of marine birds and waterfowl was initiated in 1992 through the Puget Sound Ambient Monitoring Program (PSAMP) (<http://wdfw.wa.gov/mapping/psamp/>). Aerial surveys of nearshore and offshore strata have been the primary tools used for monitoring marine birds and waterfowl throughout Washington's inner marine waters. These data, incorporated into GIS mapping systems, help describe spatial patterns in habitat use and changes in relative population indices over time. Other focus studies, concentrating on selected species and their particular demographics and habitat use, have been initiated after review of the apparent declines suggested by the aerial survey data. These efforts are helping to determine how marine avian species in the inner marine waters of Washington are responding to a changing marine environment as well as helping managers evaluate how different species depend on Washington habitats at critical stages in their life histories. This work has enabled comparisons with earlier data sets such as those collected during 1978-79 as part of the Marine Ecosystem Analysis (MESA) program administered by the National Oceanic and Atmospheric

Administration (NOAA). WDFW staff determined trends in densities over the 20-year interval for 18 species or key species groups that winter in Puget Sound (Figure 36).

Figure 36. Population status and monitoring of marine birds in Washington: Comparison of Relative Density Indices for Eight Species or Species Groups over the 1978-2002 period in Nearshore Waters of Inner Marine Waters of Washington.



Immediate needs for species protection, conservation and management have been the impetus for monitoring species such as spotted owls, marbled murrelets, sage-grouse, pygmy rabbits, peregrine falcons and bald eagles. As species such as peregrine falcons and bald eagles are delisted, their survey and monitoring needs change. For the purpose of site-specific environmental review data or management needs, baseline surveys for these species are done on an as-needed basis. More importantly, however, delisted species are monitored on a long-range plan to determine whether their populations start to decline again. The monitoring plans for peregrine falcons and bald eagles are designed to detect changes at a national level and apply sampling survey protocols that are designed to detect an established percentage of population declines that will trigger management actions.

In addition to monitoring species of concern, there is a growing need to initiate monitoring activities for the less familiar species listed in the SGCN. Baseline population status surveys for these species are hampered by a lack of knowledge of much of their biology and distribution. This is especially true for reptiles, amphibians and invertebrates. We also lack basic population information on many species that have been overlooked because they have been considered common, but may now be experiencing population declines from unknown causes. The great blue heron in western Washington, long a familiar icon of Puget Sound's rich fauna, is a good example. It has been losing nesting colonies at a steady rate.

Game Monitoring

Game species are monitored to evaluate their trends relative to the effects of different types of hunting seasons and to determine the numbers of animals that may be harvested when developing or modifying hunting seasons. Examples of these are pre- and post-hunting season big game surveys for elk, deer, bighorn sheep and moose. Breeding population surveys, midwinter counts and banding are conducted for waterfowl.

More information on game species monitoring is available in the WDFW Game Management July 2003-June 2009 and the Final Environmental Impact Statement for the Game Management Plan July 2003-June 2009, available at <http://wdfw.wa.gov/wlm/game/management/>.

Fish Species and Associated Habitat

Salmonids

WDFW has been monitoring Washington's wild salmonids since 1977. WDFW maps the geographic extent of spawning and rearing of salmonids throughout Washington, and data are updated on a three-year cycle. WDFW and co-manager treaty tribes conduct spawning surveys of 323 stocks of salmon and trout annually, and measure juvenile migrant production of salmon and trout at 34 locations statewide. Developing estimates of wild salmon production involves mass marking (adipose fin clipping) of an estimated 340 million hatchery salmon every year. WDFW annually monitors the status of all legally installed fish passage barrier repairs and reports the number of blockages discovered by inventory groups to assess progress in meeting state and federal salmon recovery goals.

Marine Groundfish and Forage Fish

Marine groundfish and forage fish abundance are estimated through a variety of survey types such as trawl, video and acoustics, and monitoring of catch and effort data. WDFW conducts periodic surveys on the distribution of forage fish eggs on a small percentage of spawning beaches each year to assist local governments in characterizing and protecting important nearshore habitats.

Shellfish

Shellfish (such as geoduck, razor clam and oyster) abundance is estimated through dive surveys, sampling at index sites and monitoring of catch and effort data.

B. Research Monitoring

Species of Greatest Conservation Need and Associated Habitat

A broad array of ecological research is underway at WDFW with the objective of deducing causal relationships between physical habitat, ecological processes, conservation actions and wildlife and populations. The brief summary included in this chapter lists some of the more prominent studies currently conducted by WDFW.

Several studies focus on the causal relationships between conservation management actions and target wildlife species. These include the impacts of the federal Conservation Reserve Program (CRP) on shrub-steppe wildlife, the reintroduction and monitoring of sharp-tailed grouse, and pygmy rabbit captive breeding. Population ecology monitoring is conducted for large raptors, mountain goats, tufted puffins,

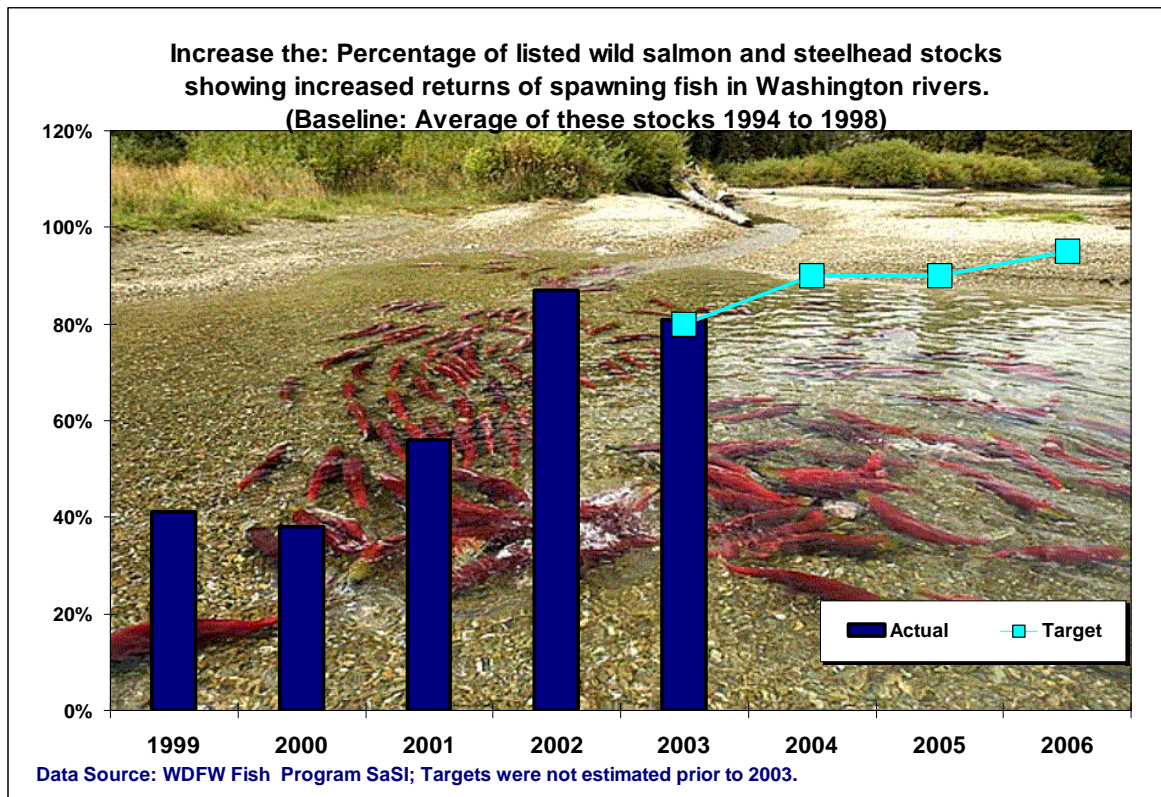
northern leopard frogs and Columbian white-tailed deer. Habitat relationship studies are carried out for Washington ground squirrels and western gray squirrels. Studies of the effects of disease and toxicology are underway for deer (notoedric mange) and marine mammals (PCBs, PBDEs) in killer whales.

Fish Species and Associated Habitat

Salmonids

Intensive research monitoring for salmonids is generally referred to as validation monitoring because the great body of knowledge surrounding anadromous salmon allows for hypothesis testing of the population response to specific management actions. WDFW conducts validation monitoring to also periodically reevaluate anadromous salmonid productivity, upon which fishery management is based (Figure 37). WDFW's hatchery program evaluates the effects of artificial production problems on wild salmonid stocks. Finally, WDFW has partnered with numerous cooperators to evaluate fish production responses to habitat and land use restoration treatments in 10 streams in western Washington in the Intensively Monitored Watershed Studies. See http://wdfw.wa.gov/fish/wild_salmon_monitor/publications/imw2004_report.htm.

Figure 37. Sample graph tracking spawning returns of listed wild salmon and steelhead stocks.



Marine Groundfish and Forage Fish

Puget Sound groundfish are surveyed using a stratified-random trawl survey. The two subbasins (northern and southern Puget Sound) are surveyed on an alternating year basis. A near-shore, quantitative video survey of rocky habitats provides information on these habitats. WDFW marine protected areas are monitored for trends in fish abundance, spawning activity and size distributions. Commercial and recreational catch are monitored. Two methods are used by WDFW to provide quantitative estimates of herring abundance: spawn deposition surveys and acoustic/trawl surveys. Using one of either of the two methods, WDFW currently estimates the abundance (spawning biomass) of each of the 18 recognized herring stocks in Puget Sound each year. Occasional assessments are conducted on the Washington coastal stock. Commercial catch and recreational catches are managed and monitored. In addition, long-term studies have been conducted regarding contaminant levels of fish in marine waters of Puget Sound.

Offshore assessment of the status of fish stocks is conducted through the Pacific Fishery Management Council (PFMC). The groundfish covered by the Council's groundfish fishery management plan (FMP) include 82 different species that, with a few exceptions, live on or near the bottom of the ocean. These stocks are now managed on a biennial cycle. Off the coast, PFMC operates triennial trawl surveys and conducts periodic stock assessments for the managed species. Highly migratory species require integrated management and assessment by a variety of nations. A variety of sources of information are integrated into the stock assessments for these fish. Coastal pelagic species also require integration of information among various states to determine the stock status for each species.

C. Effectiveness Monitoring

Effectiveness monitoring gauges the success of projects and programs in achieving their stated goals. The product of these monitoring efforts will be used to determine whether specific monitoring projects and programs should be continued, expanded, terminated or adapted to address new circumstances.

WDFW also periodically studies the effectiveness of Bonneville Power Administration habitat enhancement projects on WDFW Wildlife Areas. Game managers monitor hunting harvest and conduct polls to collect information on hunter recreational interests and feedback for hunting seasons.

Fish Species and Associated Habitat

WDFW participates in harvest monitoring through the Pacific Salmon Commission, Pacific Fisheries Management Council, North of Falcon Process, and Columbia River Compact to ensure that commercial and sport fisheries are aligned with population goals. WDFW's coded wire tagging program and its genetics laboratory also contribute to harvest monitoring. 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, and makes it possible to estimate marine survival and overall salmon productivity. The WDFW genetics laboratory provides information about stock composition of fishery catches in Washington and in neighboring states. In addition to harvest monitoring, WDFW evaluates the habitat and fish responses to site-specific habitat restoration actions that are conducted in the Intensively Monitored Watershed basins. WDFW contracts with landowners to

monitor fish screening devices in streams to ensure they are effective in preventing the passage of fish into irrigation canals, and monitors fishways in state-owned lands to ensure the free passage of fish over dams, spillways and complex road crossings.

D. Implementation (Compliance) Monitoring

Many of the conservation strategies and actions described in the Washington CWCS will be implemented by WDFW, either alone or in cooperation with other conservation partners. Other projects may be carried out solely by other conservation partners, either as part of their own mandates and programs or through funding arrangements with WDFW. Projects that are carried out and funded by WDFW will be monitored by WDFW to ensure that the funds were properly spent and to document that the projects were effective in addressing the CWCS. WDFW uses the Contract and Project System (CAPS), a new shared database system for tracking WDFW contracts and their associated projects. CAPS is designed to provide necessary management controls and reporting capabilities and to address the various programmatic and financial accountability expectations of federal, state and local contracting and grant agencies. WDFW has successfully used CAPS for compliance monitoring on several Federal Energy Regulatory Commission (FERC) projects, as well as in projects affected by Washington Forest Practice laws.

CAPS will be evaluated by WDFW and modified or expanded as necessary to ensure that it meets the expectations and requirements of the CWCS and the State Wildlife Grants program. A second monitoring tool for tracking progress towards CWCS strategies and actions is WDFW's biennial Strategic Plan (http://wdfw.wa.gov/depinfo/strategic_plan05-07.pdf). If the combination of CAPS and the Strategic Plan does not adequately track CWCS progress, new systems will be designed or acquired to meet these needs.

E. Monitoring Tools

WDFW has many data tools to facilitate monitoring activities related to CWCS implementation. Sophisticated data management systems are already in place to accommodate CWCS monitoring, as are interactive web applications making these data more easily accessible to conservation partners and the general public.

Data Management Systems

Many of the most current and sophisticated data management systems have been developed in recent years to address the weighty issue of Northwest salmon recovery. In many cases, due to a lack of funding, the development of terrestrial wildlife data systems lags behind those developed for the salmon recovery program.

WDFW employs powerful relational databases used in conjunction with geographic information systems (GIS) for data entry, automation, management, interpretation and public distribution. WDFW uses data models and platforms that conform to up-to-date industry standards. The most significant data sets supporting wildlife and fish monitoring efforts addressed in the CWCS include the Priority Habitats and Species Program, the Salmon and Steelhead Habitat Inventory and Assessment Program, and the Salmonid Stock Inventory Database.

Some of the most significant data sets supporting wildlife and fish monitoring efforts addressed in the CWCS are summarized below and in Chapter III, State Overview. Two of these three data sets were developed for salmon management and recovery.

Priority Habitats and Species (PHS). Established in 1989, PHS maintains a list of species and habitats that are currently recognized as conservation priorities by WDFW. The PHS list served as one of the source lists for creating the SGCN list developed for the CWCS. In addition to periodically updating the list of priority species and habitats, PHS maintains mapped data on the known locations of all PHS species and habitats and develops management recommendations that summarize the best available science on the conservation needs of these species. PHS is currently the principal means by which WDFW provides important wildlife, fish and habitat information to local governments, state, tribal and federal agencies, private landowners and consultants for land use planning and conservation purposes. Many local governments incorporate PHS data directly into their Critical Areas Ordinances (CAO) required under Washington's Growth Management Act. Most of the data within PHS is derived from WDFW's Wildlife Resources Data System (WRDS). WRDS is the data engine currently supporting all WDFW wildlife data and includes survey data for Washington's species of concern, diversity and game species.
(<http://wdfw.wa.gov/hab/phspage.htm>)

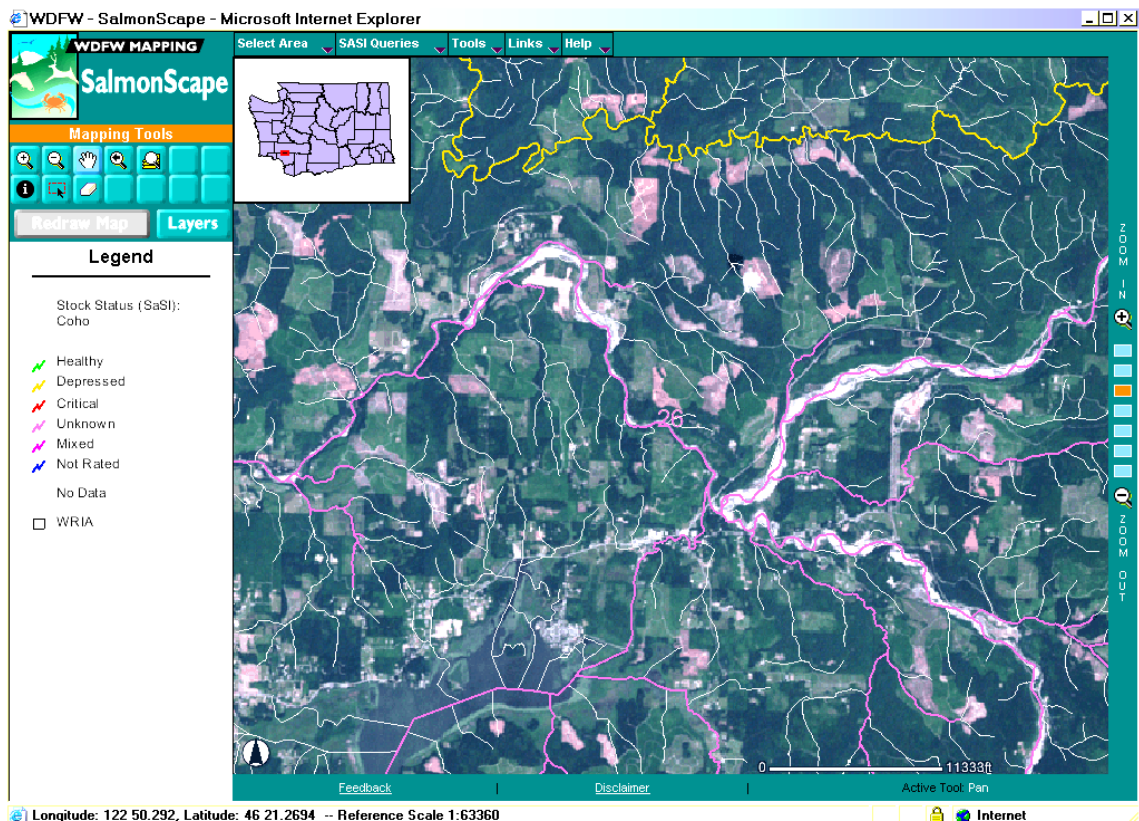
Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP). SSHIAP supports a spatial data system that characterizes salmonid habitat conditions and distribution of salmonid stocks in Washington. WDFW and tribal co-managers initiated SSHIAP in 1995. All hydrology and data related to fish presence and use is derived from WDFW's Washington Rivers and Lakes Information System (WLRIS). WLRIS is a relational database GIS system that interlinks with the regional (Washington, Oregon, Idaho and Montana) data program StreamNet.
(<http://wdfw.wa.gov/hab/sshiap/>)

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

Interactive Web Applications

As a public agency, WDFW strives to make data readily available to monitoring partners and the public through interactive, map-based web pages. WDFW's SalmonScape application supports interactive selection and display of spatial data sets such as salmonid distribution and use, migration barriers, preservation and restoration priorities, juvenile fish trap sites, SaSI stock status information, and stream habitat attributes housed within SSHIAP (Figure 38). These data can be displayed against many background layers, including administrative boundaries, roads, streams, major public land ownership, township/section lines, shaded relief imagery and orthophotos (<http://wdfw.wa.gov/mapping/salmonscape/>). WDFW plans to develop a separate application to house wildlife and fish data stored in PHS. Harvest data on recreationally harvested wildlife species is also made available through the GoHunt application (<http://wdfw.wa.gov/mapping/gohunt/>).

Figure 38. WDFW's SalmonScape application, depicting SaSI stock status for coho in southwestern Washington.



F. WDFW's Monitoring Partners

WDFW collaborates with several agencies at the state and federal level, tribes, and local and regional groups in prioritizing and conducting status and trends, research, and effectiveness monitoring for fish and wildlife species and their associated habitat. These include the U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), and the Washington Department of Natural Resources (WDNR) as well as Treaty Indian tribes, private forest landowners, utilities and land developers, conservation groups, and private citizen volunteers. WDFW works especially closely with WDNR's Washington Natural Heritage Program to design and implement monitoring programs for species that are a priority for both agencies.

Following the listing of several Pacific Northwest salmonids under the Endangered Species Act, more formalized partnerships have arisen relating to monitoring salmon recovery and watershed health. In 1998, the Washington legislature created the Governor's Salmon Recovery Office to coordinate and assist in the development of recovery plans for all listed salmon, steelhead and trout in Washington. Six locally driven regional groups formed to address salmon recovery with representation from local citizens and governments, tribes, state and federal agencies, and other interested parties. Each regional group has developed a draft recovery plan that includes a monitoring component; draft plans were submitted to the Governor's Salmon Recovery Office on June 30, 2005.

(<http://www.governor.wa.gov/gsro/regions/recovery.htm>).

Several monitoring oversight groups have been convened in Washington to guide various monitoring components of wildlife and salmon recovery plans. In 1998, the Washington legislature created an Independent Science Panel to provide scientific review and oversight of salmon recovery planning efforts and specifically to provide technical advice on monitoring components of these plans. Additionally, the Independent Scientific Advisory Board was convened by the Northwest Power and Conservation Council and the National Marine Fisheries Service to provide scientific recommendations on wildlife and fish recovery programs falling under the Northwest Power Act. The Independent Scientific Review Panel reviews projects that are considered for funding under the Northwest Power and Conservation Council's Fish and Wildlife Program, including monitoring activities.

In 2001, the Washington legislature requested the development of the Washington Comprehensive Monitoring Strategy (http://www.iac.wa.gov/Documents/SRFB/Monitoring_Executive_Report_Final.pdf). This statewide monitoring strategy is focused on salmon recovery and watershed health, and has the objectives of standardizing monitoring protocols, integrating state agency efforts, and identifying gaps in monitoring programs. An action plan has been developed with full implementation scheduled for June 30, 2007.

Established by executive order in 2004, the Governor's Forum on Monitoring Salmon Recovery and Watershed Health was convened to provide a venue for ongoing cross-agency coordination on monitoring salmon recovery and watershed health, developing standardized monitoring indicators and protocols, and providing monitoring recommendations to Washington's legislature, Salmon Recovery Funding Board, the Governor's Salmon Recovery Office and appropriate state agencies.

In addition to engaging with the aforementioned groups, WDFW participates in regional monitoring forums such as the Pacific Northwest Aquatic Monitoring Partnership, Puget Sound Ambient Monitoring Program and the Collaborative System-wide Monitoring and Evaluation Project to identify consistent data sharing and sampling protocols for specific monitoring efforts. WDFW is incorporating EPA's Environmental Monitoring and Assessment Program protocols in new large-scale status and trend and research monitoring efforts involving interstate partners. A list of website links to the above referenced programs and agencies can be found at the end of this chapter.

G. Next Steps

Once the Washington CWCS is submitted and approved, WDFW will take a further look at its monitoring activities, priorities and protocols, including the PHS database, to determine what changes should be made to effectively monitor Species of Greatest Conservation Need and associated habitats identified in the CWCS. Based on this analysis, WDFW begin to will refine its monitoring activities for all Species of Greatest Conservation Need to try to match the level of effort and sophistication currently dedicated to salmon recovery. Much can be learned or adapted from systems that have been developed for salmon.

WDFW will also continue to work with other conservation partners and the Washington Biodiversity Council to further refine and develop the concept of a new Biodiversity Index, discussed below and in Chapter II, Biodiversity Conservation.

Refined Monitoring Activities

WDFW will continue to place a high priority on the recovery, management and status monitoring of all state listed endangered, threatened and sensitive species; however, WDFW will also begin to address the monitoring of other species included on the Species of Greatest Conservation Need that are not yet listed by Washington or the federal government. The intent of this process is to recover and conserve these species *before* they are state or federally listed. By law (WAC 232-12-297), WDFW must review the status of all listed species at least every five years. However, Washington's new SGCN list includes a number of species that are not listed as Washington Species of Concern, and WDFW will need to determine monitoring methods and frequency for these species. Current monitoring efforts of species on the SGCN list, including listed species, will be evaluated and broken down into the following categories:

- Species for which adequate monitoring is currently being done—those that currently receive sufficient monitoring attention to allow confident assessment of population status and trends. WDFW will seek to maintain the current level of monitoring for these species.
- Species that are currently receiving some level of monitoring but not adequate to determine with confidence any long-term changes in population size, relative abundance, distribution or habitat use. As resources permit, WDFW will expand status and trend monitoring for these species.
- Species on the SGCN list that are not currently being monitored by anyone on any predictable basis. WDFW will seek to initiate baseline surveys to assess population status and the need for additional monitoring.
- Species for which so little is known about life history and ecology that WDFW was not able to determine current status and trends to design a monitoring program. WDFW will seek to conduct basic research in ecological relationships for these species, followed by baseline surveys to assess population status and identify the need for trend or research monitoring.

Although many specific wildlife habitats are currently mapped and monitored as part of individual species management or recovery efforts, there is no coordinated statewide effort to monitor long-term habitat trends in Washington. Furthermore, while public land management agencies such as WDFW, WDNR, USFWS and USDA Forest Service monitor wildlife habitat on their own lands, there is currently no comprehensive effort designed for long-term assessment and monitoring of habitat on Washington's private lands, which comprise 60% of Washington's landscape, or on many public lands not specifically managed for fish and wildlife. In its 2003 report to the Governor and Legislature, the Washington Biodiversity Conservation Committee (now Biodiversity Council) recommended a number of actions that would improve and broaden the geographic scope of collaborative habitat monitoring. These actions include updating a statewide land use/land cover data layer. Periodic updates of the land use/land cover data would allow for trend analysis of habitat over time.

Biodiversity Index

In addition to reviewing monitoring programs for wildlife species and habitats, WDFW is proposing the adoption of a new statewide Biodiversity Index to track and measure long-term trends in Washington's biodiversity. Biodiversity conservation is one of the Six Guiding Principles of the Washington CWCS (see Chapter I, Introduction) and WDFW is committed to promoting the long-term conservation of Washington's biodiversity.

WDFW will work closely with the Washington Biodiversity Council and other partners, such as the Washington Natural Heritage Program, to establish a proposed public-private Biodiversity Monitoring Committee and to design and implement the new Biodiversity Index. This committee, if established, would be responsible for designing scientific protocols and implementing strategies that will guide the new biodiversity monitoring program. Measures of biodiversity will include species (plants and animals) and their habitats, and the protocols developed by the Committee will determine which species and habitats will be targeted for long-term biodiversity monitoring.



A key component of the proposed Biodiversity Monitoring Program would be a strong Citizen Science network to conduct data collection and reporting activities around the state. The cornerstone of this network will be the hundreds of K-12 schools in Washington, which would be used to monitor long-term biodiversity trends. Strict data collection protocols and quality control measures would be used to ensure that data are consistent and meet standards established by the Biodiversity Monitoring Committee. All biodiversity monitoring data would be centralized and reported back to the Washington State legislature as part of a formal performance agreement between WDFW, the Governor and the Legislature.

H. Adaptive Management and CWCS Review and Revision

Adaptive management is a systematic process for continually improving management strategies by monitoring the impacts of previous management actions. An adaptive management approach is particularly important in managing biological resources because of the inherent complexity and dynamism of natural systems and the scientific uncertainty associated with many natural processes. Adaptive management provisions have been successfully incorporated into regulatory mechanisms in Washington, including Washington's Forest Practices Rules, as well as long-term hydropower Habitat Conservation Plans on the Columbia River. Monitoring is essential for identifying needed changes in management strategies and thus is a critical component of adaptive management.

Washington will adopt an adaptive management approach to implement the CWCS. Through ongoing analysis of monitoring data and periodic review of the CWCS itself, WDFW will ensure that the appropriate changes will be made in the management or funding levels of monitored programs and projects to adapt to new conditions or circumstances. In reviewing the CWCS, WDFW will evaluate the SGCN and associated priority habitats, and the conservation problems, priorities and conservation actions identified at both statewide and ecoregional scales. In order to meet the monitoring requirements of the CWCS and determine the future monitoring requirements of SGCN, WDFW will consider the adequacy of all current monitoring programs, including ongoing and new collaborative efforts.

The first WDFW program review of the Washington CWCS and State Wildlife Grants program will take place in 2006. At that time, the ecoregional assessments will be completed for all nine ecoregions addressed in the CWCS, and WDFW will be able to fully integrate the information and recommendations into an update of the ecoregional chapters in the CWCS. Up to one year will have passed from the initial submittal of the CWCS to the National Advisory and Acceptance Team, allowing for a retrospective analysis. In 2006, WDFW will also develop budget recommendations for the 2007-2009 Washington biennial budget, which could be influenced by an initial review of the CWCS. Unlike the federal government, Washington agencies develop and implement their budgets on a biennial rather than annual basis; thus, the review and revision of the CWCS will be timed to coincide with the biennial budget cycle.

The next review and revision after 2006 will take place in 2008, when WDFW and other state agencies are again developing their agency budget recommendations for the 2009-2011 biennial budget. This review will not need to be as complete as the one done in 2006, nor as thorough as the first six-year program review, which will be conducted in 2012. Beginning in 2012, WDFW will do a full review of the CWCS and State Wildlife grants program in consultation with other conservation partners and affected stakeholders every six years, with a less thorough review and revision scheduled for every two years to coincide with Washington's biennial budget development cycle.

I. Conclusion

Monitoring and adaptive management are critical elements of Washington's CWCS. The status and trends, research, project effectiveness and implementation monitoring efforts described in this chapter provide the means for gauging the health of Washington wildlife and fish populations and for determining whether or not conservation projects and programs are meeting WDFW's goals. These monitoring activities also serve as the cornerstone of Washington's adaptive management approach to implementing agency conservation programs and the CWCS. Through systematic, ongoing review of conservation management strategies and monitoring programs, WDFW will ensure that Washington is effectively conserving Species of Greatest Conservation Need, associated habitats and biodiversity at both the statewide and ecoregional scales, and will ensure that the monitoring requirements of the State Wildlife Grants program are met.

Following is the list of web hotlinks to programs and agencies discussed above in Section F, WDFW's Monitoring Partners.

Collaborative System-wide Monitoring and Evaluation Project

<http://www.cbfwa.org/committees/csmep/>

EPA's Environmental Monitoring and Assessment Program

<http://www.epa.gov/emap/>

Governor's Forum on Monitoring Salmon Recovery and Watershed Health

<http://www.iac.wa.gov/monitoring/default.htm>

Governor's Salmon Recovery Office

<http://www.governor.wa.gov/gсро/regions/recovery.htm>

Independent Science Panel

<http://www.governor.wa.gov/gсро/science/default.htm>

Independent Scientific Advisory Board

<http://www.nwcouncil.org/fw/isab/background.htm>

Independent Scientific Review Panel

<http://www.nwcouncil.org/fw/isrp/background.htm>

Pacific Northwest Aquatic Monitoring Partnership

<http://www.reo.gov/PNAMP/>

Puget Sound Ambient Monitoring Program

<http://www.psat.wa.gov/Programs/PSAMP.htm>

Salmon Recovery Funding Board

<http://www.iac.wa.gov/srfb/default.asp>

Washington Comprehensive Monitoring Strategy

http://www.iac.wa.gov/Documents/SRFB/Monitoring/Executive_Report_final.pdf

http://www.iac.wa.gov/Documents/SRFB/Monitoring/Comprehensive_Strategy_Vol_2.pdf

http://www.iac.wa.gov/Documents/SRFB/Monitoring/Action_Plan.pdf

http://www.iac.wa.gov/Documents/SRFB/Monitoring/Environmental_Monitoring_Survey.pdf