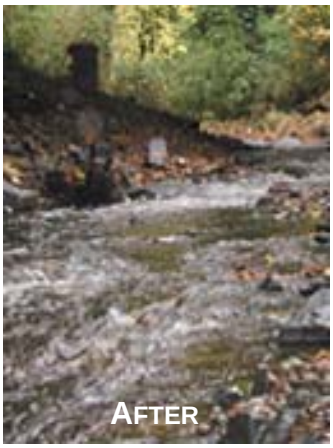
STATE OF WASHINGTON

ROADMAP FOR **SALMON HABITAT CONSERVATION** AT THE WATERSHED LEVEL



JOINT NATURAL RESOURCES CABINET

FEBRUARY 2002

The Joint Natural Resources Cabinet

In May of 1997, Governor Gary Locke and agency heads signed a memorandum agreeing to establish the Joint Natural Resources Cabinet to serve as the "…forum and ongoing institutional framework to promote interagency communication, coordination and policy direction on environmental and natural resource issues."

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The *Statewide Strategy to Recover Salmon: Extinction is Not an Option (September 1999)* emphasizes the importance of salmon recovery at the watershed and regional levels. Four tools to assist people working on salmon recovery in their watersheds and regions, including this *Roadmap for Salmon Habitat Conservation at the Watershed Level,* have been endorsed for use in Washington by the Joint Natural Resources Cabinet:

Reference Guide to Salmon Recovery (February, 2002) is intended to clarify what salmon recovery means, what is happening, and who is involved at different geographic scales. This information will help people who are interested in salmon recovery and habitat conservation in their watershed better understand the broader context of salmon recovery. It will also identify some of the sources of additional information that are available to them. Preparation of the *Reference Guide* was coordinated by the Governor's Salmon Recovery Office.

Guidance on Watershed Assessment for Salmon (May, 2001) will help watershed groups, state agencies, and others understand what kinds of assessment are needed to support decisions about projects and other actions to protect and restore habitat for salmon. The effectiveness of salmon conservation efforts depends on the kind of information we use to make our decisions. The *Guidance on Watershed Assessment* was developed by an interdisciplinary workgroup of technical specialists under the direction of the Governor's Salmon Recovery Office.

Roadmap for Salmon Habitat Conservation at the Watershed Level (February, 2002) picks up where the *Guidance on Watershed Assessment* ends. The *Roadmap* will help local groups take key steps needed for salmon habitat conservation in their watershed and relate their work to regional salmon recovery planning. It provides specific information on steps needed to conserve salmon habitat in a watershed. Information on how these steps can be taken is provided with the understanding that local groups can and will need to tailor these steps for their watershed. The Governor's Salmon Recovery Office coordinated development of the *Roadmap.*

Regional Recovery Plan Model (February, 2002) identifies essential elements of a regional salmon recovery plan. It provides guidance to regional salmon recovery planning organizations for coordinating development of regional salmon recovery plans. A salmon recovery plan is a comprehensive document that defines the actions needed to recover one or more salmon species or populations within a specific region. The Washington Department of Fish and Wildlife collaborated with the Governor's Salmon Recovery Office and others to develop the *Model* as part of a new program established by the Legislature to provide funds for regional salmon recovery plans.

PREFACE

The “Roadmap for Salmon Habitat Conservation” was developed for people interested in salmon recovery at the watershed level. Along with the companion document, “Reference Guide to Salmon Recovery,” it provides general information on how habitat conservation is related to salmon recovery at the watershed level and can be linked to regional salmon recovery efforts.

Salmon are considered a “keystone species,” and the health of salmon runs are often seen as indicators of the health of their habitats. Human population growth and the associated development and degradation of habitat are closely aligned with the decline of salmon populations. Habitat conservation at the watershed level is critical to salmon survival.

This roadmap picks up where the “Guidance on Watershed Assessment for Salmon” ends; it provides information to help take the next steps in salmon habitat conservation. It provides specific information on the components and steps needed to conserve salmon habitat in a watershed. In addition, it is intended to help watershed groups know what will be expected of them to relate their salmon habitat conservation efforts to salmon recovery planning at the regional level.

This document provides information that can be tailored by local groups to their watershed. The roadmap does not define or focus on the elements of regional recovery plans and processes. The specific content and process for regional recovery plans, including relationships to watershed level work, will be determined by the federal, state, tribal and local partners engaged in regional recovery planning.

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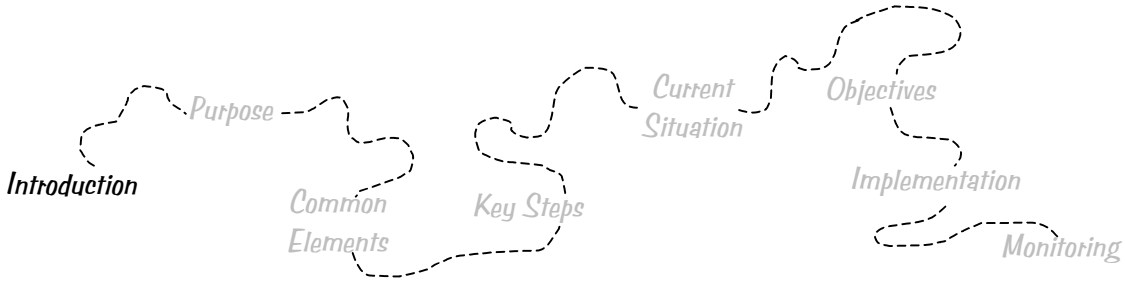


ROADMAP FOR SALMON HABITAT CONSERVATION AT THE WATERSHED LEVEL

I. INTRODUCTION

On their journey from streams to the sea and back again, anadromous salmon spend part of their life cycles within watersheds—freshwater, estuarine and marine nearshore habitats. To continue to exist and to recover, salmon require good quality habitat that provides their basic needs for spawning, rearing and migration. These needs include: 1) a sufficient number of spawning salmon, 2) adequate amounts of cool, clean and well-oxygenated freshwater, 3) free, unobstructed access to and from their habitats, 4) relatively silt-free gravel of appropriate size, 5) food and cover, and 6) a balance of predators and scavengers.

Since the late 19th century, many populations of naturally-spawning salmon have suffered a severe decline. During the 1990s, this decline in populations of several salmon species resulted in numerous listings of species as threatened or endangered with extinction under the Endangered Species Act (ESA).

The continuing decline of salmon populations is the result of many natural and human caused factors. Natural causes (some of which may be aggravated by human activities) include floods, droughts, wildfires, volcanic eruptions, extreme temperatures, and landslides. Human-caused factors include impounding and diverting water; hydropower operations; impacts from hatcheries; harvesting fish; introducing non-native species; and a variety of land use practices such as agriculture, timber harvest, and urban and rural development. These human activities have altered and degraded many watersheds in the state, affecting salmon populations, other species, and the basic health of the watersheds.

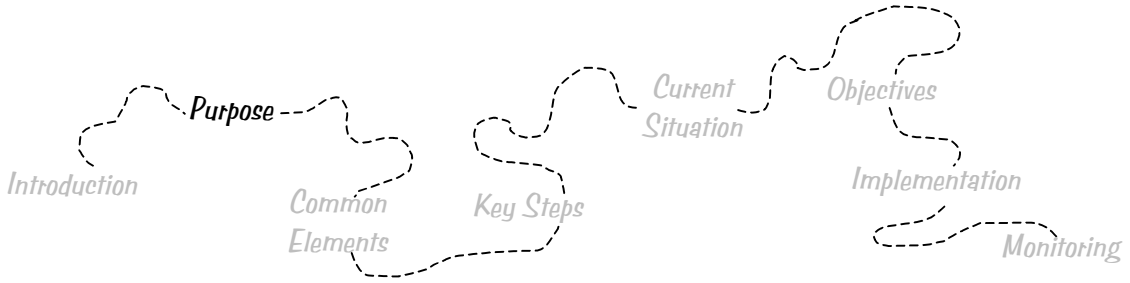
Salmon decline is attributed in part to degradation of the health of watersheds. The "salmon problem" is sometimes defined as a watershed management problem. While specific conditions vary from watershed to watershed, many of the factors contributing to degraded and modified salmon habitat are interrelated and cumulative. These factors are further exacerbated by inadequacies of existing policies and decisions; by site-by-site restoration efforts done in relative isolation; and by failure to recognize and deal with the influence of land use and resource management activities on the overall health of the watershed. In addition, competing societal priorities – which may have inherent conflicts with restoring and protecting salmon runs – contribute to making salmon recovery a difficult and long-term endeavor.

***"Salmon"** refers to all species of salmon, steelhead, trout and char native to Washington.*

*A **"watershed"** is the area of land that water flows across or under on its way to a river, lake or ocean. It includes all surface fresh water and adjacent estuaries and marine areas. A framework for watershed boundaries is provided through the state's designation of 62 Water Resource Inventory Areas (WRIAs).*

***"Habitat conservation"** includes protecting, maintaining and restoring habitat to support the needs of salmon.*

Salmon recovery efforts are taking place in nearly every part of the state to address impacts associated with habitat, hydropower facilities, hatcheries and fish harvest. Federal, state, tribal and local governments recognize that collaborative, local and watershed-based approaches coordinated with regional recovery



efforts are the most effective way to address many factors contributing to degraded salmon habitat.

Salmon habitat conservation needs to ensure that the most important actions are done in the right places at the right time. Short-term actions are needed to fix obvious problems and to help avoid further decline in fish stocks. Longer-term actions need to address on-going challenges of protecting and restoring salmon habitat and watershed health, while also accommodating population growth and development.

Salmon habitat conservation needs to address simultaneously the basic habitat needs of salmon and the well-being of people. It is important to identify and protect remaining patches of ecologically functioning habitat and to restore degraded habitat at geographical scales that make biological sense for various salmon species. Incorporating this effort into land and water management strategies and decisions helps ensure sustainable recovery of salmon and watersheds.

A collaborative, comprehensive watershed-based approach must be built on existing efforts and ensure that partners work together to restore and protect salmon populations and their habitat. Federal, state, tribal, regional and local efforts are underway in many watersheds to address declines in salmon populations and salmon habitat. These partnership efforts bring together jurisdictions that share specific problems and that need to share knowledge and resources. These efforts are valuable to protecting and restoring salmon habitat within watersheds. But because there are often many efforts going on and a lack of overall coordination, they also can be a source of confusion and frustration.

This document provides a salmon habitat conservation framework, or roadmap, to help make sense of the multitude of watershed efforts and to show how they can fit together to improve the health of watersheds and to make genuine progress toward saving salmon.

II. PURPOSE OF THE ROADMAP

This "Roadmap for Salmon Habitat Conservation" is designed to help agency representatives and local partners engaged in salmon recovery activities determine what is needed to develop effective habitat conservation for watersheds. It was created in response to concerns that what is needed is not more guidance but a framework to help local salmon recovery efforts use and build on existing activities to develop meaningful habitat conservation for their watershed. The roadmap will assist in determining the most effective and efficient ways to address past, current and future effects of human activities on salmon, to develop and implement strategic salmon conservation activities that build on current initiatives, and to coordinate the efforts of all salmon recovery partners within a watershed.

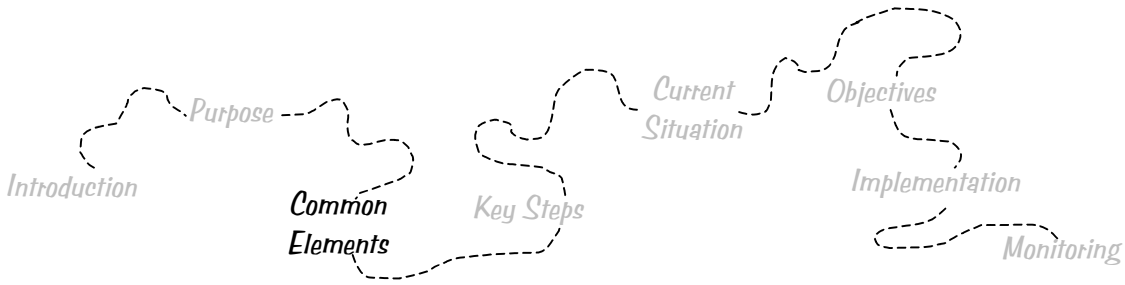
Probably of greatest importance, it provides direction for bringing together a patchwork of initiatives and creating a roadmap to salmon habitat conservation at the watershed level. It is intended to show how individual initiatives in a watershed can be brought together to ensure recovery at the watershed level, and to show how watershed efforts can be coordinated and linked with regional efforts to develop salmon recovery plans.

The roadmap will help those involved in salmon habitat conservation at the watershed level to determine and document:

- The current situation in the watershed:
  Where are we?
- Goals, objectives, strategies and priorities:
  Where do we want to go?
- Implementation:
  How will we get there?
- Performance:
  Did we make it?

It addresses the importance of:

- Using information from watershed assessment
- Identifying and evaluating the effects of current policies and programs on salmon habitat
- Choosing and prioritizing actions



- Building on existing activities
- Sharing a commitment to address the needs of salmon and the overall health of the watershed
- Linking watershed habitat conservation efforts to regional salmon recovery efforts.

This document also identifies the elements that the state considers necessary for inclusion in salmon habitat conservation in watersheds. Locally developed watershed-based approaches to salmon habitat conservation that effectively include the steps and elements outlined in the roadmap can expect support from state government. Depending on the quality and contribution that is made toward salmon habitat conservation, state support would include advocating use of the approach to habitat conservation for the watershed as part of a federally recognized, regional salmon recovery plan and continuing assistance for implementation.

Finally, just like any roadmap, you need to know the destination before choosing the route. There are often many routes from which to choose, and final selection depends on time frame, goals, budget and preferences. This roadmap offers direction to help local groups choose their destination, it offers some alternative routes depending on their goals, and offers suggested travel tips to consider along the way. The "Key Steps Toward Salmon Habitat Conservation" section of the roadmap provides the nuts and bolts kind of information needed to develop and implement salmon habitat conservation for a watershed.

For specific information on the wide variety of salmon recovery efforts underway at the tribal, federal, state, regional and local levels, please see "Reference Guide to Salmon Recovery."

III. COMMON ELEMENTS IN SALMON HABITAT CONSERVATION

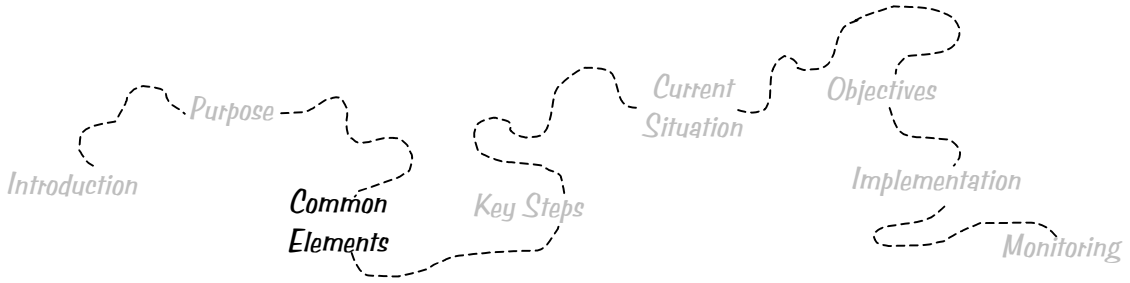
While the approach to salmon habitat conservation in each watershed may be different, it is important for any local group to know what federal, state, tribal, regional and local salmon recovery initiatives related to salmon habitat conservation are underway in their watershed and/or region. This knowledge will help local groups determine how these other initiatives apply to their own efforts.

As part of developing watershed-based approaches to salmon habitat conservation, local groups need to:

1. Know the specific state agency efforts designed to assist in salmon habitat conservation;
2. Consider and design processes for public participation;
3. Identify potential funding sources; and
4. Determine whether an environmental assessment is being done.

State Agency Efforts to Support Watershed Groups

- The Department of Fish and Wildlife (WDFW), working together with tribes, provide a key source of scientific and technical data on salmon and habitat. WDFW established the Watershed Stewardship Team, a group of biologists assigned to support local groups' salmon restoration efforts throughout the state. The Watershed Stewardship Team members provide a link between Lead Entities, formed under the 1998 Salmon Recovery Planning Act, and technical resources of WDFW. The agency also supports the salmon recovery efforts of fourteen Regional Fishery Enhancement Groups. WDFW administers a Regional Salmon Recovery Planning Grant Program, and has developed a Regional Recovery Plan Model that incorporates salmon habitat conservation efforts at the watershed level.
- The Department of Ecology, the agency responsible for implementing the Watershed Planning Act, coordinates twelve state agencies through a Memorandum of



Understanding (MOU) that identifies roles and responsibilities. The agencies are committed to providing local groups with timely information and technical assistance for watershed planning. Ecology has assigned staff to each Watershed Planning Unit, formed under the Watershed Planning Act, to coordinate state agency implementation of the MOU.

- The Conservation Commission and Conservation Districts support many local salmon recovery efforts. The Commission develops and distributes Limiting Factors Analyses (required under the 1998 Salmon Recovery Planning Act). Some Conservation Districts are Lead Entities, directing salmon habitat enhancement activities, while others are developing Habitat Conservation Plans for watersheds (e.g., Foster Creek Conservation District).
- The Office of Community Development provides technical assistance and guidance to local governments on the Growth Management Act; how to include best available science in land use management policies and regulations; and how to give special consideration to conservation measures necessary to protect or enhance salmon habitat.

Designing Public Participation Processes

Public involvement and public outreach are necessary to build broad support for, and increase certainty of, implementation of salmon habitat conservation. Development of a thorough public education and involvement program should receive a high degree of attention to ensure timely input and to reflect public attitudes and concerns. Public education and outreach needs to be incorporated at all stages of development and implementation of a watershed-based approach.

State Environmental Policy Act (SEPA) procedures will be part of some watershed approaches to salmon habitat conservation. While they provide opportunities, additional efforts will be needed to provide sufficient public involvement.

Identifying Funding Sources

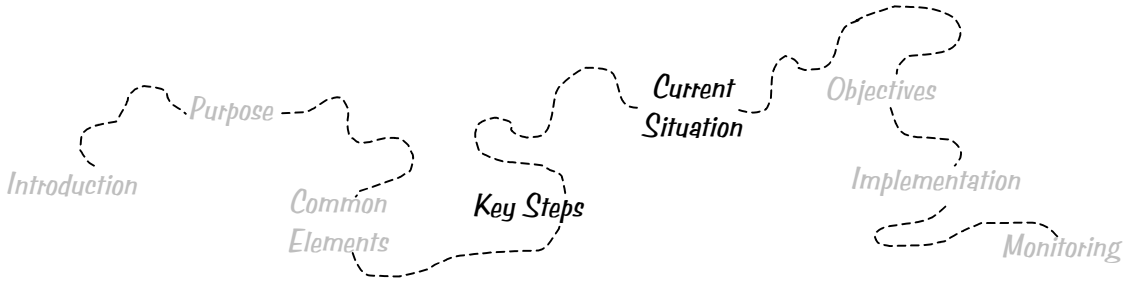
Funding support for planning and implementing salmon habitat conservation is available from federal, state and local programs. For example, the Salmon Recovery Funding Board can fund habitat restoration actions that have been identified and prioritized on project lists by local Lead Entities. Also, funding is available for Planning Units planning for salmon habitat conservation as part of their work under the Watershed Planning Act.

When planning habitat conservation activities, the amount and sources of new funds available for implementation need to be specified, as well as funds already available for current actions. Where funding is not available, is uncertain or is inadequate for implementing needed actions, a commitment to seek or confirm funds from specific sources at specific times should be made. For information on funding sources for local salmon recovery efforts, see Appendix of "Reference Guide for Salmon Recovery".

Determining Procedures for Environmental Assessment

The State Environmental Policy Act requires state and local government agencies to consider the likely consequences of a proposal before taking action or making a decision. Watershed plans developed under the Watershed Planning Act, which may incorporate salmon habitat conservation, will need to undergo environmental analysis under SEPA prior to adoption of the plan.

If any federal agency action is associated with salmon habitat conservation for the watershed, SEPA procedures should be coordinated with, and used to assist National Environmental Policy Act (NEPA) procedures, when applicable. Assistance in determining the specific SEPA procedures that may be used by a given watershed process is available from the Department of Ecology.



IV. KEY STEPS TOWARD SALMON HABITAT CONSERVATION

This section provides information and tools to use to help craft salmon habitat conservation (i.e., protecting, maintaining and restoring habitat) to best fit a watershed. It is important to keep in mind that there's not a single route to habitat conservation. Each watershed presents unique challenges and opportunities, and the tools presented here are suggestions to help state and local partners design the best path.

However, according to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS), successful salmon habitat conservation should include three key ingredients:

- ✓ Substantive protective and conservation elements;
- ✓ A high level of certainty that substantive actions will be reliably implemented, including necessary authorities, commitments, funding, staffing and enforcement measures; and
- ✓ A comprehensive monitoring program.

More specifically, the success and effectiveness of salmon habitat conservation in a watershed depends, in general, on how well local, state, tribal and federal partners carry out the following elements:

- Adequate understanding of watershed conditions – identifying what's in good shape as well as core causes of habitat degradation or salmon decline (limiting factors);
- Realistic, clear and measurable goals and objectives for salmon habitat conservation - recognizing ecological, social and economic constraints to implementation;
- Short and long-term action strategies and agreed-upon priorities to protect and/or restore habitat;
- Resources, responsibilities and processes identified for implementing actions at a scale commensurate with the problems;
- Salmon habitat conservation incorporated into existing processes, such as land and water use planning and management under the Growth Management Act and Watershed Planning Act;
- Integration or coordination of all relevant federal, state, tribal, local and private conservation activities, particularly activities within the region and watershed, designed to recover salmon;
- Active support and participation from the watershed community, affected governments, and major interests;
- Early actions put in place while salmon habitat conservation for the watershed is developed;
- Monitoring and an adaptive learning process to continuously improve salmon habitat conservation implementation decisions over time.

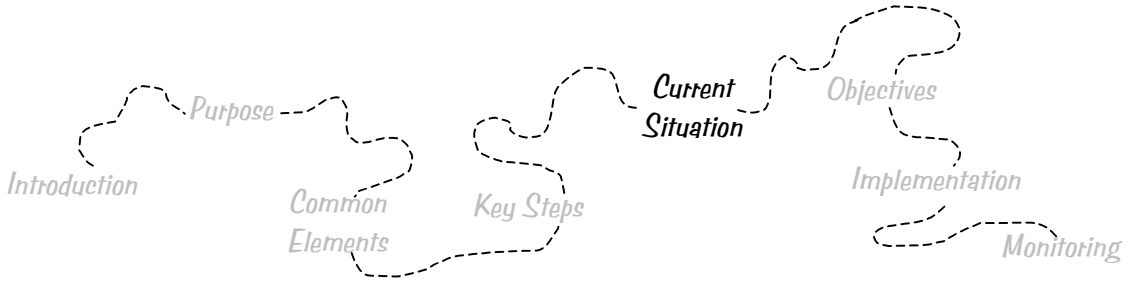
All of the above elements have been incorporated into basic questions and key steps detailed below. Following the direction offered in this roadmap will help ensure that these elements are addressed as part of salmon habitat conservation in watersheds.

For related resources, see Appendix 1.

Current Situation in the Watershed: *WHERE ARE WE*?

This section outlines the first critical steps that provide the basis for salmon habitat conservation. The first step is to conduct an assessment of current conditions in the watershed. This serves several important functions: 1) it provides information on major limiting factors and their causes; 2) it provides general information on the relationship between habitat conditions, salmon productivity, and human activities; and 3) it helps identify challenges and opportunities for protecting and restoring salmon habitat.

Assessing current watershed conditions provides appropriate reference points to determine what is attainable. It provides baseline information needed for formulating quantifiable objectives, designing strategies, setting priorities, selecting actions and designing a monitoring program. It also will help in conducting an accurate comparison of conditions before and after implementation.



In addition to understanding which human activities are causing habitat degradation, it's important to know how those activities relate to federal, state and local governments' actions, policies and programs. For some government activities, inadequate regulations, implementation or enforcement, or lack of incentives and funding may be underlying reasons for habitat degradation and could undermine habitat protection and restoration work.

Salmon habitat conservation must, therefore, be based not only on understanding past, current and future effects of land and water use on salmon habitat, but also on identifying beneficial or adverse impacts of existing land and water management programs.

There are three steps to answering the question "Where Are We?"

Step 1 Use watershed assessment to understand your watershed;

Step 2 Inventory and evaluate state and local land and water management policies and programs affecting salmon habitat; and

Step 3 Document and evaluate past and current habitat conservation efforts.

1. Use watershed assessment to understand your watershed

The "Guidance on Watershed Assessment for Salmon," developed by the Governor's Salmon Recovery Office and the Joint Natural Resources Cabinet, and supported by the Salmon Recovery Funding Board, lays out a scientific framework that provides guidance for conducting watershed assessments. This guidance acknowledges existing assessment work and data that can contribute to a watershed assessment. Comprehensive assessments cannot occur everywhere all at once— most assessments are conducted in increments or stages. The "Guidance on Watershed Assessment for Salmon" describes three stages of a watershed assessment, and each stage supports a different range of decisions. The three stages are organized around key questions:

Stage I: What habitat conditions are limiting salmon production?

Stage II: What processes or land uses are causing the habitat conditions?

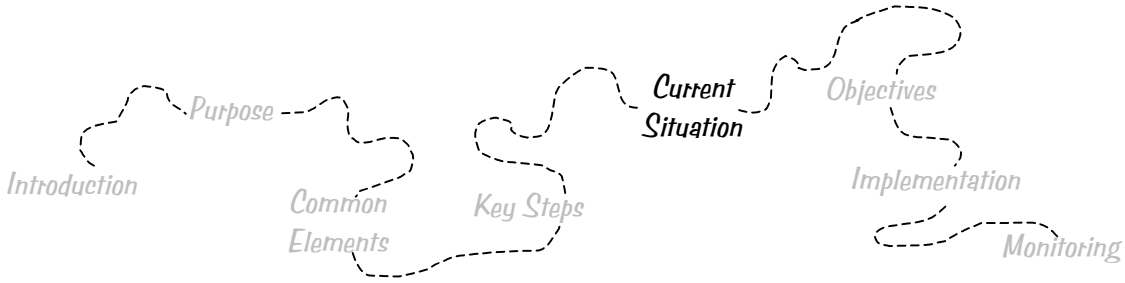
Stage III: What linkages exist between salmon and habitat conditions?

The quality and amount of available information, expertise and resources vary by watershed. Conducting a Stage I assessment provides a good understanding of habitat conditions and environmental factors limiting salmon production. However, decisions supported by this level of assessment will be limited to low-risk preservation and restoration projects, such as fish passage barriers and land acquisition. Salmon habitat conservation needs to address the core causes of habitat degradation in a watershed. Designing a comprehensive approach to salmon habitat conservation will also require information from Stage II and III types of assessment. This will provide information on causes of habitat conditions as well as knowledge of how different salmon species use different parts of the watershed.

Information generated by watershed assessment provides the basis for effective salmon habitat conservation. The information should be analyzed and then used to identify which areas in the watershed are functioning and how well, what needs to be done, and where to protect and restore habitat to a productive state for salmon.

The following questions will help focus the analysis and use of information from watershed assessments:

- ❑ What is the extent and nature of human-caused factors affecting salmon habitat in the watershed?
- ❑ What are the core causes of habitat degradation?
- ❑ How much is understood about the effects of land and water use on habitat alterations?
- ❑ At what life history stage (freshwater or estuarine) do habitat conditions have the greatest effect?



- ❑ Which areas are sensitive or vulnerable to human disturbances?
- ❑ Which sub-watersheds, or areas within them, have fragmented and disconnected habitat that affects access by salmon, and what are the causes of the disconnections?
- ❑ What type of actions will contribute the most to salmon productivity in the watershed?
- ❑ Where should restoration and protection efforts be focused in the watershed?
- ❑ Which sub-watersheds have the greatest potential for contributing to overall salmon recovery in the watershed?
- ❑ Which of those sub-watersheds are most threatened by potential future development?

Answering these questions is essential to understanding watershed conditions, and relationships between habitat conditions and human activities in the watershed and sub-watersheds. Analyzing the answers will help in designing, selecting and prioritizing actions for salmon habitat conservation approaches for a watershed.

2. Inventory and evaluate land and water management policies and programs affecting salmon habitat

Local, state and/or federal management actions, such as permitting, funding or approval of projects, frequently contribute to human-related actions that adversely impact salmon habitat. It is important to identify these management policies and programs and how they operate in the local watershed.

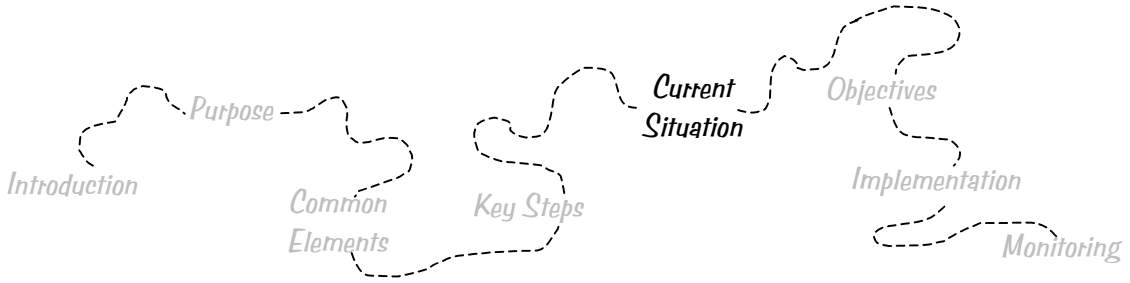
The results of watershed assessment provide the means to identify and evaluate land and water management policies, plans and actions that are, or have the potential to, affect salmon habitat. The inventory and evaluation of state and local policies, programs and actions should highlight those management actions that either help or hinder habitat conservation for salmon.

In general, environmental factors or habitat conditions affecting salmon are the result of human practices such as agriculture, forestry, urban and industrial development, mining, road construction, and dams and other structures. Most of these human practices are approved, regulated, permitted or funded by state, local, and/or federal agencies (e.g., forest practices permits are issued by the Department of Natural Resources for logging on private forest lands, local land use permits are issued for commercial, residential and industrial development). The watershed evaluation needs to focus on what happens on the ground once the programs are implemented. For example, what habitat modifications might occur if roads are constructed or maintained according to local and/or state requirements?

The evaluation should use information from the watershed assessment and should use best professional judgment to define which land and water use management policies and programs are likely to have positive or negative effects on salmon populations and their habitat. Many statewide programs also are going through review and evaluation, program-by-program, which can provide information and context for evaluation of their impacts within watersheds. The inventory and evaluation should be completed by appropriate federal, state, local and tribal agencies participating in the development of salmon habitat conservation for a watershed. It should be done for the specific watershed and it should be completed in cooperation with local watershed groups.

The following checklist can be used to guide those conducting the inventory and evaluation. When responding to the questions, think about the indirect effects of actions. (For example, a permit for a stream crossing for a road might be innocuous by itself but if it will lead to deforestation of 120 acres and replacement of the forest with roads, lawns, roofs and parking lots, then the overall impact of the permit may be considerable.)

- ❑ Would the approval, regulation, permitting or funding policy or program have the potential to result in further modification or degradation of salmon habitat such as:
  - Increase in water temperature
  - Increased sediment loading



- Habitat loss and fragmentation
- Migration blockage
- Loss of habitat complexity
- Loss of riparian vegetation
- Application of pesticides/herbicides
- Water quality degradation from excess nutrient loading or chemical pollution
- Streamflow alterations
- Stormwater runoff

❑ Would the approval, regulation, permitting or funding policy or program lead to conservation of salmon habitat by avoiding, minimizing or mitigating human impacts on salmon habitat such as:
- Protecting environmentally sensitive areas
- Preserving open space, greenbelts and stream corridors
- Reducing disruption and fragmentation of habitat
- Reducing impervious surfaces
- Preventing stormwater impacts
- Improving water quality
- Improving surface water and groundwater supplies

❑ Would the policy or program lead to degradation of habitat processes and functions?

❑ Would the policy or program help develop and implement salmon-friendly best management practices?

❑ Would the policy or program result in better knowledge or understanding of the issues surrounding the decline and recovery of salmon populations and their habitat?

❑ Would the policy or program contribute to restoration of degraded habitat processes or functions?

❑ Would the impacts of the policy or program be temporary and reversible? Or would they be irreversible?

❑ What would it take to avoid or mitigate the potential impacts of the policy or program?

❑ Does the policy or program identify standards, procedures or guidelines that are accepted as good management practices that protect salmon and habitat?

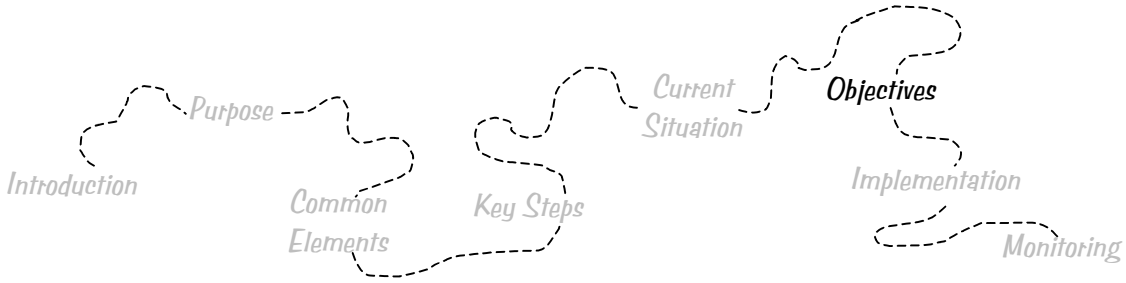
A sample evaluation form, "Evaluating the Effects of Government Policies and Programs" in Appendix 2 illustrates one potential approach to evaluating individual and cumulative impacts of programs and policies which can provide a consistent way of determining the likely positive or negative effects of those policies and programs.

The results of the watershed assessment and the evaluation of water and land management policies and programs should serve as a basis for habitat conservation policies and actions that either:
- Direct future water and land use activities away from areas with existing or potential high quality habitat; or
- Minimize and mitigate impacts that cannot be avoided.

It is also important to identify and analyze conservation efforts implemented in the past to help avoid failures and build on successes.

3. Document and evaluate past and current habitat conservation efforts

The effectiveness of habitat improvements is uncertain because past conservation activities have been mostly a patchwork of uncoordinated actions that rarely have been monitored. With limited funding available for habitat conservation efforts, it is important to understand what has already been accomplished. (See Appendix 1 for information sources for funded projects.) Part of the difficulty is finding documentation about past and on-going conservation activities, what works and why.



The following questions can help with documenting and evaluating past and current habitat conservation activities, particularly restoration and preservation projects:

- ❑ What and where have public and private salmon habitat conservation efforts been implemented? Examples include:
  - Acquisition of water and land
  - Instream diversions, such as screens and by-pass facilities
  - Instream passage improvements, for example, at culverts, diversion dams and fishways
  - Instream habitat improvements, such as bank stabilization, large woody debris, dike removal
  - Riparian habitat improvements, such as planting vegetation and installing fencing to exclude livestock
  - Upland habitat improvements, such as road abandonment/decommissioning, road erosion control, stormwater control
  - Estuarine/marine nearshore habitat improvements, such as estuary plantings and shoreline restoration
  - Water cleanup plans or "TMDLs"

- ❑ Are conservation efforts consistent with and supported by watershed assessments that identify habitat conditions and their causes?

- ❑ Do they address causes of habitat degradation and prevent further degradation?

- ❑ Have conservation strategies for the watershed been developed and used to guide project selection and prioritization?

- ❑ What guidelines and criteria have been used for strategy development and project identification and ranking?

- ❑ What processes or means were used to identify the most important habitat protection and restoration projects in the watershed and prioritize those projects for funding and implementation?

- ❑ Have measures of success been established?

- ❑ Is there a monitoring effort to assess the actual results of conservation projects?

- ❑ What substantive salmon habitat protection or restoration has resulted from conservation projects?

- ❑ What benefits to salmon population and to ecosystem functions have resulted from implementation of the conservation projects?

- ❑ Are habitat conservation projects collectively expected to achieve the conservation objectives for the watershed?

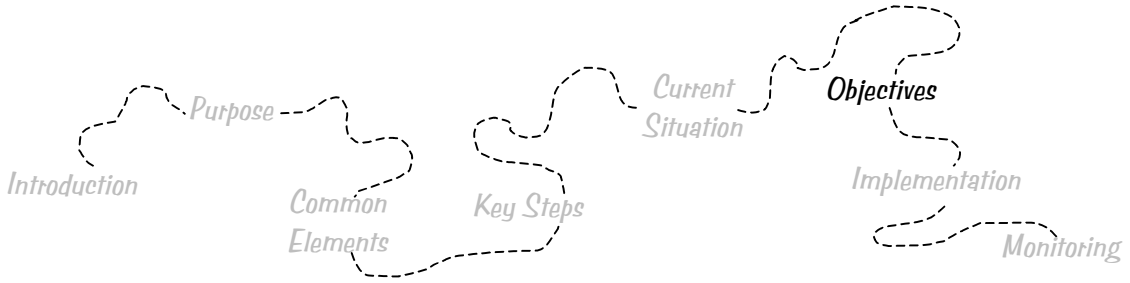
- ❑ How much was spent in the last five years on restoration and preservation projects?

Objectives, Strategies and Priorities: *WHERE DO WE WANT TO GO?*

A fundamental element of salmon recovery is to establish biological goals for salmon populations. These goals are being set at the level of Evolutionarily Significant Units, or Distinct Population Segments, by identifying key parameters related to viable salmon populations (abundance, productivity, spatial distribution and genetic diversity). Goals, or targets, are being set by the National Marine Fisheries Service, via Technical Recovery Teams, with policy input from other federal agencies, state and tribal governments and private organizations. USFWS is responsible for setting recovery goals for bull trout. Such goals are a key element in regional salmon recovery plans. To achieve the biological goals at the watershed level, factors that placed the species at risk and that are limiting recovery must be addressed.

The amount, quality and distribution of habitat attributes required to achieve salmon recovery goals need to be characterized, quantified and expressed in terms of measurable objectives.

Establishing recovery goals is a necessary part of salmon recovery. However, even in the absence



of population goals, measurable objectives that describe desired results should be set for habitat features critical to salmon survival and recovery. Those measurable objectives can be reevaluated once recovery goals are set. In addition, measurable habitat conservation objectives can establish accountability and help evaluate the efficiency and effectiveness of strategies and actions.

Because salmon recovery involves changes in the use of water and land resources, habitat conservation objectives must address not only what is desirable but also must consider what is realistic and feasible. In the face of growth and development and sometimes conflicting management activities, it is not easy to formulate specific objectives, strategies and priorities for salmon habitat conservation in a watershed. However, as communities examine how they wish to grow, there is an opportunity to look for strategies that will protect the environment while accommodating new growth and development.

The watershed assessment for salmon habitat should be used to help determine how well the current habitat conditions can meet salmon population goals for the watershed, and to what extent habitat quality and distribution should be protected and improved to support population goals.

This section will help with setting salmon habitat conservation objectives, and designing strategies and priorities for watersheds.

There are three steps in answering the question of "Where Do We Want to go?"

Step 1 Set clear and quantifiable objectives for habitat conservation
Step 2 Develop strategies for action
Step 3 Develop a priority framework

1. Set clear and quantifiable objectives for habitat conservation

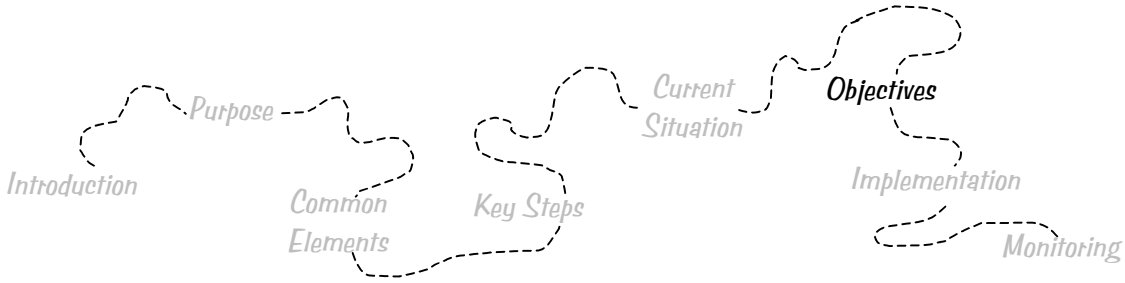
When establishing objectives to protect and restore salmon habitat, make sure they:

- Are quantifiable and measurable, and relate to biological goals;
- Consider social and economic needs;
- Are based on results of the analysis of current conditions in the watershed;
- Encourage better cooperation and coordination between governments;
- Promote compliance with ESA requirements;
- Are action-oriented and recognize the need for immediate actions to prevent further habitat degradation; and
- Address the limited knowledge and inherent uncertainty related to salmon recovery.

The following are broad qualitative objectives that are considered central to salmon habitat conservation. These or similar objectives can be tailored to specific watersheds:

- Protection and restoration efforts should be targeted to the most biologically important areas for salmon.
- Habitat processes that provide freshwater, estuarine and marine/nearshore habitat characteristics important to salmon should be maintained and restored.
- Areas where salmon populations are healthy and where existing habitat conditions are considered good to excellent should be protected by preventing water pollution, streamflow alterations, habitat loss, fragmentation and introduction of invasive species.
- Habitat productivity should be improved and increased by restoring habitat processes, reconnecting isolated and/or fragmented high quality habitat, and improving connectivity and access to off-channel habitats.
- Degraded sites considered essential for maintenance of functional downstream habitat should be restored.
- Citizens should be actively engaged in salmon conservation efforts.
- Investment and use of government resources should be coordinated and used in a cost effective and efficient manner.

To achieve long-term success, habitat objectives need to consider the extent and nature of salmon habitat problems, and the watershed's current and future capacity to support increases in salmon populations. Once quantifiable objectives are



established, a key question is: how can they be achieved? Responding to this question depends on developing strategies to achieve the desired results, and taking actions to implement strategies within realistic schedules and with adequate funding.

2. Develop strategies for action

The aim is to develop strategies for action that are sustainable in the long term. Protection or restoration alone will not be adequate to conserve salmon habitat. Protecting relatively unaltered areas is at least equally important to restoring degraded sites. Both protection and restoration are important parts of overall salmon habitat conservation.

Identifying limiting factors and core causes of habitat conditions within the watershed provides information to help determine what should be done and where efforts should be focused. This information, together with population goals and measurable habitat objectives for attaining salmon recovery, should guide the design of effective strategies for actions to protect and restore salmon habitat. In addition, understanding how different salmon species use different parts of the watershed at their different life stages can help in designing appropriate protective land and water management strategies and actions.

Strategies for action may be focused around:

- Habitat elements (water quality, flow regime, habitat features, migration barriers); or
- Major economic sectors affecting water and land resources (e.g., agriculture, forestry, urban-industrial, mining, hydropower and transportation); or
- Responsible governments and the private sector (federal, state, local, tribes and private parties); or
- Combinations of any of the above.

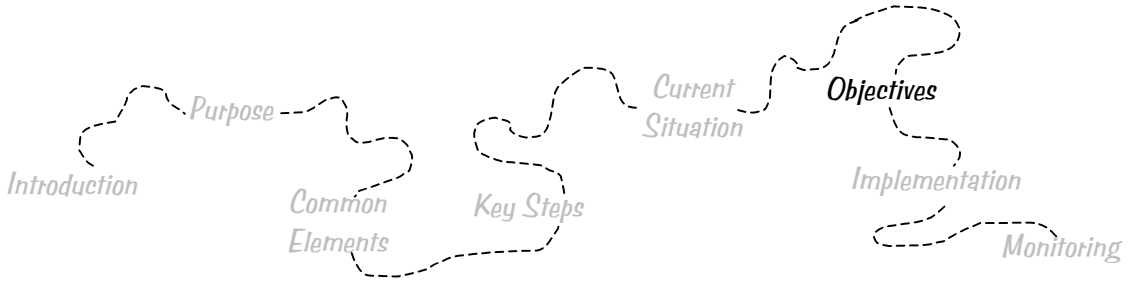
Regardless of how strategies for actions are focused and organized, it is important to identify applicable habitat elements, economic sectors and responsible parties, and to consider how the strategies relate to existing policies and programs.

In general, the following strategies should be considered for salmon habitat conservation, as applicable in a specific watershed:

- Engage citizens and salmon partners in salmon habitat conservation efforts.
- Retain or restore adequate amounts of water in streams for salmon.
- Protect, restore and maintain critical areas (unstable slopes, wetlands, riparian areas, floodplains, estuaries and marine/nearshore areas).
- Improve forest, farm and land development practices through implementation of best management practices.
- Restore and protect water quality to meet needs of salmon.
- Ensure usable habitat is accessible.
- Avoid, minimize and/or mitigate negative impacts of continuing growth and development, and ensure development projects are salmon friendly by using land use plans and regulations.
- Design decision-making processes to use best available science (taking into consideration limited knowledge and inherent uncertainty of salmon recovery).
- Enhance compliance with laws and regulations that support salmon habitat protection and restoration.
- Monitor results and make changes consistent with an adaptive learning process.
- Use financial incentives in conjunction with regulatory tools.

The potential tools and actions listed in Appendix 3 may be helpful in formulating strategies to achieve specific habitat objectives.

Some of the strategies, once implemented, may produce results in a short time frame, which may be important in protecting remaining key habitats and stabilizing salmon populations. Other strategies likely will produce results in the long term and will support salmon recovery over time. Given the limited resources available and the time and effort needed to implement some of the strategies, it is important to set priorities and target



efforts to high priority issues and geographical areas.

A framework for setting priorities needs to be developed. It should consider that:

1. Protection and prevention are less expensive and more reliable than restoration;
2. Collective actions are more effective and efficient than individual actions; and
3. Financial and market incentives, in addition to regulatory actions, usually promote greater public acceptance of changes needed to be made in water and land management.

3. Develop priority framework

Salmon habitat conservation requires decisions on where protection and restoration actions are most likely to produce effective and efficient outcomes. To determine priorities it is necessary to draw on information from assessment of the watershed's physical and biological conditions to specifically identify areas that have the greatest potential to contribute to salmon recovery and areas where habitat disturbances have the greatest potential to be reversed.

From a long-term perspective, salmon habitat conservation works best and costs less if priorities are aimed at stopping further declines of salmon populations and their habitat. Therefore, protection and preservation efforts should be emphasized as high priority. Indeed, evidence shows that once habitat degradation has occurred to the extent that restoration efforts are needed, such efforts are typically more expensive and less reliable, and some degradation may be irreversible. However, in some watersheds the extent of habitat loss means that it may not be possible to protect or add sufficient high quality habitat because it no longer exists or is extremely limited.

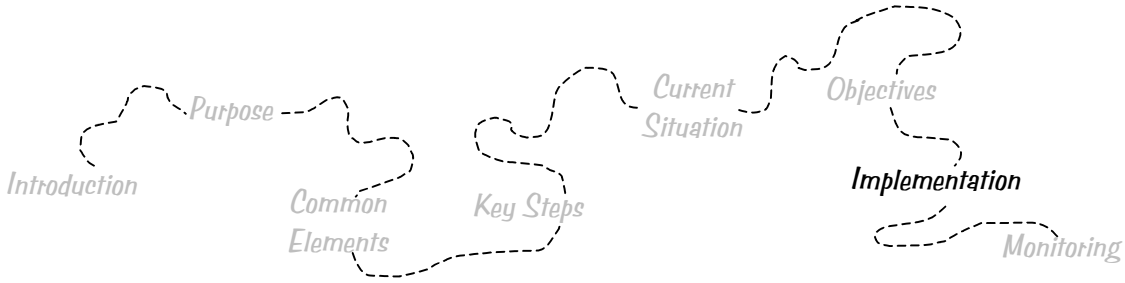
A priority framework should be based on results of watershed assessment and evaluation of the success or failure of past and current conservation efforts. It is important to develop criteria for prioritization specific to local watershed conditions. In general, salmon habitat conservation should place high priority on actions and projects that:

- Protect remaining good habitat;
- Open disconnected habitat in floodplains and estuaries;
- Improve connectivity and access; and
- Restore habitat processes altered by land use practices that have potential to be reversed.

The following can serve as a foundation for setting priorities and can be tailored to specific watersheds. Determine:

- ❑ Status of salmon productivity, number of species and life stages in the watershed and sub-watersheds;
- ❑ Historical and current significance of the watershed or sub-watersheds to one or more salmon life stages and salmon production;
- ❑ Extent that natural processes that form the habitat have been altered (for example, sediment transport or hydrologic regime alterations) due to past and current human land uses and other activities;
- ❑ Land use and other activities that have caused alterations to natural processes that are considered reversible;
- ❑ Future land use and other activities that are either likely to degrade the habitat or have the ability to protect the watershed or sub-watersheds from future threats;
- ❑ Whether the watershed and/or sub-watersheds are accessible to salmon, or access can be effectively restored;
- ❑ Whether the watershed and/or sub-watersheds are considered essential for the maintenance of functional downstream habitat.

In summary, the success of salmon habitat conservation depends on how well local groups use the best available information to set realistic objectives, design effective strategies for actions, and prioritize those actions. In addition, it is important to select the right tools for implementation. An endless number and variety of tools to achieve protection and restoration are available. They include voluntary actions, regulatory or mandatory actions, and financial and market incentives for actions. The appropriate



protection and restoration tools depend on the situation in each watershed. Local groups, with state participation, are best suited for selecting the appropriate tools.

Implementation: HOW WILL WE GET THERE?

Local groups face difficult choices as they attempt to conserve salmon habitat in their watershed as part of salmon recovery, while they also attempt to maintain a healthy economy and accommodate continuous population growth. Carefully selected and prioritized tools and actions are key to ensuring acceptability and effectiveness of approaches for salmon habitat conservation. The actions may be applied watershed-wide or on a smaller geographic scale, such as sub-watersheds or stream reaches.

The schedule and sequence for habitat conservation actions need to be clearly specified. The duration of strategies and actions for salmon habitat conservation should be linked to:

- Timing of an evaluation and adaptive learning process;
- A commitment to adjust and supplement strategies and actions as needed over time; and
- Development of region-wide salmon recovery plans.

The long-term success of salmon recovery will depend on acceptance and actions by private individuals and landowners. Use of incentives and non-regulatory tools help motivate landowners and developers to protect and restore habitat while gaining economic benefits.

In addition, what is needed to recover salmon is greater than what an individual program or jurisdiction can accomplish. Most programs have been established along relatively narrow functional lines and may have fragmented decision-making authorities. Many watersheds will have multiple local jurisdictions that share responsibility. To effectively address the challenges of salmon recovery, state, local, tribal and federal programs and activities need to be coordinated and integrated.

There are three steps to answering the question, "How Will We Get There?"

Step 1 Select tools and actions for salmon habitat conservation

Step 2 Use incentives and non-regulatory tools

Step 3 Coordinate and integrate existing programs

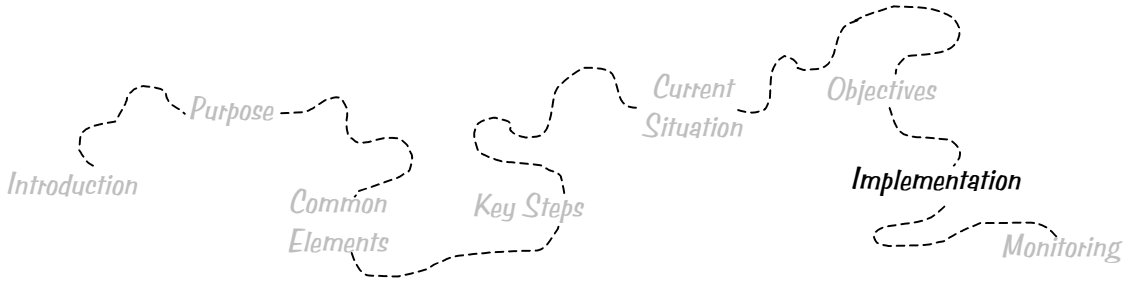
1. Select tools and actions for salmon habitat conservation

There are many tools and actions available for protecting and restoring critical habitat features, including stream flows, water quality, channel conditions and floodplains, habitat access, and riparian, estuarine and nearshore habitat.

Most tools and actions described in Appendix 3 are either requirements or guidelines outlined in various state and/or local policies, plans or regulations. These include, for example, growth management plans and regulations, shoreline management guidelines and local shoreline master programs, local floodplain management plans and regulations, stormwater manuals and local plans, transportation plans, water quality plans to control nonpoint source pollution, and water and wastewater plans and regulations.

A variety of tools and actions are listed in Appendix 3. The list is not exhaustive or exclusive, and is not intended to mandate what should be used for salmon habitat conservation. The intent in providing the list is to point out various state and local tools that are available and can be tailored to the watershed based on local ecological, social and economic constraints and opportunities.

Prior to selecting some of the tools, especially restoration tools, a comprehensive watershed assessment should be done. For example, to select protection or restoration tools to address sediment problems, a watershed assessment should document existing erosion and sediment problems, land use activities associated with the



problems and vulnerability of areas within the watershed.

Because of the complex interactions among the limiting factors and habitat processes, it is difficult to provide a general evaluation of the prospective effectiveness of a specific tool or action for a specific watershed. Local groups will need to determine for their watershed what tools to use, to what extent, and in what sequence. Also local groups will need to monitor the effectiveness of the tools.

2. Use incentives and non-regulatory tools

The long-term success of salmon habitat conservation depends on how well impacts of development activities can be avoided, minimized and mitigated without creating a greater financial burden on local economies. The majority of state and local policies and programs adopted to date are mostly regulatory in nature. Few state and local programs rely primarily on incentives. Typically, regulations establish standards for protecting sensitive areas, prohibit certain types of development and require mitigation for development that is allowed. Enforcement of applicable regulations is an important part of habitat conservation. Regulations to protect salmon habitat, such as riparian buffer zones, have also raised considerable frustration and opposition on the part of many landowners.

Conflict over regulations may obstruct the development and implementation of salmon habitat conservation. Habitat conservation efforts must, therefore, determine ways to resolve conflicts over property rights and the need to protect and restore key habitat. Habitat conservation efforts should use market incentives and non-regulatory actions, in addition to regulations, to protect and restore salmon habitat and to achieve sustainable communities.

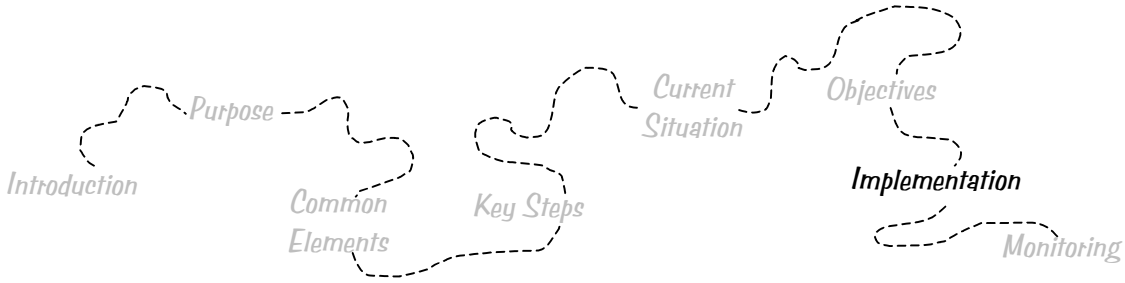
The overall purpose of this section is to encourage local partners to consider incentives and other non-regulatory tools along with enforcement of regulations, to protect and restore salmon habitat. State and federal agencies, some local governments, and non-profit organizations have developed extensive information describing in detail the available tools and where they are being used. (See Appendix 3)

Many of the incentives can be added to existing programs to provide more flexibility and greater acceptance of salmon habitat conservation. Local habitat conservation efforts should:

- Recommend actions to increase awareness and appreciation of the value and limits of natural resources within the watershed and to encourage behavior changes that would benefit salmon and ecosystems;
- Examine incentive-based tools for applicability in the watershed;
- Recommend economic incentive alternatives to existing regulatory measures;
- Design programs to motivate landowners and developers to conserve natural systems while receiving economic benefit;
- Help create economic incentives by removing market barriers that promote inefficient use of resources;
- Promote incentives and non-regulatory approaches that are integrated within existing regulatory programs;
- Recommend new ways to finance acquisitions, improvements and compensation; and
- Ensure that incentives and non-regulatory tools produce desired outcomes.

There are many land and water development-related incentives programs that are available but not used. Local groups, along with state and federal agencies, need to identify barriers and constraints that inhibit rather than support use of incentives programs. Affected agencies should make every effort to address those barriers and constraints and facilitate use of incentives and non-regulatory tools, where appropriate.

Incentives and non-regulatory programs can take the form of special taxes, direct financial assistance, credits or rebates, cost-sharing agreements, stewardship agreements and volunteer participation. (For examples, see list at end of Appendix 3.)



While there is general agreement on the importance of coordinating and integrating these programs, until recently there have been no unifying or bridging concepts to help organize what are otherwise fragmented efforts. Those involved in watersheds and with regional salmon recovery efforts can integrate and coordinate relatively independent salmon habitat conservation efforts by working together to understand current and projected future conditions within the watershed, to reach agreement on what needs to be achieved, and to determine which tools and actions will benefit salmon.

3. Coordinate and integrate existing programs

The variety and number of organizations and jurisdictions involved in salmon recovery efforts at the watershed level often lead to programs that don't mesh with each other and uncertainty about who is responsible for what. Existing programs vary widely in their mandates, available resources, and expertise. The lack of a single coordinating entity makes the success of salmon habitat conservation largely dependent on mutual cooperation among involved entities.

Standards and guidelines for protection and restoration may vary among local jurisdictions within the watershed as well as between state, federal and local authorities. To achieve salmon recovery at the watershed level with limited resources, consistent approaches are needed to protect and restore habitat, to avoid or mitigate impacts of land and water use and development, and to monitor progress.

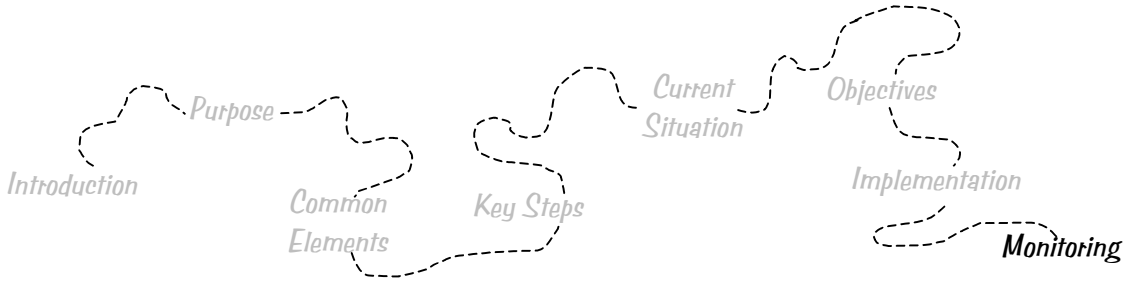
To help coordinate and integrate relevant programs, local groups need to recognize and assess physical interrelationships between salmon and land and water management. For example, increases in impervious surfaces from land use patterns and density affect groundwater recharge and discharge into streams, which in turn affects the amount and quality of water available for salmon spawning and migration. Local groups also need to identify and understand different programs' goals and strategies and ways to reconcile them. Local groups can facilitate processes and identify incentives that can promote coordination and integration.

Watershed assessments help build a common understanding of the watershed, provide a basis for integrating existing programs, and help focus what might otherwise be uncoordinated actions. This effort should highlight the relationship of salmon habitat conservation programs to other water and land management objectives. For example, protecting key habitat can complement several growth management goals, such as protecting environmentally sensitive areas, reducing urban sprawl, and retaining open space areas. Coordination and integration also will reinforce the need for consistent standards, guidelines and protocols, and the need for consistent priorities for actions.

Implementation of the roadmap's key components requires extensive participation and commitment by local, tribal, state and federal agencies and private interests. The participants involved in salmon habitat conservation need information, data, staff support, technical assistance and funds.

An overall approach to salmon habitat conservation for a watershed, once it is completed, may require the approval and commitment of federal, state, tribal and local governments. Responsibilities and authorities to implement actions need to be specified, and commitment from non-participating agencies should be sought during the development process and before selecting and prioritizing actions.

It should be made explicitly clear if additional authority or decisions are required to implement an action. For example, local government action to adopt or amend land use plans or regulations may be needed in order to implement actions identified as needed for salmon habitat conservation. Where actions on specific properties are identified, it should be specified which landowners have committed to the actions and how voluntary participation of other landowners will be obtained.



Monitoring Progress: *DID WE MAKE IT?*

Monitoring is a critical piece of salmon habitat conservation. Monitoring is a way to detect changes to habitat conditions resulting from conservation efforts. It helps improve decision-making by providing the ability to track progress toward habitat conservation and salmon recovery. In addition, monitoring helps reduce uncertainty and improves accountability.

Local monitoring programs will help determine whether local, state, and/or federal agencies implemented protection and restoration activities in accordance with planned habitat conservation actions, how well the actions achieved their objectives, and what changes or revisions should be made to habitat conservation strategies and priorities.

The State's Independent Science Panel (Panel) issued a report to the Governor and Legislature in late December 2000, recommending development of a comprehensive statewide monitoring program. According to the Panel, some general characteristics of a good monitoring program include:

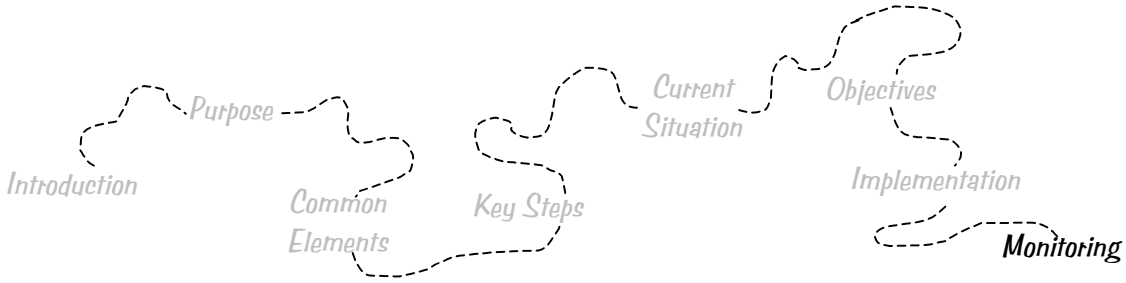
- Clearly articulated goals, objectives and questions that need to be addressed.
- Requirements for gathering data (statistical design) that are appropriate to the objectives.
- Indicators and variables defined by objectives and the appropriate geographical, time and biological scales.
- Standardized sampling protocols that allow comparison among locations, times or programs.
- Procedures to ensure that collection and handling of all data used to monitor salmon recovery are consistent (quality assurance and quality control).
- Data management systems to allow easy access, sharing and coordination among different collectors and users.
- Stable and adequate funding.
- Systems that help integrate monitoring information into decision-making.

The Independent Science Panel's monitoring report includes a matrix describing several existing state programs and databases having a strong relationship to actual field monitoring of salmon and watershed conditions and recovery. (The list is limited to those programs identified using a web-based search.) The list can be used as a reference by those developing salmon habitat conservation approaches, but it should be augmented with information on monitoring programs active in the specific watershed that may not be included in the matrix.

The 2001 Legislature enacted Substitute Senate Bill 5637, codifying and building on the Panel's recommendations. This bill calls for the development of a comprehensive monitoring strategy and action plan for watershed health with an emphasis on salmon recovery, consistent with the eight characteristics listed here. A monitoring oversight committee has responsibility to develop the strategy by December 2002. The action plan is to be prepared so that it can be fully implemented by June 2007.

The monitoring steering committee will create a framework to coordinate existing monitoring activities; identify monitoring activities relevant to local, state and federal watershed health objectives; and facilitate exchange of monitoring information and data among agencies and organizations. While this work is essential to the success of salmon habitat conservation, many protection and restoration actions and investment decisions are underway and will proceed during development of the statewide watershed health monitoring strategy and action plan.

With few exceptions, there has been relatively little monitoring of trends in salmon recovery, effectiveness of projects or actions, or documentation of what works and what doesn't and why. There has been little monitoring to



document cause-and-effect relationships, to evaluate salmon response to habitat conservation, and to understand linkages between implementing projects or actions and observed effects of the actions/projects.

With the large amounts of effort and money being spent to conserve salmon habitat, and pending development of the coordinated watershed health monitoring strategy and action plan, the question is: what monitoring activities at the watershed level should be included as part of salmon habitat conservation in the interim?

Local groups can begin with the following three steps to design a monitoring program, and to answer the question: "Did We Make It?"

Step 1 Identify and evaluate ongoing monitoring
Step 2 Begin designing a monitoring program
Step 3 Begin developing an adaptive learning process: the feedback loop

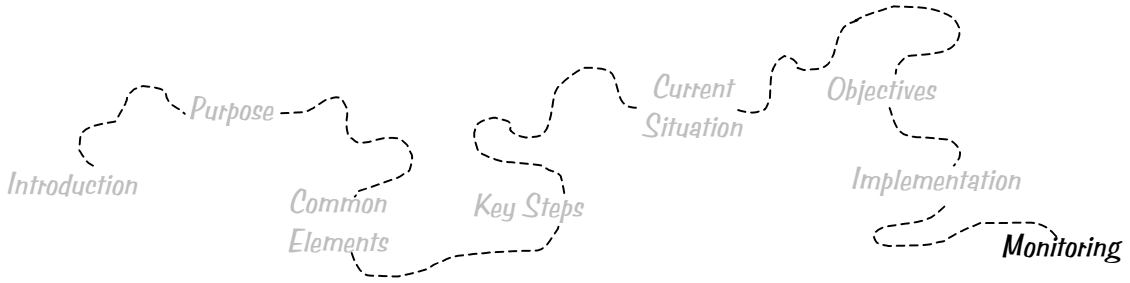
1. Identify and evaluate ongoing monitoring

A number of federal, tribal, state and local agencies, public organizations and private entities monitor issues and actions related to watershed health and salmon recovery. (See the directory and synthesis of monitoring protocols currently used in the Pacific Northwest, published by the Washington Department of Fish and Wildlife – "Inventory and Monitoring of Salmon Habitat in the Pacific Northwest" October 2001.)

The following questions can help local groups evaluate whether existing monitoring programs are relevant to their watershed's health and salmon recovery:

- ❑ What are the objectives of the monitoring programs? To what extent are they relevant to objectives identified for salmon habitat conservation?
- ❑ Do the monitoring programs acquire or deliver monitoring information over time and spatial (e.g., watershed, sub-watershed and site/reach) scales appropriate to the watershed?
- ❑ What indicators are monitored? For example:
  - ❑ Do the programs monitor health of stocks, smolt production, life histories and number of spawners in the watershed?
  - ❑ Do the programs assess condition and detect trends in physical, chemical and biological conditions in estuaries, marine nearshore, riparian areas and streams as well as uplands?
  - ❑ Do the programs monitor habitat elements identified as key to salmon recovery, such as:
    - Flows—e.g., base flows and peak flows
    - Water quality—e.g., temperature, turbidity and dissolved oxygen
    - Sediments—e.g., sources, loads and transport
    - Riparian areas—e.g., bank stabilization, accessibility to quality habitat
    - Fish passage—e.g., adult and juvenile migration
    - Land use and land cover
    - Channel and off-channel habitat—e.g., large woody debris, development structures, floodplain connectivity
    - Estuarine and marine nearshore—e.g., marine vegetation (kelp and eel grass), water quality, and shoreline development
  - ❑ Are the monitoring programs based on the best scientific knowledge, acceptable methodology, standards, protocols and data collection procedures?
  - ❑ Are monitoring programs coordinated and/or integrated?
  - ❑ Are results readily accessible, usable and meaningful?

Identifying and evaluating monitoring occurring in the watershed, sub-watersheds or stream reaches should help determine the adequacy or limitations of existing monitoring efforts and identify monitoring gaps. The effort should also identify institutional constraints, level of commitments to monitoring, and successes and pitfalls of monitoring activities. This information is important in designing a monitoring program to support salmon habitat conservation. Building on existing efforts should be emphasized as long as efforts are relevant to salmon recovery and can be linked to actions needed for salmon habitat conservation.



2. Begin designing a monitoring program

As work continues on development of a comprehensive statewide monitoring strategy and action plan, local groups working on salmon habitat conservation in their watersheds can begin to address the following:

- **Distinguish type of monitoring**. There are three different kinds of monitoring:
  - *Implementation* monitoring to confirm that management decisions were implemented;
  - *Effectiveness* monitoring to accurately assess whether the objectives of the habitat conservation strategy are being achieved; and
  - *Validation* monitoring to confirm that actions have the desired result and that salmon are responding to conservation measures.

  While each type is important to an effective monitoring program, implementation monitoring should start early in the process. Effectiveness and validation monitoring are complex and expensive. Unless commitments are already in place to undertake these two types of monitoring, local groups are encouraged to wait until the comprehensive statewide monitoring strategy is developed before beginning new monitoring efforts.

- **Define roles and responsibilities**. Monitoring effects of salmon habitat conservation actions on local habitat conditions and salmon populations is a shared responsibility of federal, state, tribal and local agencies and private entities. The roles of these entities vary. For example, "fish" monitoring is the purview of federal, state and tribal agencies, while habitat conditions can be monitored by various entities, including state and local agencies, private organizations and volunteers.

- **Baseline data and information**. Data and information generated from assessing salmon populations and watershed conditions can be used as a baseline. This information is necessary for "before and after" analysis. The analysis can help with understanding and quantifying the extent to which changes in salmon populations and salmon habitat conditions were the result of habitat conservation actions.

- **Indicators to measure**. The indicators to be measured depend on the objectives, spatial scale and resources available. The condition of salmon and their habitat can be measured in several ways, e.g., for salmon—number of fish, genetic diversity, and productivity; and for habitat—water temperatures, flows and channel conditions. See Table 1 for examples of indicators that can be selected to monitor actions in watersheds and stream reaches.

- **Scale to measure**. Measurements needed are likely to differ at the site/reach, watershed and region/ESU scales. Table 1 illustrates examples of measurements that could be done at each of the three scales.

- **Coordinate data and information**. A wide range of data systems and standards are currently in use by agencies and other entities. Based on the results of evaluating existing monitoring programs, those involved in developing salmon habitat conservation can identify data systems needing coordination, and/or improvements to better manage and share monitoring information.

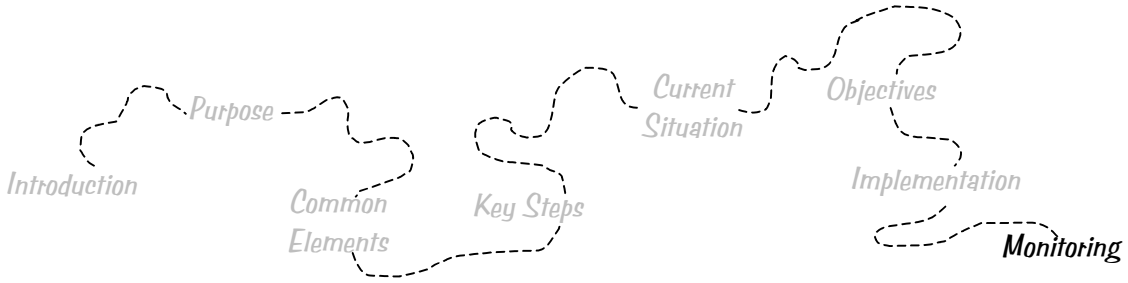
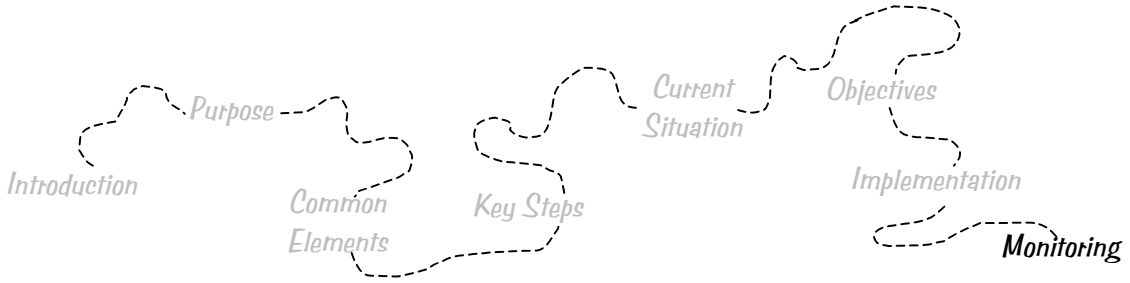


Table 1. Examples of measurements that could be employed at each of three spatial scales to characterize salmon populations and habitat condition.

Scale	Measurement objectives	Fish population measures	Habitat measures
Basin	• Total fish population • Interannual variability • Spatial distribution of salmon across the basin	• Adult counts at the river mouth • Extensive redd or spawner counts • Population genetic characteristics	• Climate • Vegetation type • Basin flow discharge
Watershed	• Effects of a suite of management actions • Population response in altered vs. unaltered watersheds	• Redd or spawner counts • Smolt output • Juvenile surveys • Adult (egg) – smolt survival rate • Juvenile or smolt size or condition • Metapopulation genetics characteristics	• Topography • Geology • Watershed flow discharge • Distribution of channel and valley types
Reach	• Effects of site-specific management • Seasonal utilization of different reach types	• Juvenile abundance/ density • Life-history stage specific survival rate • Growth rate • Juvenile size or condition • Local population genetic characteristics	• Sediment levels • Riparian condition • Habitat complexity • Water temperature

From the Validation Monitoring Panel Report to the UW Olympic Natural Resources Center (2000)

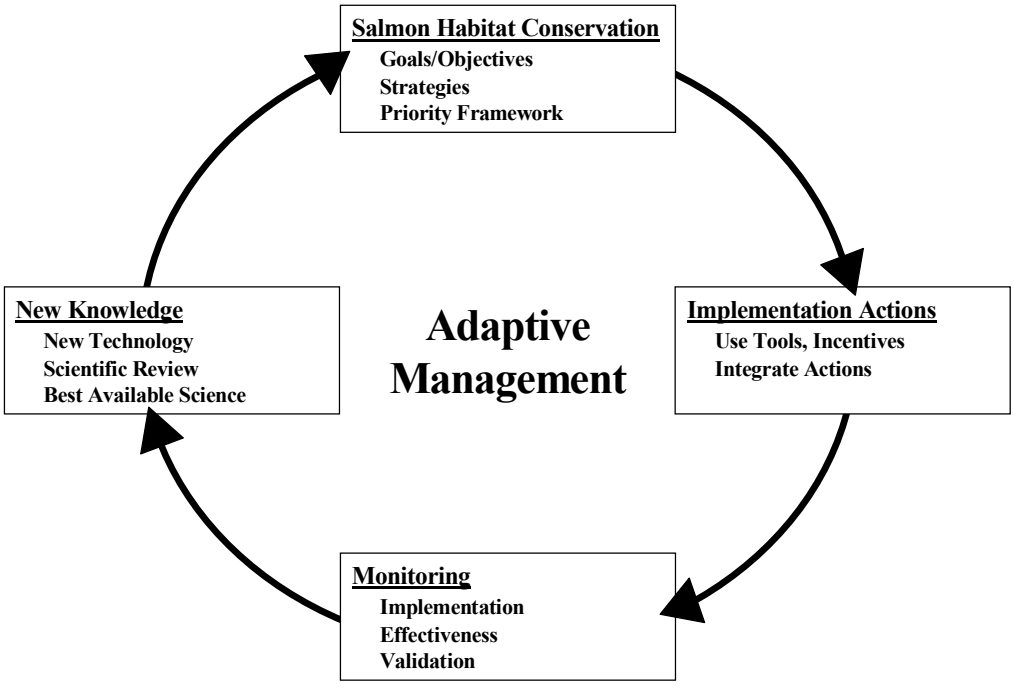


3. Begin developing an adaptive learning process: the feedback loop

To be successful, salmon habitat conservation must include a feedback loop that enables technical and policy review of how well implemented conservation actions achieve salmon habitat conservation objectives and contribute to salmon recovery goals. This will help those involved understand what works and what doesn't. The feedback loop needs to relate to the different scales of salmon recovery (i.e. watershed, regional and state). This feedback loop will either affirm the planned strategies and actions or will show that modification is required.

The figure below illustrates the adaptive learning process in a feedback loop.

Many decisions will be made and actions will proceed in the face of uncertainty and limited knowledge. Incorporating adaptive management or feedback loops into salmon habitat conservation for the watershed will improve our ability to protect and restore salmon habitat. As information becomes available on results of actions taken, salmon habitat conservation strategies and actions for the watershed can be appropriately modified. Decisions will continue to improve as everyone learns by doing.



APPENDIX 1

Resources Related To Salmon Habitat Conservation For Watersheds

Salmon Habitat Conservation Components & Steps	Suggested Sources of Information and Resources to Use	Responsible Entity*
Current Situation in the Watershed: *Where are we?*		
• Use Watershed Assessment Information	• Limiting Factors Analysis. • Watershed assessments done under the Watershed Planning Act. • Power Planning Council Technical Guide for Sub-basin Planners for the Columbia Basin. • Guidance on Watershed Assessment for Salmon (May 2000) and any assessment done in accordance.	• Conservation Commission • Local Planning Units- Ecology • Northwest Power Planning Council (NWPPC) • Governor's Salmon Recovery Office
• Inventory and Evaluation of State and Local Land and Water Management Activities Affecting Salmon Habitat	• NMFS/USFWS Working Guidance for Comprehensive Salmon Restoration Initiatives on the Pacific Coast, 1996. • NMFS/USFWS A Guide to Biological Assessments, and An Ecosystem Approach to Salmonid Conservation. • NMFS 4(d) rules adopted July 2000. • State's CWA 303(d) list of impaired waters, and list of NPDES permits in the watershed. • Programmatic biological evaluation/assessments (BA) and biological opinions prepared for consultation under ESA on broad categories of activities. These include BA's and Bi-Ops for transportation projects, federal irrigation projects, and US Corps of Engineers Nationwide Permits, and Tri-County Model 4(d) Rule Response, Biological Review Draft, May 2001.	• National Marine Fisheries Service (NMFS) US Fish and Wildlife Service (USFWS) • NMFS • USFWS • Department of Ecology (Ecology) • NMFS USFWS Washington State Department of Transportation (WSDOT) US Bureau of Reclamation US Corps of Engineers Tri-County (King, Snohomish, and Pierce) Salmon Recovery Team

* For contact information, see "Reference Guide to Salmon Recovery" January 2002

Salmon Habitat Conservation Components & Steps	Suggested Sources of Information and Resources to Use	Responsible Entity*
• Inventory and Evaluation of Past and Current Habitat Conservation Efforts	• Lead Entities' salmon restoration strategies and projects lists. • WDFW/WSDOT Fish Passage Barriers Removal Program Reports • Local watershed councils' reports (e.g., Skagit Watershed Council) • Salmon Recovery Funding Board/IAC lists of funded projects and PRISM database. • Uniform Environmental Project Reporting System • Water Cleanup plans, or TMDLs developed and implemented and list of relevant projects funded under the various water quality funds (e.g., Centennial Clean Water Fund) • Regional Fisheries Enhancement Program annual reports • Conservation Commission and Conservation Districts' annual reports on CREP and other farm conservation practices. • NWPPC and BPA lists of funded projects. • Interagency Restoration Database (IRDA).	• Washington Department of Fish and Wildlife (WDFW) Lead Entities • WDFW WSDOT • People for Salmon • Salmon Recovery Funding Board (SRFB) Interagency Committee for Outdoor Recreation (IAC) staff • WSDOT • Ecology • WDFW Regional Fisheries Enhancement Groups (RFEGs) • Conservation Commission Conservation Districts • NWPPC Bonneville Power Administration (BPA) • U.S. Forest Service US Bureau of Reclamation
Objectives, Strategies and Priorities: ***Where do we want to go?***		
• Set Clear and Quantifiable Objectives	• NMFS Technical Recovery Teams • Working Guidance for Comprehensive Salmon Restoration Initiatives on the Pacific Coast, 1996. • Statewide Strategy to Recover Salmon, September 1999. • Salmon Recovery Funding Board Funding Strategy, June 2001. • Guidance on Watershed Assessment for Salmon, May 2000. • Regional Salmon Recovery Planning Grant Program and Regional Recovery Plan Model	• NMFS • NMFS USFWS • Joint Natural Resources Cabinet Governor's Salmon Recovery Office • SRFB • Joint Natural Resources Cabinet Governor's Salmon Recovery Office • WDFW

* For contact information, see "Reference Guide to Salmon Recovery" January 2002

Salmon Habitat Conservation Components & Steps	Suggested Sources of Information and Resources to Use	Responsible Entity*
• Develop Strategies for Action	• Regional Salmon Recovery Boards' Strategies	• Lower Columbia Fish Recovery Board Upper Columbia River Salmon Recovery Board Snake River Salmon Recovery Board Tri-County Salmon Recovery Initiative Shared Strategy.
	• Lead Entities' restoration strategies	• Lead Entities
	• Watershed Plans under Watershed Planning Act.	• Watershed Planning Units
	• Statewide Strategy to Recover Salmon, September 1999.	• Joint Natural Resources Cabinet Governor's Salmon Recovery Office
	• Salmon Recovery Funding Board Funding Strategy, June 2001.	• SRFB IAC
	• Nonpoint source pollution management plan.	• Ecology
	• Water Cleanup Plans schedule, and water quality funding strategy related to salmon habitat.	• Ecology
• Develop Priority Framework	• Regional Salmon Recovery Boards' priority considerations.	• Lower Columbia Fish Recovery Board Upper Columbia River Salmon Recovery Board Snake River Salmon Recovery Board Tri-County Salmon Recovery Initiative Shared Strategy
	• Working Guidance for Comprehensive Salmon Restoration Initiatives on the Pacific Coast, 1996.	• NMFS USFWS
	• Statewide Strategy to Recover Salmon, September 1999.	• Joint Natural Resources Cabinet Governor's Salmon Recovery Office
	• Salmon Recovery Funding Board Funding Strategy, June 2001.	• SRFB IAC
	• Guidance on Watershed Assessment for Salmon, May 2000.	• Joint Natural Resources Cabinet Governor's Salmon Recovery Office

* For contact information, see "Reference Guide to Salmon Recovery" January 2002

Salmon Habitat Conservation Components & Steps	Suggested Sources of Information and Resources to Use	Responsible Entity*
Implementation: *How will we get there?*		
• Select Key Tools and Actions for Watershed Conservation Strategy	• Statewide Strategy to Recover Salmon, September 1999. • Forests and Fish Report, and Forest Practices Rules. • Growth Management Act Comprehensive Plans, critical areas ordinances and other development regulations from counties and cities. • Shoreline Management Guidelines rules adopted November 2000 (remanded after appeal, settlement under negotiations) and shoreline Master Programs consistent with the rules. • Local Stormwater Management Programs consistent with the Puget Sound Water Quality Management Plan and NPDES Permits. • Stormwater Manual for Western WA,(Aug-00). • Lead Entities' strategies or action plans. • Watershed plans under the Watershed Planning Act. • Water Resources (supply) Management Plans. • Lower Columbia River Estuary Program. • Water clean-up plans or TMDLs. • Water Quality Management Plan to Control Nonpoint Source Pollution, April 2000. • Field Office Technical Guide. • Highway Runoff Manual and Road Maintenance Manual. • Aquatic Habitat Guidelines, e.g., Integrated Steambank Protection Guidelines. • Fish Passage Design and Fish Protection Screen Guidelines. • Aquatic Nuisance Species Management Plan	• Joint Natural Resources Cabinet Governor's Salmon Recovery Office • Forest Practices Board Department of Natural Resources (DNR) • Cities Counties Office of Community Development. • Ecology Local shoreline jurisdictions • Puget Sound Action Team Ecology Local stormwater jurisdictions • Ecology • Lead Entities, WDFW • Watershed Planning Units Ecology • Ecology Department of Health • Lower Columbia River Estuary Partnership • Ecology • Ecology local jurisdictions • USDA/ Natural Resources Conservation Service (NRCS) • WSDOT • WDFW WSDOT Ecology • WDFW • Washington State Department of Agriculture WDFW Ecology

* For contact information, see "Reference Guide to Salmon Recovery" January 2002

Salmon Habitat Conservation Components & Steps	Suggested Sources of Information and Resources to Use	Responsible Entity*
• Use Incentives and Non-regulatory Tools	• Applying the Public Benefit Rating System – A Watershed Action Tool. • Exploring Wetlands Stewardship, 2000. • Alternative Mitigation Policy Guidance, February 2000. • The Citizens' Toolkit • Conservation Reserve Enhancement Program. • Wetland Incentives, Non-regulatory Approaches to protecting wetlands. • Small Landowner Forest Riparian Easement Program. • Keeping the Rural Vision	• Ecology • Ecology • WDFW WSDOT Ecology • Evergreen Agenda • Conservation Commission USDA/NRCS • National Association of Industrial Parks Puget Sound Water Quality Authority • DNR • Department of Community, Trade and Economic Development
• Coordinate and Integrate Existing Programs	• Growth Management Plans • Watershed Plans • Lead Entities' strategies and projects lists.	• Local jurisdictions Office of Community Development • Watershed Planning Units Ecology • Lead Entities WDFW
Monitoring Progress: *Did we make it?*		
• Evaluate Ongoing Monitoring	• Watershed Monitoring Strategy • 2000 Puget Sound Update (7th report of the Puget Sound Ambient Monitoring Program). • Forests and Fish monitoring efforts. • Salmonid Stock Inventory (SaSI). • Salmon and Steelhead Habitat Inventory and Assessment Project (SSHIAP). • Inventory and Monitoring of Salmon Habitat in the Pacific Northwest: Directory and Synthesis of Protocols • Environmental Information Management System for stream flows, water quality, sediment, and other environmental data.	• Monitoring Steering Committee Governor's Salmon Recovery Office SRFB • Puget Sound Water Quality Action Team • DNR • WDFW tribes • WDFW Northwest Indian Fisheries Commission • WDFW • Ecology

* For contact information, see "Reference Guide to Salmon Recovery" January 2002

Salmon Habitat Conservation Components & Steps	Suggested Sources of Information and Resources to Use	Responsible Entity*
• Begin Design of monitoring program	• Watershed Monitoring Strategy	• Monitoring Steering Committee Governor's Salmon Recovery Office SRFB
• Begin Development of Adaptive Learning Process	• Watershed Monitoring Strategy	• Monitoring Steering Committee Governor's Salmon Recovery Office SRFB

* For contact information, see "Reference Guide to Salmon Recovery" January 2002

APPENDIX 2

Evaluating the Effects of Government Policies and Programs
Sample Evaluation Form

Policy or Program to be evaluated:_____

Relevant Habitat Effects*	Activities Causing Effects					
	Public Facility Construction	Road Operation and Maintenance	Other Public Facility Operation and Maintenance	Regulate/Manage Timber Operations	Regulate/Manage Agriculture Operations	Regulate/Manage Development
Water Temperature	**	**	**	**	**	**
Sediment/Turbidity from Land Disturbance	**	**	**	**	**	**
Water Pollution from Chemicals or Nutrients	**	**	**	**	**	**
Physical Barriers to Fish Passage	**	**	**	**	**	**
Character of Instream Structure (Gravels, Wood, Pools)	**	**	**	**	**	**
Off-channel and Wetland Habitat Functions	**	**	**	**	**	**
Impacts to Refugia or Sensitive Areas	**	**	**	**	**	**
Stream Meander Patterns and Channel Migration	**	**	**	**	**	**
Natural Streambank Conditions	**	**	**	**	**	**
Floodplain Connectivity	**	**	**	**	**	**
Stormwater Discharge and Changes to Hydrograph	**	**	**	**	**	**
Peak or Base Stream Flows	**	**	**	**	**	**
Direct or Indirect Water Withdrawals	**	**	**	**	**	**
Road Density and Location in Relation to Streams	**	**	**	**	**	**
Disturbance of Native Vegetation	**	**	**	**	**	**
Riparian Areas and Reserves	**	**	**	**	**	**

* Based upon NMFS Matrix of Pathways and Indicators for Properly Functioning Habitat and the NMFS 4(d) rule criteria for the limit on take prohibitions for municipal, residential, commercial and industrial development.
** For each government policy or program being evaluated, determine applicable value for each habitat effect/activity from these options: Not Applicable, No Effect, Likely Beneficial Effect, and/or Likely Adverse Effect.

APPENDIX 3

Potential Tools and Actions for Salmon Habitat Conservation at the Watershed Level

The potential tools and actions listed below are not exhaustive or exclusive and are intended to assist in developing strategies for action as outlined in the text of the "Roadmap for Salmon Habitat Conservation at the Watershed Level."

1. Stream Flows

Base Flows

Problem: The watershed assessment documents the frequency and duration of low flow conditions affecting salmon life stages. The problem could be caused by water withdrawals, forest and agricultural practices (e.g., diking, and draining), extent of impervious surfaces, hydropower and reservoir operation, and/or alteration of groundwater recharge areas.

Objective: Ensure rivers and streams have flows to support salmon.

Protection options:

- Establish flows in priority rivers and streams.
- Protect and maintain established instream flows by monitoring water use and enforcing laws and regulations.
- Administer groundwater and surface water right permits and changes consistent with the established instream flow.
- Protect groundwater recharge areas from impacts of land development by designating and protecting agricultural, forest and other resource lands and critical areas.

Restoration options:

- Put or keep water in the streams using innovative tools, such as
  - Water banking;
  - Lease or purchase senior water rights;
  - Trust water donation;
  - Water conservation and reuse; and
  - Water storage and groundwater recharge.
- Restore wetlands, reconnect and revegetate floodplains;
- Manage stormwater and reduce the extent of impervious surfaces; and
- Require less disruptive water releases from hydropower projects.

Peak Flows

Problem: Watershed assessment identifies human-induced alterations to the frequency, magnitude, and duration of peak flows affecting salmon life cycle. Alterations may include increases in impervious surfaces, diking, draining, vegetation removal, wetland losses, stormwater and improper runoff.

Objective: Prevent and minimize increases to natural peak flows.

Protection options:

- Protect frequently flooded areas using critical areas ordinances;
- Limit impervious areas using development and zoning regulations;
- Protect agricultural and urban and rural riparian zones;
- Implement Forest Practices regulations;
- Implement clearing and grading ordinances to minimize land disturbances;

- Limit forest and agricultural land conversion through regulations and incentives;
- Require stormwater management practices for existing and new development;
- Retain open space and recreation areas and acquire critical resource lands;
- Conserve resource lands under local land use ordinances; and
- Implement provisions of the floodplain management program.

Restoration options:

- Stormwater detention or retention;
- Increase floodwater storage capacity;
- Restore hydrologic connectivity between streams and wetlands and/or floodplains;
- Remove and relocate dikes, levees and other structures; and
- Re-vegetate riparian zones and floodplains.

2. Water Quality

Problem: The watershed assessment documents the nature and extent of water quality problems in the watershed and sub-watershed areas. Forest, agricultural and urban land use practices may cause temperature extremes, increase turbidity, increase nutrients, suspended solids or toxics, alter salinity and reduce dissolved oxygen

Objective: Ensure water is clean and cool enough for salmon by preventing and mitigating impacts of human activities.

Protection options:

- Use State Environmental Policy Act (SEPA) to prevent, minimize or mitigate both immediate and long-term impacts;
- Implement forest practices regulations;
- Establish and protect riparian buffers by adopting Critical Areas Ordinances (CAOs) using the best available science;
- Regulate vegetation removal through clearing and grading ordinances;
- Implement Total Maximum Daily Loads (TMDLs) or water clean-up plans;
- Manage nonpoint pollution through land management strategies outlined in the state's nonpoint program approved by EPA in April 2000;
- Implement the Coastal Zone Act reauthorization amendments (Washington's CZARA program) ;
- Use incentives and technical assistance, such as Conservation Reserve Enhancement Program (CREP), to implement best management practices;
- Use integrated pest management strategies; and
- Implement education and enforcement programs.

Restoration options:

- Fencing livestock out of riparian areas;
- Eliminate surface and ground water discharges from existing landfills, industrial waste sites, and other waste disposal sites;
- Manage stormwater from existing and new development using detention, treatment and infiltration measures;
- Manage highway runoff and retrofit transportation projects to address stormwater concerns; and
- Issue salmon friendly National Pollutant Discharge Elimination System (NPDES) permits for municipal, industrial and commercial wastewater treatment facilities.

3. Sediments

Problem: Land use practices can cause decreased stability of substrate, banks and channels; high levels of fine sediment; high likelihood of landslides; and increased turbidity. Forest and agricultural practices contribute substantial quantities of sediment to streams and estuaries. A watershed assessment documents existing erosion and sediment problems, land use activities associated with the problems, and vulnerability of areas within the watershed.

Objective: Minimize and/or avoid land use activities in areas susceptible to mass wasting and surface erosion and in riparian zones to prevent accelerating the naturally occurring rate and delivery of sediment.

Protection options:

- Restrict development, road construction, logging and intensive farming in areas with high likelihood of occurrence of mass wasting (unstable slopes) and/or erosion;
- Minimize total road density within the watershed and provide adequate drainage control for new roads;
- Protect geologically hazardous areas, such as unstable slopes, and riparian zones through critical areas ordinances and zoning regulations;
- Implement best management farm practices, and nonpoint source control techniques for urban areas;
- Avoid road construction and soil disturbance in proximity to riparian areas, wetlands, unstable slopes, and areas where sediment related degradation has been identified; and
- Maintain drainage ditches, culverts and other drainage structures to prevent clogging with debris and sediments.

Restoration options:

- Implement a road maintenance schedule to prevent and mitigate sediment impacts;
- Remove, reconstruct or upgrade roads that are vulnerable to failure due to design or location;
- Implement road maintenance and abandonment or decommissioning plans approved under forest practices regulations;
- Upgrade stream crossing, culverts and road drainage systems;
- Reconnect floodplains through dike removal or breaching;
- Implement in-channel projects that address geologic processes such as deep-seated slope failure, toe erosion, or landslides;
- Construct detention and infiltration ponds to capture runoff from roads, development, farms and irrigation return flows; and
- Re-establish natural riparian vegetation to restore a more natural delivery and routing of sediment.

4. Riparian Areas

Problem: Riparian areas provide critical habitat elements and functions essential to all salmon life stages, such as shade, large woody debris, organic nutrients, streambank stabilization, control of sediments, and filtration of nutrients and pollutants. Watershed assessment determines that removal or alteration of riparian vegetation through logging, grazing, farming and land development has eliminated and degraded spawning and rearing habitat and diminished water quantity and quality. There is a consensus in the scientific community that protecting and restoring riparian ecosystems should be a major element of a salmon habitat conservation strategy. However, protection and restoration of riparian areas will be effective only if actions are taken to minimize impacts from upland areas.

Objective: Protect healthy areas and restore degraded riparian zones to a more natural condition.

Protection options:

- Establish and protect riparian buffers using regulatory and incentive mechanisms provided in Critical Areas Ordinances, shoreline master programs, forest practices regulations, farm conservation plans and other programs to avoid or minimize removal of native vegetation;
- Establish appropriate environmental designations according to local shoreline master programs that are consistent with the state shoreline management guidelines;
- Establish salmon friendly land use patterns and design standards;
- Regulate or restrict shoreline uses, forest practices, land conversion, rural and urban development and other activities within riparian zones;
- Acquire priority riparian areas through purchase; conservation easements; and transfer of timber, farm, grazing or land development rights; and
- Provide incentives and compensation to landowners to retain buffers (see section on incentive options).

Restoration options:

- Replant degraded riparian zones by reestablishing native vegetation;
- Install and maintain fencing or fish friendly stream crossing structures to prevent livestock access to riparian zones and streams;
- Selectively thin, remove and prune non-native and invasive vegetation; and
- Restore and reconnect wetlands and floodplains to the riverine system.
- Restore nutrients lost to the food chain because of decline in salmon populations; for instance, placement of salmon carcasses or otherwise returning adult salmon to the watershed.

5. Fish Access and Passage

Problem: Roads crossings (bridges and culverts), barriers (dams and log jams), fishways (ladders and chutes), logs, weirs, tide gates and unscreened water diversions are causing barriers to spawning and rearing habitat and interrupting adult and juvenile fish passage in many streams within watersheds.

Objective: Ensure that usable or restorable habitat is accessible to salmon.

Protection options:

- Prevent new passage problems by restricting the placement of new roads or providing adequate mitigation for unavoidable impacts;
- Design and construct road culverts consistent with the Washington Department of Fish and Wildlife's (WDFW) standards and guidelines;
- Prevent the placement of dikes, tide gates and other structures that may confine or restrict side channels and disconnect habitat in floodplains and estuaries; and
- Use permits or other local and state approval mechanisms to impose design and construction restrictions on activities that may impede fish passage and access.

Restoration options:

- Remove or replace culverts that prevent or restrict access to salmon habitat and/or cause loss of habitat connectivity;
- Remove, replace or modify diversion dams identified as major limiting factors affecting fish passage and habitat connectivity;
- Use cost-sharing programs to help landowners screen diversions;
- Address fish passage and screening concerns, as much as possible, in other restoration and protection efforts; and
- Ensure effective operation and maintenance of culverts and other instream structures.

6. Channel Complexity and Off-channel Habitat

Problem: The removal of large woody debris, ditching, diking, bank armoring and gravel removal have eliminated connectivity between rivers and side channels and off-channel waters, increased speed and volume of stream flows, simplified channel structure, and degraded estuarine and nearshore habitat. All life stages -- adult and juvenile migration, spawning and incubation and juvenile rearing -- have been affected. A watershed-wide assessment has characterized the processes resulting in the loss or alteration of channel complexity and off-channel habitat, identified reaches that have been altered by human activities, and identified land use practices associated with the alterations.

Objective: Protect key habitat and channel conditions by restoring and maintaining habitat processes directly affecting channels in the watershed (hydrology, sediment loading, and recruitment of large woody debris).

Protection options:

Measures and actions designed to address flows, hydrology, sediment loading and riparian zones (e.g., forest practices regulations, protection of agricultural, rural and urban riparian zones, minimizing road constructions, etc.) are likely to result in improved channel complexity and habitat connectivity. In addition:

- Restrict or condition new development to be consistent with shoreline management guidelines, local Critical Areas Ordinances and development regulations, hydraulic project approval and other state and/or local regulations or permits;
- Prohibit sand and gravel removal where such activities have the potential to alter the natural processes of gravel transportation in the river system and to degrade salmon habitat salmon; and
- Avoid or mitigate adverse impacts of upland development where it has the potential to adversely impact channel conditions, such as when the removal of vegetation and improper drainage result in erosion and the need for shoreline stabilization structures.

Restoration options:

Measures and actions designed to restore stream flows, sediment loading and riparian zones – such as removing or breaching dikes and levees, managing stormwater and runoff, maintaining or abandoning roads, restoring wetlands, floodplain or estuarine processes and functions, restoring fish passage, etc. – are likely to result in improved channel complexity and habitat connectivity. In addition:

- Remove or replace bank stabilization structures, such as bulkheads, breakwaters and retaining walls;
- Replace invasive or non-native vegetation with native vegetation;
- Create or redesign pools, spawning habitat, etc.;
- Influence or redirect stream flows to reduce erosive forces on stream banks or stream-beds (includes installation of deflectors, barbs and vanes);
- Add large woody debris and place in-channel engineered log jams; and
- Introduce appropriate spawning gravel to the channel.

7. Estuarine and Marine Nearshore

Problem: Estuaries and nearshore habitats provide shelter, spawning, rearing and feeding grounds and access to and from the ocean. A watershed assessment shows that cumulative impacts of human activities from shoreline armoring, dredging and filling, over-water structures, passage barriers, and degradation of water quality from discharges and upland development have significantly changed estuarine and nearshore habitats. There is a consensus within the scientific community that loss of these habitats and impairment of their functions are major limiting factors for salmon production.

The current knowledge of estuarine and nearshore habitat conditions, and the degree of protection needed, calls for actions to prevent further losses and degradation. Improved understanding of the status

of these habitats, as well as understanding and fixing problems on adjacent streams and rivers, will aid in identifying and prioritizing effective protection and restoration actions.

Objective: Protect and restore critical habitat processes -- delivery of water, sediment and organic materials -- that create and maintain estuarine and marine nearshore habitat characteristics important to salmon.

Protection options:
Measures and actions designed to protect or maintain stream flows, water quality, sediment loading, riparian zones and fish passage (e.g., forest practices regulations, protecting agricultural, rural and urban riparian zones, minimizing road construction, implementing water clean-up plans, restricting development, etc.) are likely to result in major improvements in estuaries and marine nearshore habitats. In addition:

- Implement requirements of the shoreline management guidelines, including environmental designation provisions; standards for protecting wetlands, geological hazardous areas, and critical saltwater habitats; flood hazard reduction; shoreline vegetation conservation; and standards to restrict shoreline modification and uses;
- Designate and protect shorelines of statewide significance;
- Establish salmon friendly land use patterns and design standards;
- Implement actions identified in the Lower Columbia River Estuary program;
- Implement appropriate actions from the Coastal Zone Act Reauthorization Amendments Program (Washington's CZARA program), the Nonpoint Source Pollution Control Plan and the Puget Sound Water Quality Management Plan;
- Designate and protect undisturbed critical areas as aquatic reserves, sanctuaries or conservation areas;
- Manage aquatic lands by preserving the best of what is left and restoring key habitat that has been lost;
- Prevent the introduction of invasive aquatic nuisance species by implementing control programs and managing the deliberate introduction of native species;
- Use pollution prevention strategies to prevent, reduce, re-use and recycle pollutants;
- Restrict or prohibit the dredge disposal in streams;
- Provide incentives for use of best management practices; and
- Acquire and manage key habitat areas for permanent protection.

Restoration options:
Measures and actions designed to restore stream flows, water quality, sediment loading, riparian zones and fish passage – removing or breaching dikes and levees; managing stormwater and runoff; maintaining or abandoning roads; restoring wetlands, floodplain or estuarine processes and functions – are likely to result in major improvements in estuaries and marine nearshore habitats. In addition:

- Plant or restore native estuarine or marine nearshore vegetation, such as eel grass or kelp;
- Reconstruct or restore the tidal channels that have been disconnected from the river delta and estuarine system;
- Remove or modify tide gates to restore natural flushing within the estuaries;
- Remove or break through human-made dikes to restore natural tidal exchange;
- Clean up contaminated sediments in bays, and reconnect habitat between bays and rivers to provide migration routes for salmon;
- Use incentives to encourage removal of barriers that fragment or disconnect habitat;
- Require the treatment of ballast water at sea instead of in the estuaries and marine nearshore areas; and
- Issue salmon friendly National Pollutant Discharge Elimination System (NPDES) permits for municipal, industrial and commercial wastewater treatment facilities.

INCENTIVES AND NON-REGULATORY PROGRAMS CAN INCLUDE:

- Public education and involvement to increase awareness and appreciation of ecosystem values within the watershed and to encourage behavior that benefits salmon and ecosystems.
- Density transfers -- move all or some portions of development from one parcel of land to another (on-site or off-site density transfers).
- Transfer of development rights -- off-site density transfers that reallocate potential development rights from a sensitive area to one that can better withstand development pressure.
- Planned unit development or clustering of synergistic uses can be used to protect open space and sensitive areas.
- Sustainable green building practices and low impact development techniques.
- Mitigation banking is the off-site creation, restoration and enhancement of habitat to offset unavoidable adverse impacts associated with development and activities.
- Also, other alternative mitigation approaches, such as those provided for in the state's Alternative Mitigation Policy for transportation projects.
- Conservation easements are a voluntary way for landowners to preserve sensitive lands. These include the U.S.D.A. Forest Service Legacy program, Wetland Reserve Program, Conservation Reserve Enhancement Program, and the Small Forest Landowners Riparian Easements Program.
- Water banking, dry year options, and voluntary transfers into water trusts.
- Tax incentives provided through the Open Space Tax Act, Current Use Taxation, property tax exemption, tax credit for water use or wastewater reuse, and sales tax exemptions. These tax incentives offer a range of tax credits, reductions, deferrals or preferential treatment for long-term commitments to land or water conservation.
- Acquisition or improvement programs using, for example, Conservation Futures taxes, excise tax on real estate sales, fee-in-lieu (developer pays local government a fee for mitigation), impact fees, capital improvement programs, conservation bonds, utility taxes, land exchange, donations, municipal tax exempt bonds, Aquatic Lands Enhancement Account, Washington Wildlife and Recreation Program, Salmon Recovery Account, and several low cost (some with zero interest) loans from federal and state programs (e.g., Centennial Clean Water Fund, Agricultural Facilities Fund, Coastal Protection Fund, Flood Control Assistance Account Program, and Public Works Program).

Persons needing this information in an alternate format may contact the Governor's Salmon Recovery Office, PO Box 43135 Olympia WA 98504-3135

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