

Summary

**STATEWIDE
STRATEGY TO
RECOVER SALMON
EXTINCTION
IS NOT AN OPTION**

September 1999



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The Joint Natural Resources Cabinet

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

Curt Smitch, *Special Assistant to Governor Locke for Natural Resources*

Larry Cassidy, *Member, [Pacific Northwest Electric Power and Conservation Planning Council](#)*

Martha Choe, *Director, [Office of Trade and Economic Development](#)*

Tom Fitzsimmons, *Director, [Department of Ecology](#)*

Jim Jesernig, *Director, [Department of Agriculture](#)*

Laura Johnson, *Director, [Interagency Committee for Outdoor Recreation](#)*

Tom Karier, *Member, [Pacific Northwest Electric Power and Conservation Planning Council](#)*

Jeff Koenings, *Director, [Department of Fish and Wildlife](#)*

Nancy McKay, *Chair, [Puget Sound Water Quality Action Team](#)*

Steve Meyer, *Executive Director, [Conservation Commission](#)*

Sid Morrison, *Secretary, [Department of Transportation](#)*

Busse Nutley, *Director, [Office of Community Development](#)*

Cleve Pinnix, *Director, [Parks and Recreation Commission](#)*

Mary Selecky, *Secretary, [Department of Health](#)*

Terry Williams, *Tribal Representative, [Tulalip Tribes](#)*

*In August of 1999, the Northwest Indian Fisheries Commission formally accepted the Governor's invitation to join the Joint Cabinet. They have asked Terry Williams, Executive Director of Fisheries and Natural Resources for Tulalip Tribe, to participate with the Joint Cabinet.

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A Message from the Joint Natural
Resources Cabinet and Governor's
Salmon Recovery Office

In January, 1999, the Joint Natural Resources Cabinet released a complete working draft of *Extinction is Not an Option: A Statewide Strategy to Recover Salmon* (herein referred to as the Strategy). During the past eight months the Joint Cabinet has carefully listened to what changes the public said they wanted in the Strategy, and has included those recommendations that would improve our collective efforts to recover salmon. Sections in the Strategy which referred to 1999 proposed legislation have been removed if no action was taken by the Legislature. Recent state legislation, Senate Bill 5595, the Salmon Recovery Funding Act, requires the Governor to submit this document to the National Marine Fisheries Service and to the U.S. Fish and Wildlife Service by September 1, 1999. The legislation also requires the Governor to begin revision of the Strategy in September, 2000, through public outreach efforts

A separate volume which includes additional, detailed information not included in the Strategy document will be available in late September.

A new volume, [The Early Action Plan](#), which identifies specific activities related to salmon recovery that state agencies will undertake in the 1999-2001 biennium, the expected outcomes from those actions, and performance measures will also be available in late September. We encourage you to visit the site for up-to-date information on these activities.

The Statewide Strategy to Recover Salmon is intended to be a guide for what needs to be done to recover salmon. We recognize that the process of salmon recovery will continue to remain dynamic as well as difficult. It will take all levels of government, business, environmentalists, and the public working together if we are to be successful. The Strategy will provide all these interests with the kinds of information they need to make informed decisions about how they want to address the critical task of restoring our salmon runs.

As many of you pointed out in your comments, saving salmon is also about preserving our watersheds, insuring we have adequate clean, cool water for fish and people, and providing the quality of life that we in the Northwest want and expect to have. And, to do all of this while maintaining a healthy and vibrant economy. This is the challenge the Strategy attempts to reflect.

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Acronyms

This is a partial list of the acronyms used most often in this report. For a complete list see [Appendix B](#).

AFW	Agriculture, Fish and Water Forum
ALEA	Aquatic Lands Enhancement Account
BPA	Bonneville Power Administration
CAO	Critical Area Ordinances
CREP	Conservation Reserve Enhancement Program
CWA	Clean Water Act
DCTED	Department of Community Trade and Economic Development
DNR	Department of Natural Resources
DOE	Department of Energy
DOH	Department of Health
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FOTG	Field Office Technical Guides
GCNR	Government Council on Natural Resources
GIS	Geographic Information System
HCP	Habitat Conservation Plan
IAC	Interagency Committee for Outdoor Recreation
IPSW	Interagency Permit Streamlining Workgroup
JARPA	Joint Aquatic Resource Permit Application
JNRC	Joint Natural Resources Cabinet
LWD	Large Woody Debris
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
PFH	Properly Functioning Habitat
PPF	Properly Functioning Population
PSWQAT	Puget Sound Water Quality Action Team
SASSI	Salmon and Steelhead Stock Inventory
SaSI	Salmonid Stock Inventory
SEPA	State Environmental Policy Act
SMA	Shoreline Management Act
SRFB	Salmon Recovery Funding Board
TFW	Timber, Fish, and Wildlife
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area
WSDA	Washington State Department of Agriculture
WSDOT	Washington State Department of Transportation
WSP	Wild Salmonid Policy

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I. A Sense of Urgency

Overview

Salmon, steelhead and trout¹¹ have been, and continue to be, a critical part of Washington's history, culture, economy and recreational enjoyment. They are a basic and important natural resource, a symbol of the natural beauty of the state. Salmon are also valued for subsistence, for nutritional health and for the spiritual well-being of tribal people.

Salmon have been vital to the sport and commercial fishing industry. Fishing provides jobs, supports businesses, and provides quality recreational experiences for a significant number of families from Washington, around the country and the world. For example, the U.S. Department of Commerce estimates that in 1996 sport fishing contributed more than \$704 million to Washington's economy. The decline of salmon is affecting families, communities, the state and the northwest region as a whole. The loss of salmon also means the loss of revenue for tribal economies historically dependent on salmon.

Elsewhere in this document you'll find basic information on salmon problems and the potential consequences of the listing of the salmon as endangered or threatened under the federal Endangered Species Act. This chapter conveys the importance of taking actions now by preventing further harm to salmon populations and habitats, and by implementing long-term conservation measures and programs to reverse the decline and recover the salmon.

An Indicator of Quality of Life

Salmon life history takes them through many ecosystems — riverine to estuarine to marine and back again. Salmon are important indicators of the aquatic and riparian ecosystems they inhabit. The well-being of salmon is also an indicator of the health of many other species, as well as an indicator of the environmental quality and health of ecosystems. This includes indications of health for human uses, from drinking water to swimming.

Sustained salmon productivity can be maintained only if diverse biological communities and genetic diversity of salmon are maintained, and watersheds and ecosystems are healthy and properly functioning. The basic needs for salmon spawning, rearing and migration are:

- adequate amounts of cool, clean and well-oxygenated freshwater;
- fully functioning riparian corridors with large woody debris in the stream channel;
- high quality estuarine, nearshore and marine habitats;
- adequate supply of food, cover and refuge from predators;
- unimpeded access to and from freshwater.

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Unfortunately, human activities have altered most, if not all, of these basic needs. Salmon are battling for survival, with their populations and habitats either at critical levels or at risk. Many wild salmon stocks have been significantly depleted and are being driven to or near extinction.

A Symbol in Decline

Salmon populations were historically numerous and abundant in the rivers of the state and along the Pacific Coast. The Columbia River with 1,210 miles was the greatest producer of wild salmon in the nation, with 10 million to 16 million salmon produced annually. Salmon runs now range from 3.2 million to less than a million, 75% of which are from hatcheries.

Fluctuations in the abundance of salmon have been observed for several decades. While some of the declines are normal and reflect the natural variation in ocean, freshwater and estuarine environments, human activities have severely accelerated the rate of decline of several salmon populations. For more than two decades scientists and fisheries experts have warned of the decline of salmon and the degradation of their ecosystems. Various stock status reviews have noted the decline of salmon in Washington. For example, the 1993 Salmon and Steelhead Stock Inventory (SaSSI) stated that less than 50% of Washington's salmon stocks were in a healthy state. As defined in SASSI, a healthy stock is one "experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock." Generally, coastal populations currently tend to be better off than populations inhabiting interior drainages. Losses of stocks in inland areas of the Columbia River system have occurred over a greater percentage of their range than species primarily limited to coastal rivers.

Stress Factors

Declines of wild salmon closely parallel the settlement of the Pacific Northwest by Euro-Americans, starting in the early 1800s. For more than a century, people degraded and destroyed streams, rivers and estuaries by farming, logging and developing land and water; over-fished; introduced non-native species; and substituted hatchery-produced fish for wild fish.

Unfavorable natural conditions contributed additional stress. It is important to note that the effects of natural disturbances (e.g., droughts, fires, volcanic eruptions) are quite different from the effects of human-caused factors. Natural disturbances are usually relatively short in duration and occur on an infrequent basis. While human factors may contribute minimal impacts individually, the number, magnitude, duration, and cumulative impacts since settlement combine to form the primary cause of the decline of numerous salmonid stocks.

The degradation or modification of habitat conditions by human activities influences salmon growth, reproduction, migration, demand for food and other biological and physiological functions. For example, alteration of stream flows can interfere with upstream migration of adults and reduce or eliminate stream rearing and spawning habitats. Many of the human impacts are interrelated and are cumulative in their effect. For example, a heavily over-fished stock has fewer spawners and is far less able to adapt to changing habitat conditions related to land use practices, such as urbanization or logging. Dams that block access to large areas of upstream habitat may fragment and reduce the genetic and biological diversity of a species in a basin to the extent that it may be unable to withstand further impacts from fishing, poor land use practices or interbreeding with hatchery fish.

Human factors have taken place over a long period of time and have affected particular salmon stocks or watersheds to varying degrees. Future population growth — projected by the Office of Financial Management (OFM) to increase by 36% between now and 2020 — and its associated continued urbanization and land disturbances will more likely expand the geographical extent and intensity of habitat loss.

These human factors are addressed in the Statewide Strategy to Recover Salmon in terms of the "four H's" — habitat, hydropower, harvest and hatcheries. By keeping the strategy focused on key human activities and actions

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(e.g., forest practices, agricultural practices, fish harvest, etc.) we hope to focus attention on the effects of those activities and the changes we need to make to protect and restore salmon and watershed health.

ESA Listings of Salmon: Difficult Issue for All

The protection of salmon populations and habitat occurs under several federal and state laws. Unfortunately, the decline and continuing losses of salmon stocks, as well as diminished abundance and genetic diversity, is evidence that some of the laws are either inadequate or not fully implemented and enforced. The declining status of many salmon species and populations has resulted in their listing as either endangered or threatened under the federal Endangered Species Act (ESA).

The listings of anadromous fish present new and difficult issues for the state, particularly in the heavily populated Puget Sound area, and there is little historical precedence or experiences upon which to draw. Now, or in the very near future, key regulatory mechanisms of the ESA, such as prohibition against taking or harming a listed species, (which includes significant habitat modification or degradation), may be triggered. This will require all of us to change our behavior, from how we water our lawns to how we grant new water allocations.

In summary, salmon play a critical role in our economy and way of life. But they are facing an uphill battle for survival. No specific factor is solely responsible for the salmon problem. Salmon have evolved to withstand natural disturbances such as floods, drought, predation and ocean cycles. However, these disturbances are often accelerated by human factors. Given that the stresses to fish populations posed by low points in natural ocean productivity cycles can occur over a decade or more, continually shrinking freshwater habitat presents very serious risks. In addition, many human factors contribute directly to the salmon problem, such as forest and agricultural practices, water use and development, intensive and continued urbanization, fish harvest and hatcheries. The listings across 75% of the state are cause for great concern and will have direct consequences for any actions taken that might harm the species or its habitat.

Ultimately, sustaining Washington's healthy economy and quality of life will be tied to those natural resources the state's citizens hold most dear. Salmon, an icon for the region, are letting us know they need help.

II. Background: Setting the Context

Introduction to Basic Needs of Salmon

To achieve salmon recovery, we must understand their life history, biological and physiological needs, and reasons for their decline. The life history of salmon is complex and varies by species. If any or all of the environments which support salmon are not maintained in a healthy state, populations will decline over time and eventually either become extinct or drastically change in character. The salmon life cycle can be described as a series of biological functions — spawning, feeding, rearing and migration — that are carried out in a series of connected environments.

Salmon Species in Washington

The life cycles of salmon, steelhead, and trout vary widely. Some species are anadromous; born in freshwater, they migrate to the ocean before returning home.

Others reside in freshwater their entire lives. Anadromous salmon spend part of their lives in freshwater (streams, rivers, lakes, ponds, etc.) where they spawn, their eggs incubate and hatch, and juveniles develop and grow. After varying periods of freshwater residence, again, depending on the species, the juveniles go to marine environments as "smolts" to feed and grow to adulthood. Salmon acquire most of their adult size during their ocean residence. Except for steelhead and resident trout and char, all Pacific salmon die after returning to spawn. Upon death, anadromous

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salmon return critically important marine-derived nutrients to watersheds, nutrients that the productive potential of salmon stocks may depend on. Trout have the potential to survive to spawn more than once. Non-anadromous salmonids stay in freshwater their entire lives, but seldom achieve as large a size as the ocean-going species.

There are several species of native salmonids in Washington. Each species is comprised of many stocks and populations which vary from one another in their genetic makeup, life history and other characteristics. The National Marine Fisheries Service (NMFS) uses the concept of “evolutionary significant units” or “ESUs” to refer to any distinct group of salmon populations and to further clarify the meaning of subspecies under the Endangered Species Act (ESA). Similarly, the U.S. Fish and Wildlife Service (USFWS) refers to “distinct population segments” for species under their jurisdiction. Native salmonids in Washington that have been listed, or are proposed for listing, include:

Chinook Salmon

Currently, NMFS has identified 15 distinct groups of Chinook salmon from southern California to the Canadian border and east to the Rocky Mountains. Chinook typically reach maturity in three to five years and are by far the biggest of any salmon. They are commonly referred to as king salmon. They have several distinct spawning runs: fall, winter, spring, and spring/summer. Chinook use a variety of freshwater habitats, but it is more common for them to spawn in larger mainstream rivers, compared to other salmon species.

Coho Salmon

Coho, or silver salmon, were once widespread throughout Washington and remain an important salmon species. They spend about the first half of their life cycle rearing in small streams and freshwater tributaries before migrating to the ocean as smolts. Most adults return as three-year-old fish to spawn in fall and winter months.

Chum Salmon

Chum salmon spawn in the lowermost reaches of rivers and streams. After hatching, they migrate almost immediately to estuarine and ocean waters, in contrast to most other salmonids which migrate to sea after months or even years in freshwater.

Sockeye Salmon

These salmon are one of the most complex of any Pacific salmon species because of their variable freshwater residency (one to three years) and different forms. Sockeye are the only Pacific salmon that depend on lakes as spawning and nursery areas. Sockeye salmon have greatly declined over the last 70 years and in some areas are now extinct.

Steelhead

Steelhead are the anadromous form of rainbow trout. They belong to the same scientific genus as other Pacific salmon and coastal cutthroat trout. They are highly prized by anglers. Steelhead spawn in mainstem and upriver tributaries, and juveniles typically rear in freshwater from one to three years before migrating to the ocean where they grow for another one to three years. After their ocean stage is complete, they return to the streams of their birth to spawn. Steelhead have the capacity to survive after spawning and may spawn more than once.

Coastal Cutthroat Trout

The coastal cutthroat trout, which occur only in western Washington, belong to the same scientific genus as Pacific salmon and steelhead. They have diverse life histories (e.g., resident and anadromous forms), are smaller than other salmon, rarely remain at sea over the winter, and usually don't make extensive ocean migrations. Unlike Pacific salmon, which die after they spawn, coastal cutthroat trout have been known to spawn each year for more than six

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years. They utilize smaller streams as well as large rivers, and spawn and rear higher up in watersheds than do salmon and steelhead.

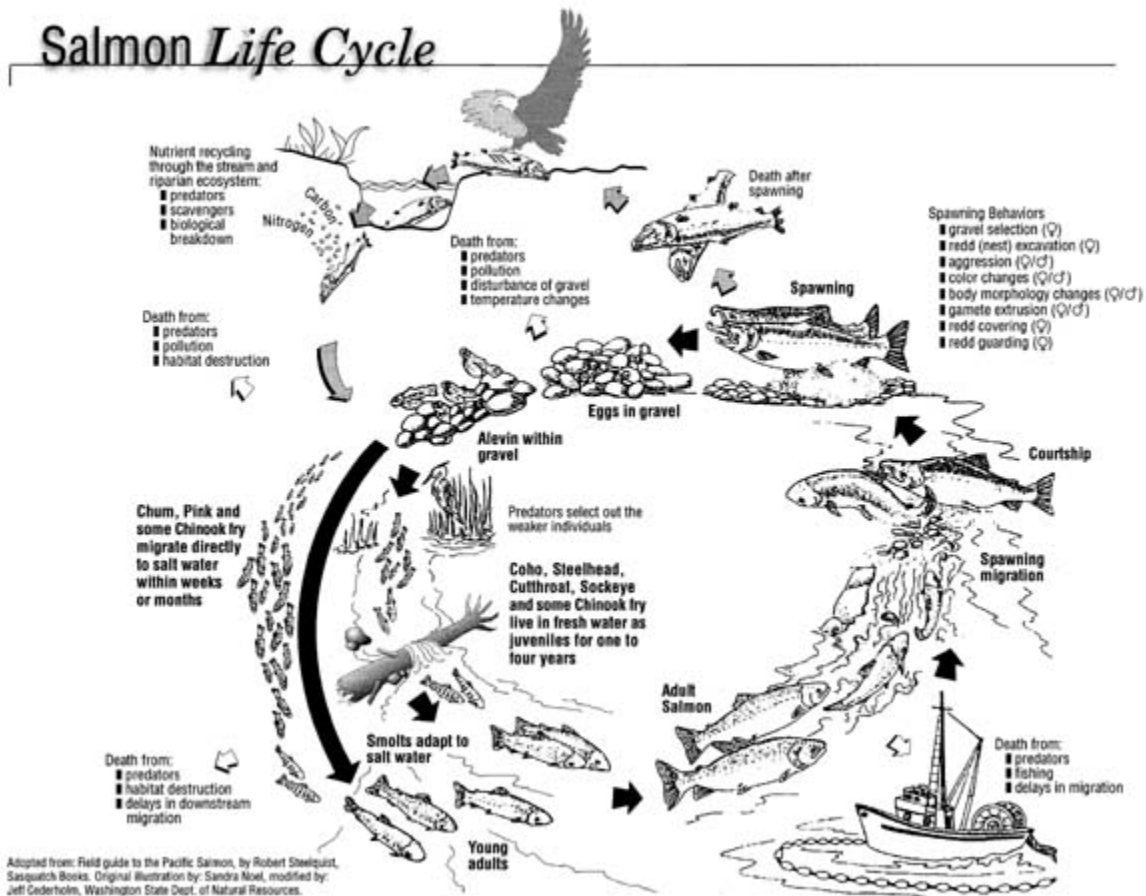
Bull Trout

Bull trout are members of the char genus of the salmonid family. They have resident and anadromous forms and can grow to more than 20 pounds in a lake environment, but rarely exceed four pounds in streams. Some trout migrate up to 155 miles to spawn while others stay close to the hatching site their entire lives.

Evolution of different runs and life histories has occurred in response to differences in the streams, rivers and watersheds in which salmon spawn and rear. Salmon have an inherent resiliency and have the capacity to colonize or recolonize new areas after disturbances. This complex set of behaviors helps salmon populations compensate for environmental fluctuations in ocean and freshwater habitat, adapt to changes in watershed conditions and buffer their populations against catastrophes. A good example of resiliency and adaptation of the salmon can be seen in the recovery of salmon in the Cowlitz and Lewis rivers after the eruption of Mount St. Helens.

Salmon Habitat

Wild salmon have evolved a wide range of behavioral and physical characteristics that allow them to survive through time and disturbances. But this flexibility can't always help salmon in the face of challenges presented by human population growth and development.



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The National Marine Fisheries Service (NMFS) is developing recovery goals and analytical tools for determining which actions are likely to be most effective for recovery and long-term survival. The recovery goals are based on the concept of “viable salmonid populations” (formerly “properly functioning populations”). This concept takes into consideration the range of wild salmon behavioral and physical characteristics and is intended to establish biological goals for ESUs and guidance on how to achieve those goals. The parameters and thresholds for viable salmonid populations being considered by NMFS address, in general:

- Population
- Population productivity (e.g., potential for populations to increase and maintain population size in the future)
- Genetic diversity (e.g., the range of variability in genetic, life history, and other characteristics to ensure the viability of the species by conserving its evolutionary potential)
- Population substructure (e.g., sufficient and suitable habitat patches and migration corridors and how they are connected)

For wild salmon to continue to exist and evolve, specific habitat conditions must be maintained, protected or restored. Specific habitat elements include water quality, base and peak water flows, riparian vegetation, habitat access and passage, channel and watershed conditions, floodplain connectivity, and estuarine and nearshore water quality and physical conditions. These habitat elements, or indicators, have been defined by NMFS for properly functioning habitat conditions. They will be used as guidance to assess the effects of proposed human activities on freshwater and estuarine salmon habitat.

Freshwater Habitat

Freshwater habitat consists of four major components: habitat for spawning and incubation, juvenile rearing habitat, juvenile and adult migration corridors, and adult holding habitat. The important features of freshwater habitat for spawning, rearing and migration include:

- Water quality — Temperature is a very critical factor affecting growth rates and timing of life history events including migration, food requirements, and other important physiological and ecological processes. Turbidity and sediments can affect abundance of food and impact spawning and incubation habitats. Salmon also require a high level of dissolved oxygen. Other chemical criteria (e.g., nutrients) influence the condition and function of habitat.
- Water quantity — Appropriate quantities of cool, clean water in streams are a key habitat requirement for sustainable fish production. Minimum streamflow must be of sufficient depth and velocity to allow passage, migration and spawning; floods must not scour channels. Salmon seek out slow velocity areas adjacent to faster water for feeding, resting and growing.

Salmon life cycles are very sensitive to changes in stream flow and, to some extent, time their movements according to flow regimes. Natural base and peak stream flows vary greatly from year to year, seasonally and even on a daily basis. Fish have adapted over thousands of years to the natural flow regime in their individual watersheds. Natural low flows are important for establishment of vegetation along stream banks. High flows add gravel, flush sediments from gravel, create new rearing channels, and perform other important functions. Protection of salmon requires streamflows to fluctuate within the natural flow regime for a given location and season.

- Channel stability — All salmon require sufficient, clean and appropriately-sized cobbles and gravel for spawning and incubation.
- Riffles, rapids, pools and floodplain connectivity are important for production, rearing, cover and aeration.
- Riparian vegetation performs a number of functions such as providing shade, moderating stream temperature, stabilizing banks, controlling sediment, providing nutrients, and contributing large woody debris which increases channel complexity, creates backwater and increases depth in pools.
- Access and passage — All species require unobstructed access downstream and upstream for migration or feeding. Access can be affected by physical structures or by lack of adequate streamflow or high temperature.

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- Food — Aquatic plants and organic litter are the sources of food for salmon. Riparian vegetation, temperature, stream flow and substrate affect the composition and abundance of food.

Estuarine and Marine Nearshore Habitats

Estuarine and marine nearshore habitats provide estuarine and ocean rearing, and juvenile and adult migration.

Nearshore habitats are critical to the health of marine life in Puget Sound and other coastal areas. A wide variety of habitats occurs in the nearshore, such as marine tidal marshes, tidal channels, eelgrass beds and kelp beds. In addition to providing shelter, spawning, rearing and feeding grounds, they protect the shoreline from erosion, filter pollutants and reduce flooding by retaining stormwater during high-flow periods.

Estuaries are also very important to anadromous salmonids as they transition from juvenile to adult, and transition from fresh to salt water and back again. Salmon pass through estuaries as juveniles on their downstream migration to the ocean and as adults on their upstream migration to spawn. Some species, such as chinook, are dependent on estuaries as rearing areas. Research has shown that depriving juveniles of access to estuaries appears to decrease their survival in the marine environment. Estuaries also provide juveniles refuge from floods and predators. The important features of estuarine and marine habitats are:

- Water quality, especially temperature;
- Adequate food and cover;
- Salt water — fresh water transition zone;
- Marine vegetation and algae in estuaries and near-shore habitats;
- Adequate river or stream discharge; and
- Migration pathways.

Salmon: A Resource in Decline

Many wild salmon, steelhead and bull trout stocks have been listed under the Endangered Species Act (ESA) by the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS). In the next year and a half, more than 75% of the state will likely be affected by ESA listings of salmon.

In 1992, the Washington Department of Fish and Wildlife (WDFW) and Western Washington Treaty Indian Tribes, concerned over the continual decline of wild salmonid populations, began a comprehensive inventory defining existing Washington salmonid stocks and their status. The first inventory report, the Salmon and Steelhead Stock Inventory (SASSI) was published in 1993 by WDFW and the Tribes. It showed that less than 50% of Washington's salmon stocks were in a healthy state. Generally, species in the inland areas of the Columbia River system have been extirpated over a greater percentage of their range than species primarily limited to coastal rivers. Coastal populations currently tend to be better off than populations inhabiting interior drainages.

In 1998, WDFW extended the stock inventory effort to bull trout and Dolly Varden char. The name of the original inventory (SASSI) was changed to "Salmonid Stock Inventory" (SaSI) to reflect the broadened inventory scope encompassing all wild salmonids. This name will be used in future stock inventory efforts.

The 1998 bull trout and Dolly Varden inventory found that, of those stocks for which sufficient information was available, 63% were rated as healthy. It is important to note, however, that only about 20 of the 80 stocks in the state had enough information for scientists to be able to determine their status. This lack of information is a key concern for some species.

Anadromous species that rear in freshwater for extended periods (up to a year), including spring/summer chinook, coho, sockeye, sea-run cutthroat and steelhead, and non-anadromous species are generally extinct, endangered, or threatened over a greater percentage of their historical ranges than species with abbreviated freshwater residence (less than a year), such as fall chinook, chum and pink salmon.

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Factors Contributing to Salmon Declines

This section briefly describes the natural and human factors contributing to salmon decline and highlights emerging threats from invasive exotic species.

Natural Phenomena Affecting Salmon

Natural disturbances, which include seasonal high flows and floods, droughts, wildfires, volcanic eruptions, seasonally extreme temperatures, landslides and debris flows provide a context for harvest, hatcheries, habitat or hydropower factors. With some exceptions, however, natural phenomena are out of peoples' direct control. Nevertheless, they can be significant factors that influence survival rates of wild salmonids and can be exacerbated by human influences. While some natural disturbances can result in diminished salmon populations in the short term, they may lead to increased productivity and habitat in the long term. Extreme floods, fires, mass wasting and erosion events, for example, are part of the dynamic environment that shapes stream ecosystems. It is important to understand these natural phenomena, the likelihood and frequency of their occurrence, and their implications for recovery planning.

Natural predators, which include marine mammals, birds and fishes, have coexisted with adult and juvenile salmon. Human alterations can affect the frequency and magnitude of natural disturbances and increase the vulnerability of salmon to capture by predators through loss of cover, obstruction of passage or delay of migration.

Ocean Conditions

The condition of marine environments has a key influence on salmon and steelhead survival over time. Wild salmonids may spend up to several years growing in the estuarine and/or marine environment before returning to freshwater to spawn. Some species spend extended periods in estuaries, whereas others spend more time in the ocean. The migratory patterns of salmon may extend well into the North Pacific Ocean; some species follow clear paths; others move in a more dispersed fashion.

Scientists understand that underlying climatic changes can affect the numerous physical, biological and chemical processes in the ocean that directly or indirectly influence fish population dynamics and survival. Variations in sea surface temperatures, air temperatures, strength of upwelling, salinity, ocean currents, wind speed and ocean productivity have all been shown to directly or indirectly cause or reflect fluctuations in abundance and survival of salmonid populations. Oceanic conditions can vary on a seasonal, annual, decadal or longer time scale but our ability to predict their impacts on salmon and steelhead stocks is very limited.

Although ocean conditions have an important influence on salmon and steelhead abundance they are not thought to be the primary factors limiting recovery of Washington's salmonids. It is important to note that salmon, steelhead and other salmonids have evolved in a context of wide-ranging oceanic environmental variability. The long-term survival of wild stocks has depended on their development of compensating mechanisms (e.g., diversity of life histories and run timing, repeat spawning by steelhead) that allow them to remain viable under such conditions. Marine conditions can affect survival of wild salmon but are probably not solely responsible for declines spanning the last three decades.

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There is little that the Statewide Strategy to Recover Salmon can offer to directly influence ocean conditions. However, ocean conditions and variability must be kept in the proper context. Wide annual and cyclic fluctuations in adult returns are common for salmon and steelhead. Given that variability, the best conditions (and lowest risks) for salmon occur when cycles in ocean productivity are high and freshwater conditions are good. In contrast, risks to these fish are greatly increased when cycles in ocean productivity are low and freshwater conditions are poor or decreasing.

Predation

Marine mammals, birds and fishes have evolved to coexist in fully-functioning ecosystems and to utilize wild salmonids as food sources. In fact, many wildlife species depend on salmonids, either directly or indirectly, for their well-being. For example, salmon carcasses have been shown to play an important role for some wildlife, such as turkey vultures and mink. Larger runs of salmon returning to watersheds and the carcasses left behind contribute levels of predominantly ocean-derived nutrients. More nutrient-rich stream systems support a broader and healthier array of invertebrate life, and support healthier and more diverse aquatic systems and associated wildlife populations. As the health of salmonid populations improves, it's likely the health of various other wildlife species will improve as well.

The occurrence and magnitude of predation by marine mammals, birds and fishes on individual salmonid species is difficult to assess and has generally not been quantified. However, there is little doubt that human-caused alterations to the environment have increased the occurrence and magnitude of predatory impacts to wild salmonids. We've introduced non-indigenous fish species, constructed hydroelectric dams, removed riparian vegetation along streams and nearshore habitat, and made other broad scale alterations to salmonid habitat. All of these can cause problems in the ecosystem, throwing predator-prey relationships off-balance. The following summarizes risks posed by predation.

Marine Mammals

The Marine Mammal Protection Act of 1972 and related conservation measures have been successful in helping to rebuild depleted populations of marine mammals. Some of these mammals, such as harbor seals and California sea lions, have close associations with salmon, including feeding on salmon. Where increasing marine mammal and at-risk salmon populations co-occur, concerns exist about the potential for marine mammal predation to play a limiting role in the recovery of wild salmonid stocks.

Scientific information indicates that seals and sea lions have increased at a rate of six to eight percent per year since the mid-1970s. Available studies have shown that while salmonids do not form the majority of the seals' and sea lions' diets, they can create a localized problem. They prey on salmon near man-made structures such as dams or fish passage facilities where salmon congregate. The presence of large numbers of seals and sea lions in estuaries during migration raises concerns for predation on already depressed salmon populations. In most other areas, seals and sea lions feed on non-salmonid fishes.

The National Marine Fisheries Service (NMFS) submitted a report to Congress in early 1999 on "Impacts of California Sea Lions and Pacific Harbor Seals on Salmonids and West Coast Ecosystems." The report addresses the conflict between the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA) regarding appropriate steps to protect listed species of salmon from predation by expanding California sea lion and Pacific harbor seal populations. The report recommends that Congress: 1) consider a new framework that allows state and federal resource management agencies to immediately address site-specific conflicts involving sea lions and seals; 2) safe and effective non-lethal deterrence methods should be developed; 3) Congress should selectively reinstate authority for the intentional lethal taking of sea lions and seals by commercial fishers to protect gear and catch; and

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4) additional information and research is needed to evaluate and monitor the impacts of sea lions and seals on salmon and the west coast ecosystems. The state of Washington supports these recommendations.

Populations of orca whales which also rely on salmon in their diets inhabit Puget Sound. However, orca whale populations are not known to be critical factors for the decline of salmon and steelhead stocks in general.

Marine mammal populations are high and they do cause salmon mortality. It is difficult, if not impossible, to accurately determine how much marine mammal predation is contributing to the problem of salmon recovery. The state continues to be involved, in collaboration with neighboring states, federal agencies and other interests, in field investigations and review of data to determine the extent of marine mammal predation on threatened and endangered salmonids in Washington.

Birds

In healthy ecosystems, various bird species may include salmonids as basic food sources. Bald eagles, ospreys, gulls, common mergansers, belted kingfishers, great blue herons, Caspian terns, murre, puffins, and double-crested cormorants include salmonids in their diets. As with marine mammals, there is little quantitative information available documenting the extent of bird predation on salmonids, but increasing evidence suggests problems can occur. What is known about population sizes, geographic location and feeding habits suggests Caspian terns, double-crested cormorants, and perhaps common mergansers are the bird species most likely to impact juvenile salmon and steelhead.

Recent evidence suggests that under certain conditions, predation by birds can cause significant mortality of juvenile salmonids. In the Columbia River basin, from the mouth to the Tri-Cities, there is a significant Caspian tern population breeding on Rice Island, an artificial island in the lower Columbia area formed by accumulation of dredge spoils. Preliminary study results in the area suggest that this tern population has increased from 1,300 breeding pairs in 1987 to more than 10,000 pairs in 1998. This is the largest Caspian tern colony in North America, and perhaps the world. Preliminary estimates suggest that these terns consumed between six and 25 million smolts, or three to 12 percent of the combined hatchery plus wild smolts in the basin. For reasons that are yet unclear, hatchery fish appear to be more vulnerable to these predators. An interagency group is aggressively working to reduce the predation risks to salmon from birds.

The abundance of other predatory birds (e.g., double-crested cormorants) also appears to be increasing in recent years and may lead to increased risks for wild salmonid stocks. For example, certain double-crested cormorant populations appear to have increased up to 15-fold in some areas along the West Coast. Double-crested cormorant predation has been identified as a significant concern in some areas for salmonids rearing in lakes. In addition, common mergansers may consume substantial numbers of salmon.

It's important to note that many bird species are under the federal protection of the Migratory Bird Protection Act and other laws. In some cases, large-scale efforts have been taken to address risks to them and to develop conservation responses (e.g., bald eagles, great blue herons, marbled murrelets, etc.). It will be important to carefully consider predation by birds as a factor for the decline of salmon in an ecosystem context, one that recognizes the contributions and significance of all species.

Fishes

Predatory fishes may consume wild salmonids in both marine and freshwater environments. In some years, predators such as Pacific mackerel may deplete juvenile salmon in nearshore areas. Impacts increase when concentrations of ocean predators move north during ocean warming cycles. Some salmon species may be less vulnerable than others due to the manner in which they migrate from estuaries to offshore areas.

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Non-indigenous predatory fishes such as walleye, smallmouth bass and channel catfish, and native species such as northern pikeminnow (squawfish), have been found to consume significant numbers of juvenile salmonids.

With the exception of areas of the Columbia River mainstem, information is generally limited on the extent and quantitative impacts of fish predation on wild salmonids. Identification and consideration of predation by fishes in the estuarine, ocean and freshwater environments will occur under the Statewide Salmon Recovery Strategy, generally through joint efforts with federal agencies and in the development of associated regional conservation initiatives.

Human Factors Affecting Salmon

Many factors have reduced salmon populations over the years, including natural phenomena such as ocean conditions, floods, drought and predators, as well as human-caused factors. Most notable of all factors are past and continuing intensive use and development of land and water resources, such as timber harvest and agricultural practices; urbanization; water diversions; hydropower; overfishing and hatcheries. Continual urbanization and land disturbances associated with the projected 36% increase in population by the year 2020 will expand the geographical extent and intensity of habitat loss.

If improperly managed, the most serious human threats to salmon populations and habitat include:

- Land use practices, including conversion of forests, coastal tidelands, and floodplains; agricultural practices; grazing in riparian zones; forest practices; road construction; and urban and rural development;
- Impoundments and diversions of water, which result in water quality or quantity problems;
- Dams and hydropower operation;
- Fish harvest;
- Hatcheries; and
- Introduction of non-native species.

Agricultural Practices

Agriculture in Washington is a diverse industry and a significant contributor to the state's economy. Agricultural lands, especially in western Washington, generally are in lowland valleys that historically contained the majority of floodplains and wetlands. Agricultural practices that may adversely affect salmon include diking, draining, filling, stream channelization, removal of large woody debris, installation of riprap along stream banks, removal of riparian vegetation, road building, diversion of surface and ground water for irrigation and agricultural processing, and pesticides and fertilizer applications.

There are more than 1.8 million acres of irrigated land in Washington, 90% of which are located in eastern Washington. Irrigated agriculture requires diversion of water, which reduces streamflows. In some years this leaves little or no water for salmon and other aquatic species. Return flows, while perhaps increasing the amount of water in streams, degrade the water quality by raising its temperature and adding dissolved chemicals. Unscreened or improperly screened diversions can have devastating effects on juvenile fish.

Dryland farming, particularly in areas where soils are highly erodible, such as in the Palouse region, can alter natural erosion rates. Erosion caused by rain and snowmelt affects 4.3 million acres (69%) of non-irrigated cropland statewide. Loss of soil results in discharge of substantial quantities of fine sediments to streams and rivers.

Livestock grazing and rangeland management have damaged upland and riparian natural vegetation in many areas of the state. Rangeland covers 7 million acres, with an additional 5.5 million acres in grazable woodlands. Heavy and continual grazing practices compact the soil and modify soil characteristics (e.g., reduce the rate of infiltration of surface water). Grazing affects salmon largely through degradation of stream riparian areas, where the intensity of use by livestock leads to erosion and sedimentation, water quality degradation, loss of riparian vegetation, and modification of the stream channel.

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The dairy industry in Washington consists of 758 commercial dairies and 298,000 cows, with 145,000 concentrated in the counties around Puget Sound. Effects on surface and ground water quality from improperly managed dairy farms have been well-documented. Increased nutrient loads, sedimentation, excess surface water from overgrazed pastures, trampling of streamside vegetation, and animals with direct access to streams result in loss and degradation of aquatic and riparian salmon habitat.

While the magnitude of the effects of agricultural practices vary by watershed and stream, overall, associated habitat alterations have reduced or eliminated spawning and rearing habitat, interfered with adult and juvenile migration, and increased predation.

Forest Practices

The timber industry is important to the state's economy. About half of the land area in Washington is covered by forests, which supports many functions benefiting fish. Most salmon-bearing streams in Washington have their headwaters, and in many cases the majority of their watersheds, in forested areas.

Salmonid species in forested ecosystems have evolved in streams in which large woody debris (LWD) plays a major role in forming in-channel and off-channel habitats, providing cover, influencing the sediment process and trapping nutrients. Forest riparian corridors provide critical functions, including shade, supply of logs or large woody debris, sediment filtering and bank stability. Other riparian features (e.g., reduction of floodwaters and off-channel habitat) are also important to both forest and aquatic systems.

Historical forest practices left a legacy of degraded habitats. Stream surveys conducted by federal agencies show that habitat in forested areas is fair to poor. In addition, the intense harvesting in the past 30 years resulted in 67% of forest lands being occupied by young trees, which provide lower quality habitat than the original forests.

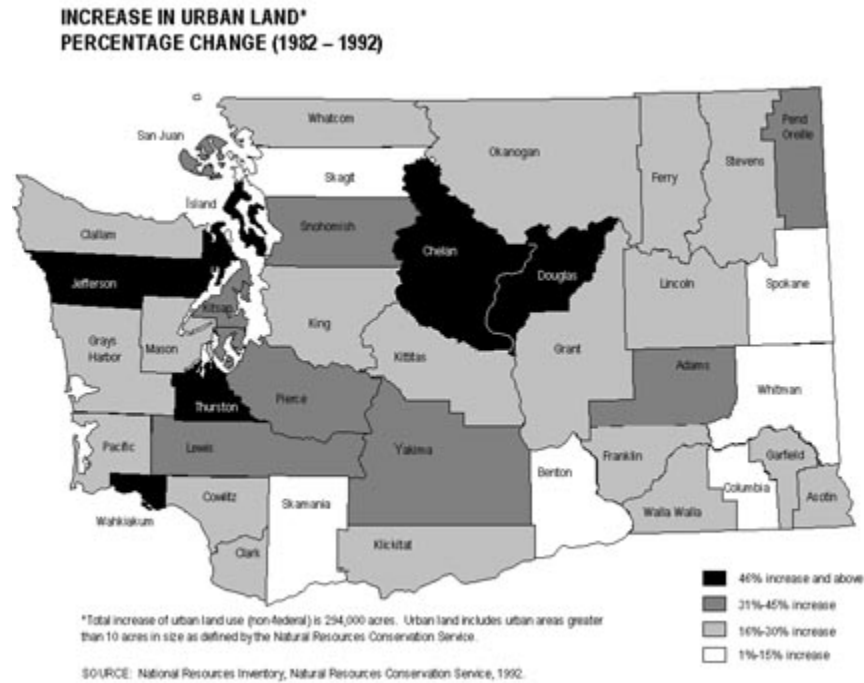
Forest management activities such as road building, timber harvest near streams or on steep or unstable areas, and the application of chemicals have damaged fish habitat and water quality. The most profound impacts include: increased stream temperature, diminished opportunities for large woody debris recruitment, alteration of groundwater and surface water flows (increased runoff and reduced percolation of rain and snowmelt into the ground), and degradation or loss of riparian habitats. These forest practices also resulted in loss or degradation of spawning and rearing habitats, contributing to the listing of some salmon runs.

In addition to the threat to salmon from poor forest practices over the last 30 years, more than 2.3 million acres (or nearly ten percent of the state's forest lands) have been converted to other uses, such as roads, cities, farms and rural development. The loss of forests contributes to elimination and degradation of habitat for fish, and diminished water quality and quantity in streams and groundwater aquifers.

Urbanization

The tremendous population growth experienced by the state in the past 30 years has taken a toll on the state's natural resources. The State Office of Financial Management's Forecasting Division estimates show the state's population has grown by 20% every 10 years since the 1960s. It stands now at 5.6 million, and is forecasted to reach 5.9 million in the year 2000 and 7.7 million by 2020. While growth was experienced in many counties in the state, urban counties along Interstate-Five have grown the most, with some counties experiencing up to 33% increase in population between 1990 and 1997. The population increase and associated development have drastically altered many natural habitats critical for salmon survival. Managing growth will continue to be a major challenge facing the state for many years to come.

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Urbanization, which occurs when land is developed in both urban and rural areas, starts with forest and farm lands conversion and/or low-density development, and continues with increasing intensities of land use. Many cities and towns were built along rivers and often within floodplains. Urban areas are frequently located in important salmon migration corridors and rearing areas. The areas most significantly affected by urbanization are small streams, riparian corridors and associated wetlands, and shorelines and estuaries.

The impacts occurred mostly in increments, with no single action significant enough to cause any noticeable harm. However, this incremental damage has resulted in a wide-scale disturbance of the natural landscape and degradation of the environment, and insufficient or diminished habitat quality for salmon. Early attempts to address public safety and property losses due to flooding — by building dikes, stormwater retention ponds and other structural solutions — were inadequate, costly and caused widespread environmental problems. For example, levees along rivers have all but eliminated connectivity between rivers and remaining off-channel waters, and increased the speed and volume of run-off.

It's a well-known and documented fact that streams, wetlands and estuaries are being degraded by urbanization. Streams in urbanized areas continue to be highly altered and degraded. Scientific information demonstrates that the proportion of streams within urban areas that are degraded is greater than the proportion of altered streams and rivers on agricultural and forest lands.

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Between 45% to 62% of Washington's estuarine habitats have been lost to diking, channelization, dredging and filling. We've also lost more than 30% of the original 1.35 million acres of wetlands. More than 90% of the wetlands in urban areas have been lost to development. It's estimated that one-third of Puget Sound's shoreline has been modified by human development, with 25% occurring in the intertidal zone. Conversion of forest and agricultural lands, filling, diking, dredging, creation of impervious surfaces (parking lots, roofs, etc.), construction of bulkheads and docks, and introduction of contaminants and exotic species are some of the primary causes of loss of wetlands and estuarine/nearshore habitats in urbanizing areas.

Sand and gravel mining for road construction, industrial and urban development occurs either in streams or adjacent floodplains. Sand and gravel operations — dewatering, extraction of the sand and gravel, washing and processing — degrade channel conditions (wider and more shallow channels), reduce streamflow and lower ground water levels, eliminate gravel needed for spawning, and add sediment and minerals to streams.

Water quality in urbanized streams is highly degraded. Nearly 700 water bodies in Washington state are on a list of those failing to meet water quality or sediment standards. While the list represents only about 2% of the state's waters, most estuaries and river systems in the state are on the list, including those important for salmon. Bacteria, temperature, toxics, dissolved oxygen and acidity are the most common water quality criteria exceeding standards — all except for bacteria are critical for the survival of salmon and other aquatic life. Most of the pollution comes from point sources that enter the waters from commercial, industrial and municipal discharges and nonpoint sources generally caused by land use activities.

Residential, commercial and/or industrial development changes the natural hydrologic cycle by stripping vegetative cover, removing and destroying native soil structure, modifying surface drainage patterns, and adding impervious and nearly impervious surfaces, such as roads and other compacted soils. Loss of water in stream channels and riparian areas due to water withdrawal and consumptive use of water from streams, rivers and aquifers further reduces groundwater recharge.

Streamflow Modification

Fish need cool, clean water in adequate amounts and at the right time. Stream flows which are either too high or too low to sustain healthy production levels are among the many factors contributing to the poor status of many naturally reproducing fish stocks. Natural flow conditions have been affected by several human activities in the past 100 years, chiefly through the diversion of water from streams for irrigation, municipal and industrial uses, water storage operations, and land use changes. Increases in the frequency and duration of both floods and low flows are having considerable detrimental effects on salmon.

Human activities have resulted in some streams being so over-appropriated that they are nothing but dry streambeds during the low flow period in the summer. In many other streams, flows are reduced well below natural flow levels. Over-appropriation conditions occurring in many streams and rivers used by salmon can be found in at least 16 watersheds throughout the state, representing about a quarter of the state's basins. These basins also contain 65% of the state's population. Over-appropriation means more water is being withdrawn from rivers and streams in those watersheds, especially in late summer and early fall, when flows are naturally low and when fish need water for migration, spawning or rearing. In some cases, flows that are too low can provide insufficient spawning areas to accommodate all returning adult fish. Flows that are depressed below natural low flows generally cause fish production to decline by reducing the total amount of habitat and food sources available in the stream. Low summer flows are also associated with higher water temperature and higher concentrations of pollutants, which can be debilitating or even lethal to fish.

Fish Barriers

Salmonids need access to spawning and rearing habitat, and unimpeded migration to and from the ocean in the case of anadromous fish. Unnatural physical barriers interrupt adult and juvenile salmonid passage in many streams, reducing productivity and eliminating some populations. Barriers may also cause poor water quality (such as

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elevated temperature or low dissolved oxygen levels) and unnatural sediment deposition. Impaired fish access is one of the more significant factors limiting salmonid production in many watersheds.

Fish blockages or barriers are caused by dams, culverts, tide gates, dikes and other instream structures. The Departments of Transportation and Fish and Wildlife have estimated that at least 80,000 miles of public roads were constructed in Washington, not including roads under private ownership (railroads, forest industry, agriculture, etc.). These roads have resulted in a minimum of 2,400 human-made barriers at road crossings. These structures block fish access to an estimated 3,000 miles of freshwater spawning and rearing habitat.

Unscreened or inadequately screened surface water diversions, whether associated with a physical barrier or not, are a serious source of salmonid mortality or injury as a result of:

- diversions that are unscreened or the screen mesh openings are too large to exclude small fish, or
- inadequately screened diversions have small enough mesh but the approach velocity at the screen exceeds the swimming capability of the fish.

If the fish are unable to locate a bypass to the waterbody, they become exhausted and are swept against the screen, resulting in injury or death. Recent inventories of unscreened or inadequately screened diversions in the Snake, Yakima and mainstem Columbia Rivers show that only 25-40% of diversions are adequately screened to protect salmonid fry.

There are about 1,000 dams in the state blocking or impeding movement of adult and juvenile fish, obstructing the flow of water in many streams, modifying the streamflow regime, destroying riparian habitat, and modifying the water quality temperature and the level of dissolved oxygen.

Hydropower

Years ago, hydropower dams were built with little or no consideration for protecting river ecosystems and fish and wildlife resources. The example of the Columbia-Snake River system (including the dams and hydropower facilities above Bonneville dam) best illustrates the impact of hydropower on salmon and the difficulty of addressing these impacts. The river system was once host to salmon and steelhead populations numbering 10 —16 million fish. As many as nine major dams now block or impede the progress of fish on their way to and from the Pacific Ocean. And thousands of square miles of salmon habitat have been inundated by the reservoirs behind the dams or are inaccessible.

Diversions and impoundment of rivers by hydropower dams have dramatically altered flows and riparian habitat for a large number of rivers and streams. Dams and hydropower operations have modified the level, timing, frequency and duration of stream flows. They have blocked the movement of fish both upstream and downstream, dewatered stream segments below dams, caused loss of upstream habitat, and increased predation in reservoirs. Smolts and juvenile fish migrating downstream through the reservoirs encounter slower moving water, increasing the time it takes for them to reach the ocean, thereby increasing their chances of dying from predation and diseases. In addition, the absence or inadequacy of fish ladders or other by-pass systems block or limit adult migration upstream, closing off many miles of potential spawning and rearing habitat.

Dams have reduced water quality by altering water temperature and decreasing oxygen levels. Sediments from eroded soils collect in the reservoirs as fine sediments and eventually are flushed downstream, affecting water quality in the river. Gas supersaturation from water passing over the spillways also impacts salmon. Too much nitrogen can be trapped in the water as it plunges over the spillway into the river below. Fish exposed to this can develop “gas bubble” disease, a condition similar to what divers call the “bends.”

Harvest

Fishing has been considered by many to be a major cause of the declines in salmon abundance since the late nineteenth century. Over-fishing in the Columbia River resulted in closure of fishing seasons as early as 1915.

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Ocean fishing expanded after World War II with the advent of refrigeration and improvement in fishing equipment. Harvest rates of adults in many fisheries can reach 50% to 80% of the salmon populations, and though many salmon stocks can sustain this level of harvest, stock that are challenged by poor productivity or poor ocean conditions can not. In addition, size-selective gear, coupled with high rates of harvest of larger adults, can result in shifts toward younger, smaller adults with less ability to negotiate the challenges salmon face during their journey (i.e., large barriers) and lower reproductive potential.

The desire to increase harvest, as well as increases in hatchery fish mitigating for lost natural habitat, led to a rapid increase in overall hatchery salmon production and resulted in expansion of commercial and sport fishing. Some species, such as spring and summer chinook, were targeted more than others by fishermen because of their high desirability and prices. A number of wild stocks were intentionally harvested at higher than optimum rates in order to catch co-mingled surplus hatchery salmon. This was happening at a time when extensive logging, and agricultural, hydropower and rapid urban developments were altering the landscape salmon needed to sustain natural production.

Salmon management in the Pacific Northwest involves several states, tribes, regional and international institutions, agreements, treaties, and other legal mechanisms. For example, international fisheries are addressed under the Pacific Salmon Treaty, and fisheries off the coasts of Washington, Oregon, and California are managed by the Pacific Fishery Management Council. Puget Sound and coastal salmon management operate under cooperative agreements between the state and the treaty Indian tribes under the U.S. v. Washington and Hoh v. Baldrige court rulings. Columbia River fishing is managed under the U.S. v. Oregon court ruling. Because of the adaptive management mechanisms integral to each of these mechanisms, substantial changes in fishing regulations in rivers and estuaries have been implemented throughout the state, resulting in dramatic reductions in fishing over the past three decades.

It is clear, however, that harvest restrictions alone cannot ensure rebuilding of challenged salmon populations to healthy, harvestable levels. The effects of harvest reductions, natural environmental fluctuations and improvements in human-caused habitat disturbance must occur together in order to improve salmon productivity.

Hatcheries

Artificial production in hatcheries has been used for many purposes during the past 100 years. Hatcheries initially were used to augment the fishery, later to mitigate for habitat destruction by development activities, and more recently to supplement natural production and conserve salmon.

The early hatchery programs simplified and controlled salmon production systems. To offset declining wild fish runs, large quantities of eggs were collected, hatched, and the fry then transplanted into areas where fish were declining, or into bodies of water to increase catch. The program worked simply and efficiently and brought substantial results by protecting salmon eggs from predators, disease and scouring floods, and maximizing the number of fry released as well as the harvest of fish returning from the ocean.

Early salmon managers viewed rivers as agrarian-ecosystems; agricultural objectives and approaches were adapted to salmon management. The main objective of most fish management programs was to maximize consumptive utilization of the resource - similar to an agricultural model of crops. Fish not harvested were considered a wasted resource.

Hatchery production was assumed to be additive to natural production with no impact on natural populations. Freshwater production was limited by spawning habitats and hatcheries were conceived as a means to augment the natural production. Substantial hatchery efforts were developed to mitigate impacts from construction of hydropower projects and water diversions. The hatcheries were meant to replace harvest potentially lost as a result of habitat alteration and degradation. Some of the hatchery programs were associated with the Mitchell Act, the federal legislation enabling federal cost sharing of state hatcheries.

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Several scientific reviews recently conducted on the use of hatcheries in Pacific salmon management have concluded that historic hatchery practices have had adverse effects on natural salmon populations. Although hatcheries have been identified as one of the causes of the current salmon decline, changes in hatchery use to favor conservation of biological diversity and marking of hatchery fish to distinguish them from wild fish, plus new management regimes which employ adaptive management in the context of entire watersheds, will ensure hatcheries become part of the solution to salmon recovery.

Aquatic nuisance species

Aquatic nuisance species are plants and animals that threaten native marine life and habitat. Several aquatic nuisance species currently pose a threat, such as *Spartina* (a cordgrass), zebra mussel, Chinese mitten crab, European green crab, and Eurasian watermilfoil. These plants and animals are not native to Washington's waterways and therefore have few or no predators. In a new environment, without checks and balances, their populations proliferate. As a result, these unwanted residents severely alter the ecological relationships in streams, lakes, estuaries and marine environments.

For example, the noxious weed *Spartina* now occupies more than 6,000 acres in Washington and is successfully displacing native eelgrass in many areas along the coast. Eelgrass provides important habitat for the rearing of juvenile salmon. In the Chehalis River, parrotfeather, another invasive weed, is colonizing the sloughs and backwaters of this system. These areas are known to be vitally important for salmon habitat. Because parrotfeather alters water chemistry, these sloughs are becoming lost as rearing areas for juvenile salmon.

Aquatic nuisance species may out-compete native vegetation, resulting in a loss of biodiversity. In addition, these species severely alter or eliminate native habitat by elevating water temperatures, removing phytoplankton and zooplankton from fresh waters, reducing dissolved oxygen levels, changing pH, providing hiding places for prey species, and impacting spawning beds by colonizing areas where no native vegetation existed. The relationship between the introduction of aquatic nuisance species and the protection of salmon habitat must be fully understood and acted upon before vital habitat can be adequately preserved or restored.

The state strategies for prevention and control of invasive species include:

Prevention and control action — Identifying aquatic invasive species that may be making their way to Washington's waters by monitoring aquatic invasive species occurrences along the West Coast and communicating with other states. Developing an action plan to deal with potential aquatic invasive species before they enter state waters. Evaluating current eradication and control programs (state, federal, local programs). Controlling the spread of *Spartina* and working toward eradicating known infestations. Placing potential invasive plants and animals on a quarantine list that prohibits their sale or transport within Washington. Containing large populations of established aquatic nuisance species to reduce their size and expansion. Enforcing current laws governing aquatic nuisance species.

Monitoring and data collection — Designing and conducting a risk assessment for each invasive species to identify waters that are at risk of infestation by the species. Monitoring freshwater non-indigenous plants and animals in lakes and rivers. Developing and maintaining lists of non-native species known to occur in Washington. Making baseline survey and distribution data for aquatic nuisance species available to local, state and federal governments and other interested parties.

Education — Developing and providing information on aquatic nuisance species to appropriate resource managers and key decision-makers. Compiling, developing and coordinating the dissemination of educational materials on aquatic nuisance species to increase public awareness of the aquatic nuisance species problem.

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Endangered Species Act and Its Consequences

Understanding ESA

Congressional efforts to conserve endangered species began with the passage of the Endangered Species Preservation Act of 1966 and the Endangered Species Conservation Act of 1969. In 1973, Congress enacted the Endangered Species Act (ESA), which is a complete rewrite of the two acts. The Endangered Species Act has been amended several times, and although further reauthorization is pending, it remains vital to the conservation of species.

The purposes of ESA are to “provide a means whereby the ecosystems upon which endangered species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of treaties.” The ultimate goal of the Act is to return endangered and threatened species to the point where they no longer need the statute’s protection.

The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) are the administering agencies of the ESA and its implementing regulations. Under the ESA, both NMFS and USFWS have three basic missions:

1) identify species needing protection and the means necessary to protect and recover those species; 2) prevent harm to listed species; and 3) prevent and enforce against the taking of listed species and destruction of their habitats.

Species can be determined to be either threatened or endangered. The term endangered refers to any species which is in danger of extinction throughout all or a significant portion of its range. Threatened species are those determined likely to become endangered within the foreseeable future.

A decision to list as endangered or threatened must be made “solely on the basis of the best scientific and commercial data available.” Economic impacts cannot be considered in the listing decision. However, economic considerations may be taken into account in the exception and exemption processes and in designating critical habitat. Also, state and local programs may be considered as part of the decision on whether to list a species.

NMFS or USFWS must designate “critical habitat” to identify and protect habitat essential to the survival and recovery of the species. Designation is generally done at the time of listing. Critical habitat means the areas within the geographic region occupied by the species at the time it is listed which are judged crucial to species survival. Critical habitat contains the physical or biological features essential to the conservation of the species, or that require special management.

After the decision to list a species, NMFS or USFWS must develop and implement a recovery plan for the conservation and survival of the listed species. Listing also triggers key regulatory mechanisms of the Act, which include prohibition against take, procedures for getting exceptions from take, and enforcement of the requirements of the Act. There are three major ways in which the ESA affects state and local governments and private citizens:

- First, where a proposed federal action might impact a listed species, the federal agency is required to consult with either the National Marine Fisheries Service (for anadromous fish) or the U.S. Fish and Wildlife Service (for wildlife and non-marine fish) to determine if the action will jeopardize the species. If it does, the action is either prohibited or modified so that jeopardy does not occur. In this kind of situation, the types of actions affected range from curtailing or reducing the amount of water available to irrigators, to making major changes in the way the Columbia River power system is operated, or to restricting timber harvest on federal forest lands. Earlier this decade, timber harvests from federal forests in the Pacific Northwest were shut down for three years, pending development of a federal forest plan that met the requirements of the ESA to protect the northern spotted owl.
- Second, to provide protection from ESA sanctions, private landowners, public agencies and others have developed Habitat Conservation Plans (HCPs) which allow reduced impacts on certain listed species while ensuring their long-term protection. The Mid-Columbia Public Utility Districts, for example, have spent

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millions of dollars in habitat improvements and dam modifications to protect listed fish species, and the Washington State Department of Natural Resources (DNR) has adopted an HCP for 1.6 million acres of forest land to protect the spotted owl and listed fish.

- Third, where actual harm has occurred to a listed species, litigation can be initiated by the federal government or a citizen to enforce the protection requirements of the ESA. For example, an irrigation district in southwest Oregon was forced to remove an irrigation dam to protect a listed fish species.

Summary

To achieve long-term protection for a diverse and abundant salmon resource in Washington, two conditions must be met:

- Everyone must recognize and protect the genetic diversity of salmon. It is not enough to focus only on the abundance or mere numbers of salmon; their long-term survival depends on genetic diversity within and between local breeding populations. This diversity and the protection and rehabilitation of salmon habitat are the basis of sustained production of anadromous salmon and of the species' evolutionary futures. All impacting sectors — habitat, harvest, hatcheries and hydropower — must keep genetic diversity as the highest priority.
- Any solution to the salmon problem must take the effects of growth in human population and economic activity into account. If economic and population growth in the region continue, many of the forces that have reduced salmon runs will continue to make it harder and more expensive to rehabilitate salmon successfully. The social structures and institutions that have been operating in the state have proved incapable of ensuring a long-term future for salmon, in large part because they do not operate at the right time and spatial scales. This means that institutions must be able to operate at the scale of watersheds; in addition, a coordinating function is needed to make sure that this larger perspective as well as issues associated with accountability, enforcement and performance monitoring are also considered.

III. A Road Map to Recovery

The Statewide Strategy to Recover Salmon focuses on salmon, but at the same time recognizes and addresses the importance of providing adequate and clean water for the people of the state and healthy watersheds. The task at hand is about more than protecting and restoring fish — it's also about sustaining the quality of life we have come to expect.

This chapter describes how activities addressing human threats can fit together into a comprehensive salmon recovery strategy. The factors limiting recovery vary, however, from watershed to watershed, from river to river, and even from river reach to river reach. Any one of the "four Hs" — habitat, harvest, hatcheries and hydropower — can be the main cause limiting recovery of a particular salmon population. Regional, watershed, and site-specific efforts are the appropriate level of response to address human factors and to design salmon protection and recovery programs. A framework is outlined for development and implementation of comprehensive regional salmon recovery plans; state, federal and local watershed management initiatives; and ESA compliance approaches.

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This chapter also examines the role of science, the various contexts for application of “best available science,” and outlines a scientifically-based conceptual framework for the strategy. The Statewide Strategy to Recover Salmon and its related regional and watershed plans should be viewed as adaptive management — experiments on a large and long-term scale. The specific problems faced by different salmon species and populations are being identified, and objectives and actions to address them are being defined. Monitoring and evaluation plans are being developed. The approach used by the Strategy sets deliberate courses of action to address key questions and to generate needed information to improve decision-making.

Current Conditions

Regulatory Framework

Although there are many laws with mandates that either directly or indirectly attempt to protect or restore salmon and their habitats, the troubling status of these fish is an indication that our existing regulatory framework and implementing agencies have been unable to protect salmon populations and their ecosystems. Some of the failures are due to the complexity and difficulty in addressing ecosystems — interconnections are either ignored or not well understood. Decisions may have been made in the past which favor development or the status quo because of scientific uncertainty or the inability to resolve conflicts between economic development and environmental protection. Other problems arise due to lack of enforceability, coordination, comprehensiveness, resources for implementation, data and scientific information, and public support. Fortunately, salmon are very adaptive and have incredible survival skills.

Following are some examples of current laws which affect salmon:

- Laws dealing with land and water use and development — State: Environmental Policy Act, Shoreline Management Act, Growth Management Act, Floodplain Management Act, Forest Practices Act, Water Pollution Control Act, Hydraulic Project Approval, Aquatic Lands Act, Water Code and Water Resources Act; Federal: National Environmental Policy Act, Clean Water Act, Federal Reclamation Act, Coastal Zone Management Act, Rivers and Harbors Act, Food Security Act, Federal Power Act, Wild and Scenic Rivers Act, and many more.
- Laws pertinent to fish and wildlife protection — In addition to some of the above, such as State Environmental Policy Act and Hydraulic Project Approval: the federal Fish and Wildlife Coordination Act, The Northwest Power Act, the Magnuson-Stevens Fishery Conservation Act, The Endangered Species Act, and the Marine Mammal Protection Act .
- Recently enacted legislation — Three acts passed in the last year were designed specifically to improve conditions for salmon recovery. These key pieces of legislation recognized the need for comprehensive, scientifically-based, coordinated, collaborative, incentive-based and locally-implemented solutions:
 - Salmon Recovery Planning Act (ESHB 2496): Passed in 1998, the Act provides the framework for developing restoration projects. It requires a limiting factors analysis for habitat restoration be completed, and establishes a funding mechanism for local habitat restoration projects. It also creates the Governor’s Salmon Recovery Office. The office’s primary purpose is to coordinate and assist in the development of salmon recovery plans for Evolutionary Significant Units (ESUs) and submit those plans to NMFS, USFWS and appropriate tribal governments. The Salmon Recovery Office is obligated to prepare a State of the Salmon Report by December 2000. The bill also calls for the creation of an Independent Science Panel to provide scientific review of salmon recovery efforts in the state. The panel will provide independent and objective scientific advice to inform decision-making, separated as much as possible from economic, historic, cultural or political factors. This will help increase the level of credibility and public trust in Washington’s salmon strategy and regional conservation/restoration responses.

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- Watershed Planning Act (ESHB 2514): This legislation, created in 1998, encourages voluntary planning by local governments, citizens, and tribes for water supply and use, water quality, and habitat at the Water Resource Inventory Area (WRIA) or multi-WRIA level. Grants are available to conduct assessments of water resources and develop goals and objectives for future water resource management.
- Salmon Recovery Funding Act (2E2SSB 5595): This legislation further developed concepts established in ESHB 2496. A Salmon Recovery Funding Board is established to localize salmon funding in one board. This Board will make decisions about base level allocations across regions, and will deliver funds for projects and activities based on a science-driven, competitive process. The legislation further clarified what must be considered in a Statewide Strategy to Recover Salmon, and directs the Governor, with the assistance of the Salmon Recovery Office, to submit this document to NMFS and USFWS.
- Pacific Salmon Treaty — This Treaty is negotiated among Washington, Oregon, Alaska, tribes, and the federal governments of the U.S. and Canada. The outcomes of these discussions impact fish stocks and harvest in both western Washington and the Columbia Basin.

Cooperative Efforts by fisheries CO-Managers

Since 1992, the Department of Fish and Wildlife (WDFW) and the tribal co-managers have been implementing a Wild Stock Recovery Initiative, including Stock Inventories (SASSI and SaSI) and a Salmon and Steelhead Habitat Inventory Project (SSHIAP). The co-managers are nearing completion of comprehensive species management plans for Puget Sound coho and chinook, Hood Canal and the Strait of Juan de Fuca summer chum and Lake Ozette sockeye. Each of these plans examines limiting factors and identifies needed habitat activities, but they concentrate on actions in the harvest and hatcheries areas, including comprehensive hatcheries planning. In December 1997 the WDFW and some western Washington treaty tribes adopted a Wild Salmonid Policy to provide general policy guidance to managers on fish harvest, hatchery operations, and habitat protection and restoration measures to better protect wild salmon runs.

Regional Response

Regional and local salmon recovery plans are the way the Statewide Strategy to Recover Salmon will be put to work and make salmon recovery a reality, now and for the future. Every one of the salmon recovery regions is different and unique, but they hold one thing in common: each is required to recover salmon within its boundaries and to make decisions about what needs to be done in the area. All across the state, new partnerships to recover salmon are emerging. Federal, state and local governments, tribes, businesses and citizen groups are crafting plans, implementing restoration projects, collecting data and monitoring habitat conditions.

Washington State Salmon Recovery Regions

In consultation with the Washington Department of Fish and Wildlife, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service, the Governor's Salmon Recovery Office has identified seven salmon recovery regions in the state; the Puget Sound Region has been further divided into three sub-regions. Each salmon recovery region is based on the salmon recovery needs within a specific geographic area and includes existing Endangered Species Act listings, proposed listings, and where there is a strong likelihood for future listings.

Regional Salmon Recovery Entities

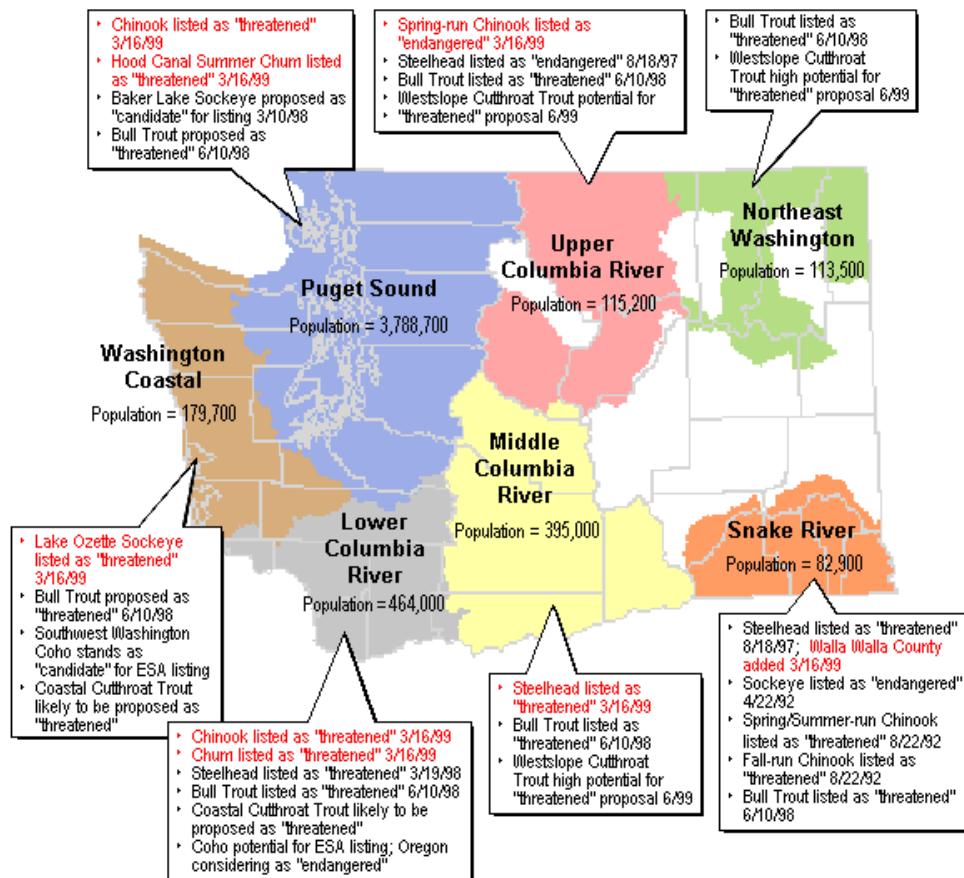
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Although at this time there are not many incentives for the various governmental jurisdictions to pool their salmon recovery resources and create regional entities to oversee effort, some regional efforts are underway. These include:

- **Salmon Recovery Management Board** (also known as the Lower Columbia Fish Management Board) — ESHB 2836 created this fifteen member Board to participate in the development of recovery plans for the Lower Columbia Salmon Recovery Region. Members include a legislator; commissioners from Cowlitz, Lewis, Wahkiakum, and Skamania Counties; a tribal representative; a mayor; and citizen designees.
- **Hood Canal Coordinating Council** — This group is coordinating the development of a habitat-related salmon recovery plan for the ESA listed Hood Canal summer chum.
- **Tri-County Executive Committee** — Salmon recovery efforts for the Central sub-region of the Puget Sound Salmon Recovery Region are being coordinated by this group.
- **Douglas, Okanogan, Chelan Counties and Tribes Habitat Recovery Board** — Recently appointed by stakeholders to coordinate habitat components of salmon recovery, this entity represents the Upper Columbia Salmon Recovery Region.

SALMON RECOVERY REGIONS

Areas with Salmon, trout, or steelhead that are listed, proposed for listing, or have a high potential for future listing under the Endangered Species Act.



Science is Our Guide

Role of Science

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Science is not an outcome; it's an approach to the pursuit of knowledge. Knowledge can be acquired in various ways, but science typically operates under a series of guiding concepts or rules. Scientists' work includes developing a broad understanding of the scientific literature on topics of interest and performing rigorous empirical research or observations leading to theoretical analyses and sound interpretations. This process is by nature self-correcting, where hypotheses are formed based on clearly articulated assumptions and then are systematically tested and either supported or rejected. The ability to build upon previous work, to change course based on new findings or theories, and to be able to test and re-test hypotheses and reproduce findings is a fundamental aspect of science. High quality work that has passed the scrutiny of independent peer review is published in scientific journals, books or other scientific media.

It is important to emphasize that science is not a panacea for salmon recovery. Science can help provide direction and answer some key questions, but should not be expected to solve all problems. Science may simply not be able to answer some questions; in some cases suitable technologies may not exist, and in others, results from needed scientific investigations may take too long to be of help with current problems. Uncertainty will always be a part of natural resource management.

Best Available Science

References to the use of the "best available science" appear in various sections of the Statewide Strategy to Recover Salmon. In addition, various state and federal laws and regulations call for the use of "best available science." In the context of the Strategy, this means that the best scientific information available on a subject will be used to inform related public policy decisions.

Science-based Conceptual Foundation for the Salmon Strategy

To ensure the conservation strategies and actions of the Statewide Strategy to Recover Salmon have the best chance of achieving the desired outcomes, a strong conceptual scientific foundation is required. A conceptual scientific foundation helps clarify what is known and not known about watershed and ecosystem dynamics in relation to salmon conservation and recovery. It provides a way to view needs and issues using a more holistic, ecosystem approach, rather than in piecemeal or single-issue fashion. A conceptual foundation provides the basis for adaptive management and monitoring that links conservation strategies, critical uncertainties, and related objectives and risks to key questions that can be addressed with improved decision-making. It provides the lens through which principles and approaches for recovery actions and decisions can be viewed.

Scientific principles will help guide a wide range of monitoring planning needs and decisions, and will promote their integration. The principles will influence identification of key questions and the relative priority of their answers to salmon recovery, will shape the appropriate scale(s) of monitoring and evaluation efforts, will help identify gaps and redundancies in monitoring attributes, and will guide the selection of appropriate methods and analytical approaches. Ultimately, use of the scientific framework will facilitate understanding, coordination and cooperation among partners involved in the salmon strategy.

Scientific Review

The five-member Independent Science Panel, created to provide scientific review and oversight of the state's recovery effort, will review recovery plans at the request of the Governor's Salmon Recovery Office and will report to the Governor's Office and the Legislature. The panel will focus on scientific issues and will not have authority to make policy decisions. Members were appointed by the Governor in May, 1999. Science reviews, particularly at the project level, are anticipated in 2E2SSB 5595 and plans are underway for integrating these with other efforts. For example, the Northwest Power Planning Council uses an Independent Scientific Advisory Board to provide scientific guidance on issues associated with fish and wildlife restoration in the Columbia River Basin, and an Independent Scientific Review Panel to assist with project review and selection. The State of Oregon has formed an

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Independent Multidisciplinary Science Team to advise on matters of science for the Oregon Salmon Plan. Formation of a science panel is also being explored by parties in the central Puget Sound area to address questions pertinent to recovery of fish in the Puget Sound ecosystem. It will be in the best interests of parties in all areas to ensure science panels are coordinated to achieve efficiencies, avoid unnecessary duplication, and share relevant information in a timely manner.

As will be discussed further in the strategy, the use of scientific review groups is not the only mechanism through which the Statewide Strategy to Recover Salmon will receive and use scientific information. State agencies and other partners can draw upon their scientific resources in developing recovery strategies and plans. Federal, tribal, state and local agencies have staff resources and existing mechanisms for including scientific information in their processes and methods.

Adaptive Management and Monitoring

Science has a key role to play in making decisions associated with salmon recovery. Decisions will be informed by the best available scientific information. Information obtained from monitoring the implementation and consequences of activities will help determine whether strategies and actions are producing the desired results so that decision-makers can affirm or change course as needed.

Coordinated and integrated data and information management systems will be implemented to help make salmon recovery decisions and support adaptive management. To help meet this need, 2E2SSB 5595 requires that salmon monitoring data be provided to the Salmon and Steelhead Habitat Inventory and Assessment Project (SSHIAP). This system will be used and expanded to acquire and integrate salmon habitat data from a wide variety of sources, and streamline access to the data by all interested parties. It will also integrate habitat information with stock status information available from SaSI efforts. More information on adaptive management and monitoring strategies can be found in a later chapter of this document.

Building Blocks for Salmon Recovery

People of Washington tend to agree that salmon recovery is an important goal to achieve, but there is little consensus about how to get there. Current systems are particularly criticized for their failures: lack of collective agreement on goals (“Where are we going?”), inability to define success (“How will we know when we get there?”), as well as general chaos of structure (“Who’s in charge?”). It is the intent of the Statewide Strategy to Recover Salmon to provide a coherent framework — the foundation — upon which to lay other crucial building blocks so that we may collectively build salmon recovery.

Salmon recovery and ESA response require partnerships at all levels. Certain actions are, necessarily, state-initiated while others are local. The state building blocks which locals will rely upon include those covered in the following chapters. It is the intent of the state strategy that these partnerships reduce duplication of efforts wherever possible; for example, when the state has achieved a level of ESA protection for an action, and where locals are in conformance with state standards and guidelines, then the same ESA protection will be extended to the locals. It is this “umbrella effect,” combined with geographically-tailored actions, which will make ESA compliance and salmon recovery achievable with the least disruption. Essential building blocks for recovery include:

Federal Recovery Plans and ESA Response

National Marine Fisheries Service and U.S. Fish and Wildlife Service (the Services) are required by the Endangered Species Act to develop recovery plans for listed species under their jurisdiction. They will also review the plans and actions taken by state and local governments and grant certain protections under the ESA. The Services are required to develop the biological standards that fish require from each of the “4 Hs” — habitat, hatcheries, harvest and hydropower — and also to describe how they will determine when fish are recovered — which is the pinnacle of the

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pyramid (see p.34). The degree of protection granted state and local governments will depend on how well the plans do in meeting recovery goals developed by these federal agencies. NMFS' "Working Guidance for Comprehensive Salmon Restoration Initiatives on the Pacific Coast" identifies three overarching components of a successful restoration strategy:

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

NMFS further has stated that the strategy will "greatly benefit from the existence of explicit default measures whose implementation is certain should reasonable time frames or other expectations not be met."

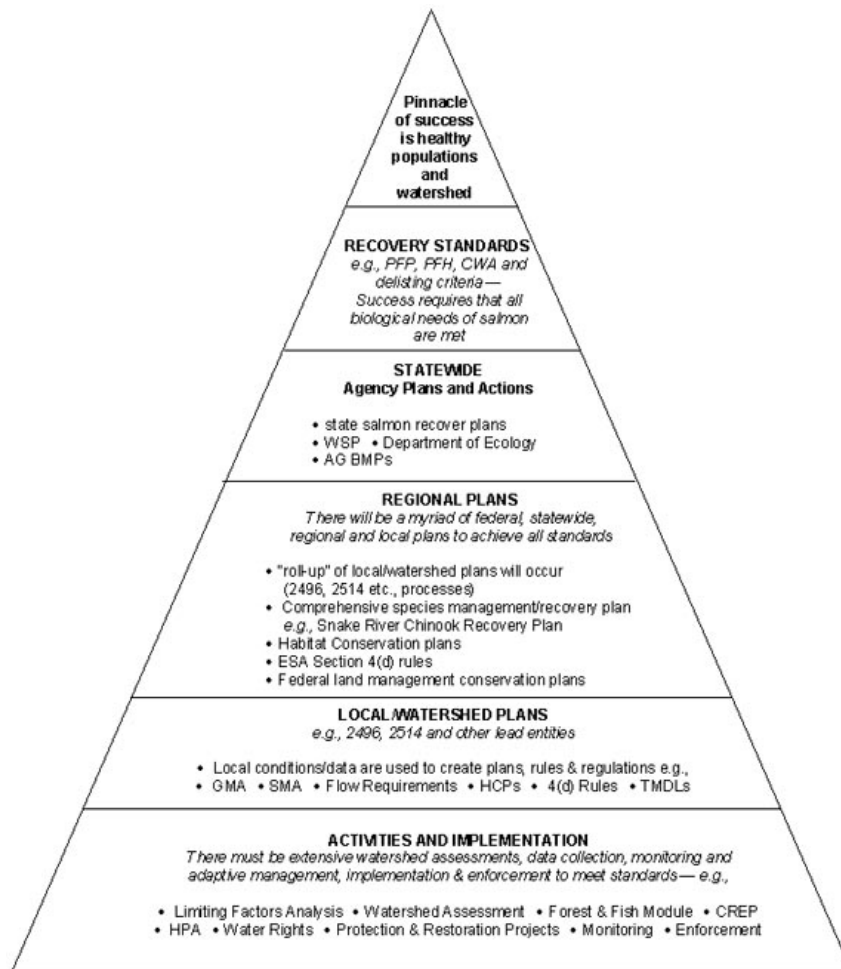
Statewide Strategy and Early Action Plans

The Statewide Strategy to Recover Salmon is the state vision of what needs to be done to recover salmon. It is intended to present major elements of an agenda for protection and restoration of salmon and aquatic resources. If these elements are not successful or are not implemented, default measures have been identified for some sections. Where they are not indicated, the state is still debating options, from increasing enforcement, tightening restrictions on important permits, or seeking new legislative authorities to correct the problems.

BUILDING BLOCKS OF SALMON RECOVERY

A complete list of acronyms can be found in [Appendix B](#).

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The strategy is intended to:

- Provide a forum to address all factors, within state control, limiting salmon recovery.
- Set statewide goals and objectives for protection and restoration.
- Identify major policy and program changes and actions related to the “4 Hs.”
- Identify statewide initiatives, and regional and local watershed initiatives as the mechanism for implementing the strategy.
- Provide a framework to effectively coordinate and integrate changes and actions to be taken under all “4 Hs.”
- Set joint objectives for state agencies’ activities, such as cooperation to fully integrate enforcement, monitoring and data collection activities.
- Set framework for priority setting and decision making.
- Identify actions, options or programmatic approaches that could lead to conservation of salmon and protection of state, local, and/or private actions from legal exposure under ESA.

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- Guide the formulation and evaluation of early actions and long-term state implementation plans, and regional and local responses.
- Guide and endorse the use of good science, adaptive management whenever significant uncertainties exist about the best action or its effect, and implementation of monitoring programs.

Goal and Objectives of the Statewide Strategy to Recover Salmon

Goal

- Restore salmon, steelhead, and trout populations to healthy and harvestable levels and improve habitats on which fish rely.

Objectives

- Develop and implement a coordinated and balanced statewide strategy that moves aggressively toward the goal while maintaining a healthy economy.
- Use sound scientific concepts, principles, and design approaches to guide development, implementation, monitoring, and revision of statewide and regional conservation frameworks and plans.
- Collaborate with tribes, local governments, and the private sector to integrate local knowledge with flexibility and control at the local level into quantifiable state and regional salmon recovery plans. Regional plans should detail the desired future condition of the salmon resource and the future habitat conditions needed to support it. Incentives will be provided to assist and encourage development and implementation of regional structures.
- Provide guidelines and standards for use by local governments, which, if implemented, will extend any ESA protections granted the state.
- Monitor progress of state agencies and regional bodies in developing and implementing salmon recovery plans. In doing so, the state will provide technical, enforcement, and financial support in the highest priority areas.
- Compile relevant components of state and regional salmon recovery and species management plans into responses to NMFS for specific ESU listings.

The outcome of achieving these recovery objectives is not only healthy salmon runs that support fisheries, but also healthy streams and rivers we all depend on. This, in turn, will lead to compliance with the Endangered Species Act, which is vital to state and local economies. Strong ownership in the locally-based, geographic-specific regional salmon recovery plans is the key to achieving these objectives.

Guiding Principles

The Statewide Strategy to Recover Salmon is being shaped using a wide range of fundamental principles:

- Use collaborative, incentive-based approaches to recover salmon. Coupled with this, the state will enhance enforcement of existing authorities to protect salmon habitat.
- Science will be a guide, performance measures for recovery will be established, time lines for achieving these measures will be clarified, and progress toward salmon recovery goals will be monitored.
- Where resource risks are severe, take early and immediate actions as necessary to address key factors for decline.
- Where insufficient effort is made to recover salmon or where performance measures are not met after a reasonable period, the state should be prepared to take necessary default actions.

Early Action Plan

The strategy is the guide to state agencies' long-term implementation plans. An additional volume, The Early Action Plan, contains specific activities state agencies will undertake in the 1999-2001 biennium and the expected outcomes from those actions. Many of those activities will directly benefit local recovery efforts. These early actions form the first chapter in long-term implementation plans currently under development, and are the foundation for ESA

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compliance strategies. Although these compliance actions will require a mosaic of federal, state, and local conservation and protection measures to be taken, pursuit of these actions will proceed concurrently with recovery activities. The state approach to achieving ESA compliance is:

- Pursue programmatic (instead of project-by-project) approaches, grouping activities, projects, programs, and/or entities whenever possible.
- Focus the state's compliance efforts first on programs under direct state jurisdiction.
- Avoid doing further harm to listed species by strengthening regulatory policies and activities to avoid, minimize and mitigate human impacts on salmon habitat; adopting standards and conditions to address impacts — including incremental effects — and providing consistency in decisions; implementing early actions to provide immediate and substantial salmon protection; and enforcing existing regulatory programs.

Setting Priorities

Determining how priorities will be set is a fundamental issue in developing the Statewide Strategy to Recover Salmon. The Strategy cannot be implemented to the same extent in all places at the same time. Given the nature and extent of the problems faced by Washington's salmon, the need for funding and other resources will always be greater than what's available. Decisions must and will be made to allocate available resources to specific activities and areas over time. At the state level, priority decisions for each program related to salmon recovery are now made independently by each agency using program-specific criteria on a case-by-case, project-by-project basis. In the future, coordination will occur to effectively set priorities for the "four Hs" of salmon recovery — habitat, harvest, hatcheries and hydropower.

The Joint Natural Resources Cabinet adopted the following guidance for allocating resources for salmon habitat protection and restoration:

- Allocate a greater portion of new state and federal funds to habitat protection than to habitat restoration.
- Use scientific principles and information consistent with recovery of healthy salmon populations as the basis to identify and establish geographic priorities for habitat protection and restoration.
- Allocate most new state and federal funds for salmon habitat protection and restoration to higher priority geographic areas.
- Provide continuing technical and financial support to ensure that decisions within high priority areas are scientifically sound.
- Prioritization approaches should be based on scientific principles and information that emphasize salmon recovery in high priority areas, while also addressing potential Endangered Species Act (ESA) liabilities of local governments and others.

2E2SSB 5595 created a Salmon Recovery Funding Board (SRFB) which will be comprised of ten members, five of which are voting members appointed by the Governor, subject to Senate confirmation. The other five members will represent the Departments of Fish and Wildlife, Transportation, Ecology, Natural Resources and the Washington State Conservation Commission. The Board will be responsible for developing procedures and criteria for the allocation of funds, including priorities and geographic distribution. It will also make grants and loans for salmon habitat projects and recovery activities.

The Board will develop, refine and implement the framework for prioritization, and rely on scientific information to ensure funds are allocated for use on the highest priority activities. However, many details pertaining to the implementation of the legislation and related activities are still under development.

Local planning and decisions developed under the Watershed Management Act (ESHB 2514), the 1998 Salmon Recovery Planning Act (ESHB 2496), and 2E2SSB 5595 will determine priorities for habitat protection and restoration projects and actions within WRIsAs or watersheds. To ensure coverage of marine as well as freshwater habitat issues, planning processes for WRIsAs that discharge to saltwater should also set priorities for local estuaries and nearshore marine areas. State agencies will provide technical and financial support to local decision processes.

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To ensure a level of statewide consistency in setting priorities, the state may also provide guidance on the minimum elements that should be present in a local WRIA or watershed priority-setting process. These minimum elements include: 1) consideration of science-based principles and analyses; 2) use of best available data; and 3) a collaborative and open public process.

The science-based principles include: 1) freedom for stream channel movement; 2) consideration of the time needed for regeneration of the natural processes that salmon are dependent upon at various life stages; 3) maintaining biological diversity; 4) improving connectivity of critical habitats; 5) analysis of the overall landscape context of the watershed; and 6) incorporating the needs and impacts of people in the analysis and priority-setting process.

Monitoring and Adaptive Management

The Governor's Salmon Recovery Office will coordinate and assist in the development of state and regional salmon recovery responses. Monitoring the implementation and effectiveness of these is essential at both a regional and at a watershed scale. It is important to remember that regional salmon recovery will reflect an ongoing and evolving process, not an endpoint.

Regional Recovery Responses

To achieve recovery objectives, regional salmon recovery plans are needed that build upon watershed plans and data to address all of the factors necessary for salmon recovery within each region. The number of fish caught both commercially and recreationally, as well as hatchery management, must be coordinated with habitat protection and restoration. Priorities for actions and funding must be set. The more this is coordinated, the more efficient and effective the effort will be.

Discussions are on-going to develop incentives which encourage "regionalizing" salmon recovery efforts. Some possibilities include:

- Improved efficiency of state-region actions. As problems arise within a recovery region, the state will more quickly and effectively assist a regional council than a number of competing jurisdictions.
- Increased effectiveness of regional councils in legislative and congressional discussions.
- Funding through block grants or other mechanisms may be encouraged for regional councils.
- Federal agencies reviewing regional response plans for contributions to salmonid recovery and for ESA compliance require planning to address all issues across an ESU. The likelihood of swifter review and a favorable response is increased when all levels of government agree on a course of action that does not contain competing plans.

Watershed Biological Assessments, Monitoring Plans and Activities

It is important to recognize that local habitat protection and restoration projects are proceeding concurrent with watershed assessment and the development of the broader regional planning framework. Watershed assessment, planning and management provide an opportunity to improve and protect water quality, habitat and instream flows. All partners will need to ensure these local processes use resources effectively, monitor implementation effectiveness, identify local needs and opportunities, and coordinate existing as well as new efforts.

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Restoring and protecting wild salmon populations and their habitats in perpetuity, with or without ESA listings, will not be easy or inexpensive. Effective conservation and recovery of wild salmon stocks and their watersheds must occur as specific critical factors or ecosystem functions and processes limiting natural production are identified.

Several recurring themes underlie the Statewide Strategy to Recover Salmon. All of Washington's citizens and governments have a role to play. To accomplish the goal of the Strategy:

- **We need to determine our own future**

If we do not act to save our salmon we will be depending on the federal government and federal courts to decide the future — not only of salmon but also of our watersheds and the communities within them.

- **We must make tough choices**

We are not going to save salmon by talking about it. We must make changes in the way we conduct our lives in our communities and our watersheds. These changes must result in improvement to salmon habitat, and include how we use our water, where we build our homes, how we harvest our timber and how we farm. We are also going to have to change how we manage harvests of salmon.

- **We must undertake significant effort and provide adequate funding**

It is going to take a lot of hard work to protect and restore our salmon. The kinds of change that are needed will not and cannot happen without extraordinary efforts. In addition, saving our salmon will not be free. Protecting and restoring salmon habitat will require substantial investments.

- **We are all in this together**

Saving our salmon is not about blaming anyone. We are all part of the problem and we must all be part of the solution. Each of us must come to understand the impacts we have on salmon and the opportunities we have to contribute to their protection and restoration.

Most importantly, a successful strategy will require four key ingredients: use of science as a guide, collaborative decision-making, increased public understanding and engagement, and collective energy to challenge the status quo.

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IV. Core Elements

Habitat is Key

AGRICULTURAL STRATEGY TO IMPROVE FISH HABITAT

I. Current Situation: *Where are we now?*

Considering that agricultural lands comprise 37 percent of our state and represent approximately 74 percent of water use state-wide, it's no surprise that agriculture plays a significant role in the recovery of Washington's salmon. Approximately 37,000 farms cover 15.7 million acres and produce more than 200 commodities, such as apples, milk, hay, berries and Christmas trees. More than half of these farms are smaller than fifty acres, while others are large corporate entities. Large and small farms combined provide thousands of jobs and contribute billions of dollars to our state's economy.

Unfortunately, agricultural activities sometimes contribute to the degradation of water quality and reduction of water quantity; both of these can significantly affect salmonid habitat. Activities which remove riparian habitat along streams, or that add excessive amounts of nutrients and silt to water, contribute to the increasing numbers of water bodies not meeting water quality standards. These activities also play a role in the listing of several salmon, steelhead and trout populations as threatened or endangered under the Endangered Species Act (ESA).

Most existing state and federal laws and regulations dealing with agricultural practices apply incentive-based approaches and rely largely on providing technical and financial assistance to farmers. Most program delivery is through local Conservation Districts in partnership with the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS). The Washington State Conservation Commission provides grant funds to the Districts to implement local conservation practices, and NRCS staff provides technical assistance to private landowners. They also join with Conservation District staff to help landowners develop management plans that protect resources, as well as the landowner's economic interests.

In addition, the State Conservation Commission funds a variety of water quality projects using state Centennial Clean Water funds. These projects are implemented by local Conservation Districts. The Department of Ecology also funds agricultural water quality and quantity projects.

II. Goals and Objectives: *Where do we want to be?*

Goal

- Improve farm and sector-based practices to provide the water quality, water quantity, and functional riparian habitat needed for salmon recovery in the agricultural sector.

Objectives

- Revise the Field Office Technical Guide (FOTG) to provide the tools needed to enhance, restore and protect habitat for fish and to address state water quality standards.
- Ensure that there is thorough stakeholder participation in the process of revising the Field Office Technical Guides under the Natural Resource Conservation Service's Memorandum of Understanding (MOU) with state and federal resource agencies.
- Raise the awareness and understanding in the agricultural community of salmon recovery and watershed health, and build support for the agricultural strategy and its implementation.
- Support agricultural organizations' and associations' efforts to implement the agricultural strategy and to help communities and general public understand and support this effort.
- Fully implement the Conservation Reserve Enhancement Program (CREP) and expand its scope to include tree fruit, berries and grapes.

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III. Solutions: *What is the route to success?*

The agricultural strategy builds on the infrastructure used for the last 40 years to implement conservation practices on farms. This system has relied on voluntary actions and incentives, with technical assistance and cost-share money provided by the Natural Resource Conservation Service and state Conservation Districts. The Strategy will encourage comprehensive programs in those areas most in need of protection and restoration.

The first priority of the strategy is to review and, if necessary, upgrade the conservation practices currently used by the Conservation District — Natural Resource Conservation Service partnership. These standards will address water quality and fish habitat on farms and are designed to provide upgraded conservation standards that meet Endangered Species Act (ESA) and Clean Water Act (CWA) requirements. Conservation Districts and the Natural Resource Conservation Service will use these to develop farm plans that will be the mechanism used to address water and fish habitat quality. Federal and state programs will be used to provide technical assistance and cost-share money to help farmers implement the practices. The program will use conservation practices from the Natural Resource Conservation Service's updated Field Office Technical Guide. A second component of this effort is a guidance document to assist irrigation districts in developing comprehensive plans that address their ESA-related concerns. This effort is known as the "Agriculture, Fish and Water" (AFW) forum.

A second cornerstone of the strategy is implementation of the Conservation Reserve Enhancement Program (CREP). The program is a joint effort between Washington state and the U.S. Department of Agriculture to restore fisheries habitat on private agricultural lands adjacent to depressed or critical salmon streams. The program has \$250 million in funding, enough to restore between 3,000 and 4,000 miles of degraded riparian habitat.

The strategy also relies on a commitment by the state to enforce existing environmental laws and regulatory programs. It includes better tracking and accountability than in the past and calls for monitoring and adaptive management. Benchmarks will be set to measure success, and if they are not met within three years the state will seek new authority from the Legislature to ensure salmon protection in agricultural areas.

The strategy also encourages sector-based approaches such as commodity groups or irrigation districts developing Habitat Conservation Plans. The state will provide technical and funding support to groups developing these comprehensive commitments.

IV. Monitoring and Adaptive Management: *Are we making progress?*

The Conservation Districts and NRCS will implement monitoring at the local level. The state Conservation Commission will develop a statewide database to track implementation by watershed, or Water Resource Inventory Area (WRIA), region or statewide. An oversight committee will develop a process to assess the success of implementation.

An effectiveness monitoring system will be designed to ensure conservation practices are working. This will be part of an overall monitoring strategy used by the state to measure success in providing clean water and good physical habitat.

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Habitat is Key

FORESTS AND FISH

I. Current Situation: *Where are we now?*

Roughly half the land area in Washington, about 21 million acres, is covered by forests. Nearly 12 million of these are non-federal forest lands owned by large and small private landowners and the state of Washington, and managed primarily for timber production. Forest management practices on these state and private lands have been regulated since 1974 under the State Forest Practices Act, administered by the Department of Natural Resources (DNR) with rules co-adopted by the Forest Practices Board and the Department of Ecology.

Most salmon-bearing streams in Washington have their headwaters, and in many cases a majority of their watersheds, in forested areas. Studies have consistently shown that streams flowing from forested areas are healthier than streams flowing from agricultural lands or developed areas. On the other hand, forest management activities such as road building and timber harvest near streams or on steep or unstable areas can damage fish habitat and water quality. Impacts from these forest practices are among those contributing to the listing or proposed listing of some salmon runs.

Protecting water quality and fish habitat has always been an objective of forest practices regulations. Since 1986, state, tribal, environmental, citizen and industry leaders concerned about forest management on state and private lands have formed a consensus-based negotiating forum known as Timber, Fish and Wildlife (TFW), which has developed scientifically-based proposals for new regulations. The listings of salmon runs as threatened or endangered prompted TFW participants, with the addition of federal and county representatives, to launch in 1997 a new round of negotiations. Participants sought to create strengthened regulations and other measures necessary to meet fish conservation requirements of the Endangered Species Act (ESA), as well as water quality requirements of the Clean Water Act (CWA), while maintaining a viable timber industry and providing long-term regulatory certainty.

The Joint Natural Resources Cabinet requested the Forest Practices Board in 1997 to transmit its salmon and water package (originally termed the "Forestry Module" and now known as Forest and Fish Report) for inclusion as the forest habitat component of the Statewide Strategy to Recover Salmon.

Negotiations took place until September, 1998 through Timber, Fish and Wildlife, and continued after then with all participants except representatives of environmental organizations. Forestry Module negotiations resulted in the Forest and Fish Report submitted to the Forest Practices Board and the Governor's Salmon Recovery office on February 22, 1999. The report was finalized on April 29, 1999 and is now an integral part of the implementation of the statewide strategy.

The 1999 Legislature passed Engrossed Substitute House Bill 2091 (ESHB 2091), "An Act Relating to forest practices as they affect the recovery of salmon and other aquatic resources." Section 101 of states that the Act:

"Constitutes a comprehensive and coordinated program to provide substantial and sufficient contributions to salmon recovery and water quality enhancement in areas impacted by forest practices and are intended to fully satisfy the requirements of the endangered species act with respect to incidental take of salmon and other aquatic resources and the Clean Water Act with respect to nonpoint source pollution attributable to forest practices."

The Act establishes legislative direction to the Forest Practices Board for using the Forest and Fish Report to protect salmon habitat and water quality.

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II. Goals and Objectives: *Where do we want to be?*

Goals

- Strengthen regulations to restore and maintain habitat to support healthy, harvestable quantities of fish.
- Strengthen regulations and other measures necessary to meet fish conservation requirements of the Endangered Species Act, as well as water quality requirements of the Clean Water Act.
- Maintain a viable timber industry and provide long-term regulatory certainty.

Objectives

The Forest and Fish Report and ESHB 2091 are designed to deal with the following topics:

- Riparian protection for fish habitat and non-fish habitat streams
- Mandatory improvements for existing and new roads
- Protection for unstable slopes
- Application to small landowners
- Use and modification of watershed analysis
- Adaptive management
- Overall funding
- Assurances and certainty associated with the agreement

Specific objectives are being developed for each of those listed above.

III. Solutions: *What is the route to success?*

The Forest Practices Board is authorized by ESHB 2091 to take immediate action by declaring emergency rules to put several of the Forest and Fish recommendations into effect until permanent rules are adopted. The Joint Natural Resources Cabinet expects the Board will take this action in late 1999 or early 2000, with final rules ready for adoption on or before June 30, 2000.

Implementation of the Forest and Fish recommendations will rely heavily on Geographic Information System (GIS) mapping and data processes to better protect and monitor public resources. Transportation, water typing and wetlands mapping and data layers will assist forest managers in fully evaluating forestry impacts on salmon.

Developing conservation strategies for riparian areas, unstable slopes and wetlands will be the primary but not exclusive focus for achieving forest goals.

Riparian Areas

Riparian areas will be protected through buffers and limits on management activities along fish and non-fish habitat streams. Specific requirements vary in western and eastern Washington, but ecological functions of the streamside habitat are the primary focus. A new system of water typing will be employed, designating streams according to availability of fish habitat rather than fish presence.

Roads

The number of new roads built in riparian areas will be minimized, and construction and maintenance standards for all new and existing roads will be improved. For existing roads, enhanced best management practices will be adopted immediately and road maintenance and abandonment plans will become mandatory. New roads will be built according to improved sediment and water delivery standards, and new culverts will be required to meet a 100-year flood standard to ensure passage of fish and some woody debris. No new roads will be allowed in bogs or low nutrient fens.

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Unstable slopes

The Department of Natural Resources and the Timber, Fish and Wildlife participants will screen all forest practices applications to identify and address hazardous unstable slopes.

Watershed analysis

Watershed Analysis will be revised to address technical upgrades necessary for compliance with the Clean Water Act.

Small landowners

A program for small forest landowners was created to achieve full riparian protection and to provide financial incentives to small landowners who volunteer to participate in the Forestry Riparian Easement Program. The program does not provide an exemption to small landowners, except those with fewer than 20 acres in a parcel and fewer than 80 acres statewide. It is intended to help assure the viability of non-industrial forest landowners and keep forest land base in forestry.

A Small Forest Landowner Office was created by the 1999 legislature to administer the Forest Riparian Easement Program, and to assist small landowners with development of options and alternate plans. The Office is required to evaluate the cumulative impacts of alternate plans on essential functions within the watershed and make any necessary adjustments. An advisory committee was established to assist the office.

Wetlands protection

The objective is to achieve a “no net loss” of forested wetlands functions by avoiding or minimizing forest practices impacts or by restoring affected wetlands.

Timber harvest in bogs is not allowed. The required wetlands mitigation sequence will be determined based on loss of wetland function, site management plans, and maps of all forested wetlands — regardless of size — that are associated with an affected riparian management zone. For the long-term, through the adaptive management process, a technical group will be convened to better define the functions of forested wetlands, to evaluate their regeneration and recovery capacity, and to evaluate the effectiveness of current wetlands management zones.

Landowners will map all forested wetlands associated with riparian areas and other forested wetlands three acres or larger. In addition, the Department of Natural Resources will incorporate wetlands into a Geographic Information System (GIS) map layer, depending on availability of funding.

Pesticides

The use of pesticides will be managed to meet water quality standards and label requirements and to avoid harm to riparian vegetation.

Best management practices will be implemented to eliminate direct entry of pesticides to water. A variable buffer width will be used to keep pesticides out of water and wetlands. In unfavorable wind conditions, no aerial spraying will be allowed in a specified wider buffer. With few exceptions, no spray will be allowed in the no-touch zones or inner zones or to wetland management zones. In addition, no aerial applications will be allowed within the area of the inner zone used to meet the basal area and tree density targets. Use of BT is subject to label requirements.

IV. Monitoring and Adaptive Management: *Are we making progress?*

Adaptive management

Adaptive management is critical to implementation of an agreement in areas where knowledge is currently limited and requirements may need to evolve through time. Forests and Fish will employ a more formal and structured process than has been used in the past for monitoring, research and adaptive management to ensure accountability.

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Four primary relationships will be monitored: correlation between target forest conditions and goal attainment, effect of forest practices on forest conditions, effect of forest practices on other resource objectives, and enforcement (on-the-ground implementation of forest practices.) The Forest Practices Board will be involved in the process, and a multi-staged dispute resolution mechanism could be triggered if necessary. A key component of adaptive management is Timber, Fish and Wildlife's ongoing Cooperative Monitoring, Evaluation and Research program (CMER), which incorporates the scientific foundation for forest practices.

Default mechanisms

Forests and Fish differs from some other elements of the Statewide Strategy to Recover Salmon that rely on voluntary or incentive-based approaches to achieve desired outcomes. In the case of forest practices, objectives have been pursued since 1974 through the statewide regulatory program embodied in the Forest Practices Act and evolving forest practices rules. The new rules and other features of the Forests and Fish report will become in effect the default mechanisms. In addition, the proposal includes adaptive management measures to ensure objectives are met over time. Finally, federal regulatory agencies will implement their authorities to require ongoing achievement of the Forests and Fish report's goals.

Habitat is Key

Linking Land Use Decisions and Salmon Recovery

I. Current Situation: *Where are we now?*

Population growth experienced in Washington in the past 30 years has taken a toll on the state's environment and natural resources. The population increase has profoundly affected our natural resources, and impacts associated with development have drastically altered many natural habitats critical for salmon survival.

Urbanization has significantly affected small streams, riparian corridors and associated wetlands. A great percentage of spawning and rearing habitats in estuaries, wetlands and streams have been eliminated or degraded. The cumulative effects from years of human disturbance will take many years to turn around. The on-going challenge will be developing and implementing strategies in urban and rural areas to protect and restore habitat while accommodating population growth, and addressing economic viability in light of restrictions anticipated for salmon recovery.

The primary tools for regulating land development are the Shoreline Management Act and the Growth Management Act, supplemented by the State Environmental Policy Act. There are other state, federal and local laws and regulations that apply to various land use activities.

Several of these laws establish a shared responsibility between various local governments, between the state and local governments, and with tribal governments. In addition, there is a wide range of governmental entities and authorities with a role in land use and environmental decisions.

The current condition of many salmon populations suggests that most plans, programs and regulations are not yet fulfilling their goals to protect and preserve natural resources and the environment. Current knowledge and understanding of salmon protection and recovery requires that state and local plans and regulations be updated to include the best available science. In some instances, more restrictive regulations and/or economic incentives must be enacted to protect, preserve and restore salmon habitat. In many other cases, more effective implementation, mitigation, enforcement and rigorous monitoring of current regulations are required.

To effectively respond to the threat to salmon runs, land use issues must be addressed at the same time as other specific factors such as harvest, hatcheries and hydropower. No single governmental agency or private party will be

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able to solve this problem on its own. State, local and tribal governments and citizens must work together in a coordinated manner to change those land use practices that have the most detrimental impacts on salmon.

II. Goals and Objectives: *Where do we want to be?*

Goal

- Protect and restore fish habitat by avoiding and/or mitigating site specific and cumulative negative impacts of continuing growth and development.

Objectives

- All counties and cities will revise their Growth Management Act (GMA) plans and regulations by September 1, 2002, to include the best available science and give special consideration to the protection of salmon.
- Ensure implementation of land use practices that protect habitat and/or have no detrimental impacts on salmon habitat.
- Focus state and local land use and salmon recovery efforts first in areas with Endangered Species Act (ESA) listings and areas with potential for high quality habitat.
- Promote the use of local incentives and non-regulatory programs to protect and restore wetlands, estuaries and streamside riparian habitat.

III. Solutions: *What is the route to success?*

Counties and cities are required on a five-year cycle to review and, if needed, amend their comprehensive plans and development regulations to conform to the requirements of the Growth Management Act (GMA) and the Shoreline Management Act (SMA). In addition, all Critical Areas Ordinances must be developed using the best available science and give special consideration to the protection and conservation of salmon.

These requirements provide an excellent opportunity for local governments to upgrade the quality of GMA and SMA plans, programs and regulations. They also provide a higher level of protection of natural resources and remove or address any uncertainties local governments and private landowners face under the Endangered Species Act and the Clean Water Act. The state will provide guidelines for locals to use in meeting these requirements. The first review and revision of plans and regulations must be completed by September 1, 2002.

The state will seek collaborative decision-making and will provide incentives to encourage voluntary efforts, recognizing that there are minimum expectations that must be met. It will rely on better implementation and enforcement of existing laws to prevent continuation of land use practices that have negative impacts on salmon. Where gaps in existing laws are identified, new regulatory authorities will be sought.

Policy guidance: preserve, protect and restore

Our state's growing population has led to development that replaces vegetation, removes or destroys soil, changes surface drainage patterns, and covers the land with impervious surfaces. While we can reverse some of the effects of these developments, it is not feasible to undo many of them, such as replacing soil or removing roads and buildings.

It is therefore important that remaining high quality habitat is preserved, protection measures undertaken, and restoration and enhancement efforts begun. State and local governments will consider the following policy guidance when making land use decisions, reviewing and approving plans, adopting regulations and permitting developments:

- Preserve high quality habitat and salmon populations through various methods of land conservation.
- Protect aquatic ecosystems by using, enforcing and improving current laws, rules, guidance and incentives for planning, designing, constructing and maintaining new development and redevelopment.
- Restore or enhance degraded and impacted habitat

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Immediate actions

While local, state, federal and tribal governments are combining their efforts and resources to address the critical needs of salmon, interim measures must be taken immediately to prevent further harm to the species:

- Use the State Environmental Policy Act (SEPA) to specifically address salmon issues.
- Use existing permitting requirements, such as shoreline conditional permits, to protect habitat and mitigate project impacts.
- Fund preservation and restoration projects.
- Offer financial incentives to private landowners for preservation of critical areas.

Improve plans and regulations

- The state will adopt new shoreline guidelines based on scientific information, designed to protect and enhance shorelines' natural functions and values. Proposed key features include establishing vegetation management areas along all shorelines of the state, and increasing shoreline stabilization by restricting new, and removing existing unnecessary, shoreline armoring.
- The state will update procedural criteria to provide guidance on inclusion of best available science in critical areas ordinances and giving special consideration to salmon protection and conservation. These guidelines will assist counties and cities in making land use decisions and eventually reduce the number of legal appeals.
- The Washington Department of Fish and Wildlife's (WDFW) Priority Habitat and Species Program will be used to provide important information on fish, wildlife and habitat to landowners, land use planners, elected officials and other decision-makers. WDFW will assist local governments in identifying land use activities likely to affect critical fish habitat and will recommend measures to preserve or enhance fisheries.
- State agencies will provide model ordinances to help local governments address fish habitat protection and enhancement when in-filling urban areas, conserving rural lands and reducing natural hazards.
- Update and ensure implementation of stormwater management programs (see Managing Urban Stormwater to Protect Streams chapter).
- Revise floodplain management planning and funding criteria to reduce damages to life and property, save public money, improve water quality, restore habitat, and improve aesthetics and recreation. Coordinate and integrate flood management with other planning and regulatory programs.
- Use collaborative decision-making and improved scientific tools to link transportation planning with land use decisions and salmon recovery.
- Support additional funding of local and state activities.
- State agencies will provide other technical and financial assistance to local governments on use of non-regulatory programs, such as use of open space taxation, which offers property tax relief to private landowners who preserve important natural resources.
- Coordinate state, regional and watershed plans and programs with related local programs.

Incentives and regulatory actions to improve performance and implementation and increase compliance

- State, federal and local governments, tribes and private entities will coordinate salmon recovery efforts and focus priorities on those areas with listings and potential listings and high population growth.
- State will link salmon-related funds to local regulations by giving a preference to cities and counties that have taken actions that benefit salmon recovery efforts.
- The state will provide funds for local and state implementation monitoring and enforcement programs with clear expectations of results, and consequences if state agencies and local governments do not meet the expectations.
- Withhold capital facility construction funds from jurisdictions that have not adopted Critical Areas Ordinances that include best available science. Withhold funds for infrastructure and economic developments that could potentially harm salmon or delay recovery efforts.
- Local governments that fail to implement programs and regulations that include best available science and give special consideration for salmon protection and restoration will not be eligible to receive certain protections granted under the Endangered Species Act.

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IV. Monitoring and Adaptive Management: *Are we making progress?*

Monitoring is an essential element of the strategy. The state will do the following to assure that state and local actions achieve the expected results:

- Develop benchmarks; monitor and publish progress in the Governor's State of the Salmon Report.
- Incorporate monitoring and reporting programs into contracts for salmon-related grants.
- Continue to support and enhance data and information programs, such as the limiting factors analysis, and use Geographic Information Systems (GIS) to help local governments assess the impacts of existing and future land use decisions, evaluate cumulative impacts and trends, and make appropriate changes in land use practices.
- Implement default actions. State agencies will use their permitting, plans approval, and funding approval authorities and legal appeals to stop or restrict developments if local governments fail to meet the requirements to 1) review and update plans and regulations by September 1, 2002; 2) use best available science; 3) give special consideration to salmon protection and conservation; and/or 4) if no progress is made toward protection and restoration objectives.

Habitat is Key

MANAGING URBAN STORMWATER TO PROTECT STREAMS

I. Current Situation: *Where are we now?*

Studies show that increased surface flow of stormwater caused by land development has contributed to degraded salmon habitat. It's generally more effective and less expensive to prevent urban stormwater impacts on habitat than to retrofit existing development. Degradation of habitat from urban stormwater can be prevented or minimized by preserving high quality habitat or restricting where development occurs. Stormwater management programs and practices are only partially able to offset the degradation of salmon habitat caused by development. Retrofitting or upgrading stormwater facilities can be very expensive, take years to implement, and in most cases will not fully restore the habitat that existed prior to development.

The principal tools currently used by state and local governments to prevent or mitigate the negative impacts of urban stormwater on salmon habitat are either not fulfilling their goals to protect and preserve habitat or are not fully implemented. These tools are:

- The Growth Management Act (GMA) and Shoreline Management Act (SMA) — the implementation of both acts has not focused on stormwater management as a priority. They have not yet been sufficiently effective in preventing stormwater impacts from new development by controlling the geographic extent, location and intensity of development that degrades streams, wetlands and estuaries.
- The Puget Sound Water Quality Management Plan (PSWQMP) stormwater provisions — these apply only to Puget Sound, are essentially voluntary, and as of July 1998 have been fully adopted by only 31% of the affected local governments. The guidance provided to local governments in the current Puget Sound Stormwater Manual, particularly flow control requirements, is outdated and inadequate to protect salmon habitat.
- The National Pollutant Discharge Elimination System (NPDES) stormwater permit program — The NPDES stormwater permit program is a regulatory tool for urbanized areas under the Clean Water Act (CWA), designed to achieve both water quality and salmon habitat objectives. The permit requirements currently apply only to Seattle and Tacoma and the unincorporated areas of Snohomish, King, Pierce and Clark counties. The requirements do not apply to all storm drainage systems within those areas.
- The Hydraulic Project Approval (HPA) permit program — The program covers the review and approval of development projects that affect stream flows. However, the program has not been effective in monitoring and preventing cumulative impacts of stormwater on salmon habitat.

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Setting priorities for stormwater management to protect and restore urban streams and estuaries is necessary and must be done at the watershed level. A potential model for setting stormwater management priorities within the context of local watershed management has been developed and is being used by the Washington State Department of Transportation (WSDOT).

Financial and technical assistance is provided through many state and federal programs as incentives for watershed management, habitat protection and restoration. Although some technical and financial assistance for development of stormwater management programs has been available from the state, substantial funding needs related to local stormwater management are not yet addressed or are only partially addressed. Transportation projects include significant costs to mitigate impacts from stormwater. An estimated 5% of state and federal highway construction funds are being spent on stormwater conveyance and treatment systems and related items, such as land acquisition. Additional funding has been provided by the 1999 legislature to WSDOT for stormwater.

II. Goals and Objectives: *Where do we want to be?*

Goals

- Prevent negative impacts on salmon habitat and water quality caused by urban land development and changes in stormwater flow.
- Mitigate impacts of urban stormwater and restore habitat where impacts occur.

Objectives

- Prevent urban stormwater impacts on salmon habitat by preserving remaining high quality habitat, based on a priority system for streams, wetlands and estuaries in urban and urbanizing areas.
- Use growth management planning tools to control where and to what extent development is allowed.
- Encourage and support all cities and counties within the Puget Sound region, and in other areas of the state where urban stormwater contributes to the decline of salmon, to adopt and implement stormwater management programs.
- Research, demonstrate and implement improved designs for new land development and redevelopment that will prevent urban stormwater impacts on salmon habitat.
- Retrofit stormwater controls for existing development and rehabilitate streams in priority areas as needed to reduce stormwater impacts on critical salmon habitat.

III. Solutions: *What is the route to success?*

Assistance and incentives for voluntary action

- The Department of Community, Trade and Economic Development (DCTED), the Department of Ecology (Ecology), and the Puget Sound Water Quality Action Team (PSWQAT) will use financial incentives and technical assistance to promote local governments' adoption and implementation of the stormwater program elements of the Puget Sound Water Quality Management Plan (PSWQMP). Programs which maximize salmon habitat protection and restoration, and which are consistent with local watershed management priorities, will have funds directed to them from existing grants and loans.
- The state, using financial and technical assistance, will encourage local watershed management processes to identify high quality habitat for preservation or protection through a variety of means, such as purchase of development rights or conservation easements, and will establish priorities for habitat restoration.
- The state will work with federal and local governments to identify new funding as an incentive to implement and enforce local stormwater management programs and ordinances that are adopted and consistent with the PSWQMP. Overall priorities for salmon recovery and priorities identified through local watershed management processes or adopted by the Salmon Recovery Funding Board will be the drivers for identifying specific funding needs and for making funding allocation decisions.

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- Transportation projects impact salmon habitat by increasing stormwater runoff. Funding is being provided to mitigate the environmental impacts of road construction, to retrofit and upgrade stormwater controls associated with state highways and roads and local transportation projects.
- Current local authority and options for funding stormwater programs need to be expanded. For example, the statutory authority of regional and local jurisdictions to establish and fund stormwater utilities and stormwater management activities needs to be clarified.
- Ecology will enhance technical assistance on stormwater management to local jurisdictions within the Puget Sound Basin and will begin providing technical assistance outside the Puget Sound area. This is contingent upon additional funding for technical staff.
- State and local governments will collaborate to seek and coordinate federal, state and local funding to support research and demonstrate the effectiveness of best management practices for stormwater, including building and site development practices. Opportunities for funding coordination include the Centennial Clean Water Fund, Salmon Recovery Funding Board, Transportation Equity Act for the 21st Century, and others.

State guidance and regulatory actions

A key in the strategy for urban stormwater is to improve state guidance and regulatory tools so they are accepted by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service as measures of the adequacy of stormwater management programs in relation to salmon recovery and ESA requirements. Over the next year the state will be working on the activities described below:

- DCTED will develop guidance to local governments on land development practices and growth constraints necessary to preserve salmon habitat and prevent stormwater impacts.
- The Puget Sound Water Quality Action Team will upgrade the elements of local stormwater program in the Puget Sound Water Quality Management Plan (PSWQMP) by July 2000. Local governments in the Puget Sound Basin will have two years to make their stormwater programs consistent with the amended plan.
- Ecology will improve and update the stormwater technical manual and will expand its scope to include guidance for areas of the state outside the Puget Sound Basin. After the manual is updated in the year 2000, local governments will have two years to make their stormwater programs consistent with the manual.
- Ecology will strengthen NPDES permit requirements and enforcement to incorporate standards for new development; require commitments to retrofitting in priority areas and to operation and maintenance of stormwater facilities; and to implement new expanded federal Clean Water Act (CWA) requirements and enforce where appropriate.
- The Washington Department of Fish and Wildlife (WDFW) will improve the Hydraulic Project Approval program's capability to monitor and prevent cumulative impacts from projects affecting stream flows.
- Where the basic or comprehensive PSWQMP stormwater programs have not been adopted by local jurisdictions as scheduled, state agencies will consider which state authorities and regulatory tools should be applied and enforced to protect salmon habitat.

IV. Monitoring and Adaptive Management: *Are we making progress?*

Adoption and implementation of local stormwater programs consistent with or equivalent to the PSWQMP and compliance with NPDES stormwater permits will be monitored. The effectiveness of stormwater management practices, particularly new practices, will also need to be monitored.

After evaluating progress in achieving urban stormwater objectives as of September, 2002, the state will pursue the following actions for jurisdictions that have failed to implement stormwater programs and, outside the Puget Sound region, where stormwater has been identified as a limiting factor:

- Mandate the adoption and implementation of the basic PSWQMP stormwater program elements. This will require expanding NPDES stormwater permit requirements to apply to any jurisdictions within Puget Sound or to jurisdictions outside Puget Sound that have not adopted or implemented local basic stormwater programs as called for in the Strategy.
- Propose legislation amending the Shoreline Management Act or Growth Management Act (GMA).

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- Further strengthen state water quality standards to incorporate additional biological and physical criteria.
- Amend the Washington Uniform Building Code to incorporate building and site design standards and construction specifications.

Habitat is Key

ENSURING ADEQUATE WATER IN STREAMS FOR FISH

I. Current Situation: *Where are we now?*

Lack of stream flow to sustain healthy production levels is a key factor contributing to the poor status of wild fish stocks. Streams and rivers in several basins used by salmon are over-appropriated, meaning more water is being withdrawn for uses such as irrigation, when flows are naturally low and when fish need water.

Allocation of water in the state is based on a first-come, first-served basis. To address the needs of fish and ensure that water is set aside for that purpose, instream flows are established by rule for the amount of water required by fish. However, most major development in and around water occurred before instream flows were established, making water for fish “junior” in right to pre-existing water diversions. In addition, fewer than one-third of Washington’s major rivers have had instream flows set by rule, and the few streams that have instream flows established frequently don’t meet the intended goals. For example, the existing instream flows in the Cedar River in King County are not met 81 days out of the year — and the number is increasing.

No instream flows have been set in Washington since 1985. Meanwhile, the state’s population has increased by 30% and nearly 20 salmon runs have been listed under the Endangered Species Act.

II. Goals and Objectives: *Where do we want to be?*

Goal

- Retain or provide adequate amounts of water to protect and restore fish habitat.

Objectives

- Establish instream flows for watersheds that support important fish stocks.
- Protect and/or restore instream flows by keeping existing flows and putting water back into streams where flows are diminished by existing uses — especially illegal or wasteful uses or by poor land use practices.

III. Solutions: *What is the route to success?*

Ensuring adequate water for fish requires a collaborative, incentive-based approach, taking immediate actions where needed, using strong enforcement of current regulations, ongoing monitoring, and implementing default actions when collaborative efforts fall short of expectations. This will be done within a priority framework based on fish stock status, water availability and conditions, and population growth. In addition, where gaps or legal conflicts with the goals exist, appropriate legislative solutions will be actively pursued.

Instream flows will be established, protected and restored as follows:

Flows will be established in priority watersheds with ESA listings and in watersheds with healthy fish stocks and high population growth pressure.

- Review and revision of existing instream flow rules, including closures, will be a lower priority, but will be accomplished within a set schedule, focusing first where flows are inadequate.
- Until instream flows are set, either no new water rights will be issued (except for public health and safety emergencies) or interim instream flows will be set. Groundwater connected with surface water will be treated as a surface water source, subject to the same restrictions.

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Flows will be protected through effective monitoring and enforcement of established instream flows.

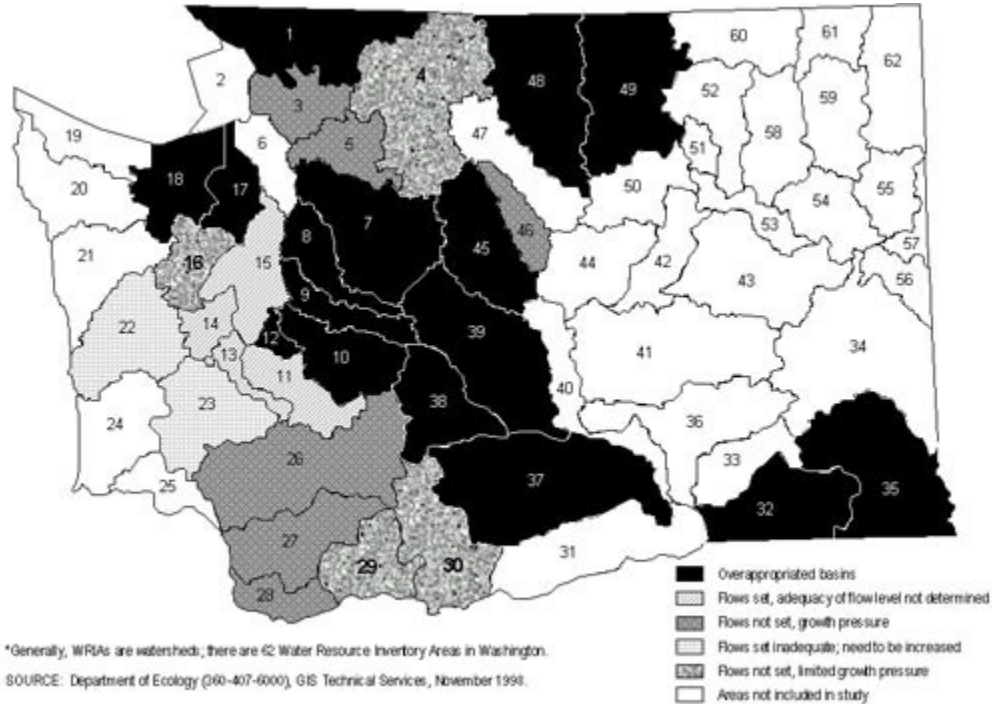
- Future water right permits and changes to water rights, if approved, will be conditioned with instream flows.
- Stream gauges will be monitored to determine when instream flows are not being met. Instream flows will be protected by regulating affected water rights when the flows are not met.
- Enforcement against illegal uses and restriction of withdrawals from exempt wells contributing to flow problems will be implemented.

Flows will be restored through a variety of means to put water back in streams.

- Flow restoration will be the primary objective in watersheds where flows are diminished by existing uses.
- Each watershed supporting listed fish stocks will have in place a comprehensive strategy for restoring instream flows.
- Innovative tools, such as water banking, will be explored and supported as appropriate.
- Applications for grants of public funds for fish screening, diversion passage correction, water conservation, etc., will receive priority where the project includes a return of water for instream flows.
- Public leasing or purchasing of senior water rights for instream flows will be pursued aggressively.
- Water conservation and water reuse will be emphasized to augment stream flows and reduce the demand on streams and groundwater.
- State approvals for hydropower projects will be conditioned with instream flow releases. (See Hydropower and Fish: Pursuing Opportunities chapter.)
- Enforcement will be carried out against unauthorized diversions, unauthorized uses and waste of water.

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**62 WATER RESOURCE INVENTORY AREAS (WRIAs)
 IN WASHINGTON**



- | | | | |
|-------------------------|--------------------------|----------------------|--------------------------|
| 1 Nooksack | 16 Skokomish-Dosewallips | 32 Walla Walla | 48 Methow |
| 2 San Juan | 17 Quilcene-Snow | 33 Lower Snake | 49 Okanogan |
| 3 Lower Skagit-Samish | 18 Elwah-Dungeness | 34 Palouse | 50 Foster |
| 4 Upper Skagit | 19 Lyre-Hoko | 35 Middle Snake | 51 Nespelem |
| 5 Stillaguamish | 20 Soleduck-Hoh | 36 Esquatzel Coulee | 52 Sanpoil |
| 6 Island | 21 Queets-Quinault | 37 Lower Yakima | 53 Lower Lake Roosevelt |
| 7 Snohomish | 22 Lower Chehalis | 38 Naches | 54 Lower Spokane |
| 8 Cedar-Sammamish | 23 Upper Chehalis | 39 Upper Yakima | 55 Little Spokane |
| 9 Duwamish-Green | 24 Willapa | 40 Alkali-Squilchuck | 56 Hangman |
| 10 Puyallup-White | 25 Grays-Elokoman | 41 Lower Crab | 57 Middle Spokane |
| 11 Nisqually | 26 Cowlitz | 42 Grand Coulee | 58 Middle Lake Roosevelt |
| 12 Chambers-Clover | 27 Lewis | 43 Upper Crab-Wilson | 59 Colville |
| 13 Deschutes | 28 Salmon-Washougal | 44 Moses Coulee | 60 Kettle |
| 14 Kennedy-Goldsborough | 29 Wind-White Salmon | 45 Wenatchee | 61 Upper Lake Roosevelt |
| 15 Kitsap | 30 Klickitat | 46 Entiat | 62 Pend Oreille |
| | 31 Rock-Glade | 47 Chelan | |

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Locally based collaborative watershed management efforts will be supported if they address establishing, protecting and/or restoring instream flows within a reasonable time.

- Solutions will be tailored specifically for each watershed.
- Deference will be given to collaborative watershed management efforts to establish, protect and restore instream flows, but not if delays risk the extinction of wild salmonids.

Certain requirements, intended to apply in all watersheds with ESA listings or potential listings, will be implemented first in the highest priority watersheds. The requirements include:

- Metering and reporting of diversions and withdrawals by all water users.
- Implementation of water conservation and use of reclaimed water where feasible.
- Strategic enforcement against illegal uses (including wastage).

Immediate actions will be pursued on a priority basis:

- To avoid further decline in fish stocks, the state will collaborate with local groups to identify and implement actions that need to be taken immediately.
- Immediate actions could include restricting use of exempt wells, enforcing against excessive waste of water and illegal water uses, and requiring strict water conservation measures and water use standards.

IV. Monitoring and Adaptive Management: *Are we making progress?*

The state will closely monitor the progress of both its own efforts and that of local watershed groups developing solutions to instream flow problems. Performance indicators to be tracked and reported include:

- Number of watersheds (Water Resources Inventory Areas - WRIAs) with instream flows established by rule.
- Number of watersheds with instream flow protection and/or restoration programs implemented.
- Number of watersheds with adequate instream flows (i.e., meeting the needs of fish).
- Default actions will be identified and used when a local collaborative process fails or is unable to address the establishment, protection and restoration of instream flows in a timely manner.
- Default actions could include closing or withdrawing basins from further appropriation, restricting the use of exempt wells, mandating the implementation of water conservation and water use efficiency practices, and pursuit of additional state, federal and local regulatory avenues where appropriate.

Habitat is Key

Clean Water for Fish: Integrating Key Tools

I. Current Situation: *Where are we now?*

Many Washington waters are not clean enough to meet standards for water and sediment quality and are causing harm to salmon. Although municipal wastewater and industrial discharges require increasingly intense treatment under the Clean Water Act (CWA), many water bodies still fail to meet standards. Point and nonpoint sources of pollution, individually and in combination, affect aquatic resources, especially fish. Pollution sources include agriculture, forestry, stormwater and municipal discharges, as well as runoff that carries bacteria, toxins and excess nutrients.

Washington is currently launching two significant and parallel environmental initiatives: development of a statewide plan for salmon recovery and development of cleanup plans for polluted water bodies. These two initiatives are governed by separate federal acts — the Endangered Species Act (ESA) and the Clean Water Act (CWA) — that have historically been powerful tools for change, with varying degrees of success. The two acts have seldom been applied concurrently to the same activity or issue. But because water quality and habitat conditions are largely governed by human activities, it is imperative that the state and federal agencies administer these laws and develop the salmon recovery and water cleanup plans in a coordinated, consistent and complementary fashion.

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The federal Clean Water Act requires the state to establish standards for specific pollutants in water bodies, prepare a list of water bodies that do not meet water quality standards, and develop water cleanup plans, or Total Maximum Daily Loads (TMDL), for each of the polluted water bodies. The implementation of these requirements is critical to protection and restoration of salmon habitat.

The Environmental Protection Agency (EPA) and the state of Washington were sued for allegedly not making satisfactory progress in assessing water quality and developing water cleanup plans. The plaintiffs and the agencies negotiated a settlement agreement and consent decree that was filed in federal court in January, 1998.

The primary outcome of the settlement was the establishment of a schedule for the state to develop and begin implementing cleanup plans for each of the nearly 670 marine and freshwater bodies identified on the state's 1996 pollution list.

The cleanup plans, or TMDLs, are a calculation of the capacity of a water body to assimilate pollution without violating water quality standards, and an allocation of that capacity to various point and nonpoint discharges. Implementation plans to achieve reductions that address timing and methods of pollution control, tracking, monitoring and adaptive management are required.

The majority of the cleanup plans will address pollutants that adversely affect salmonids, including toxics, as well as more common pollutants such as elevated temperature and depleted oxygen.

II. Goals and Objectives: *Where do we want to be?*

Goal

- Restore and protect water quality to meet the needs of salmon.

Objectives

- Revise and implement water quality standards to respond to aquatic ecosystem needs.
- Implement water cleanup plans for water bodies in ESA listed areas first.
- Implement nonpoint source "best management practices," and nonpoint action plans.
- State and federal agencies will integrate the Endangered Species Act (ESA) and Clean Water Act (CWA) to offer agencies and landowners a predictable, practical and coordinated process to meet the needs of both laws.

III. Solutions: *What is the route to success?*

Ensuring clean water for fish requires agreement on a common set of performance measures (e.g., water quality standards), implementation of conservation practices through regulatory and voluntary actions, and monitoring.

Water quality standards

- The state will adopt, collaboratively with the Environmental Protection Agency (EPA), the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS), revised surface water quality standards.
- The state will implement the revised standards, relying on water cleanup plans, waste discharge permits, nonpoint pollution action plans, enforcement and funding.

Water clean-up

- The state will accelerate the development and implementation of water cleanup plans for water bodies listed under ESA and CWA. This will be done in conjunction with other watershed planning efforts underway at state and local levels, including planning under the Watershed Planning Act.
- The majority of cleanup plans will address pollutants that adversely affect salmon such as elevated water temperature and sediments. Priority will be given to development of water cleanup plans that protect salmon.

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- To implement the cleanup plans the state will rely primarily on existing regulatory and voluntary programs, such as waste discharge permits, programs for cleaning up contaminated sediments, nonpoint source “best management practices,” inspections and enforcement. Existing water quality programs will be better focused and enhanced to implement cleanup plans and improve water quality.
- Additional funding to implement the settlement agreement is needed. Ecology will continue to work with legislative committee members, their staffs and consultants, as well as other agencies and stakeholders, to identify and resolve program and funding concerns.
- The state will finalize and submit to EPA and to the National Oceanic and Atmospheric Administration (NOAA) Washington’s Nonpoint Management Plan as required by the Clean Water Act and Coastal Zone Act reauthorization.
- The state will enhance the implementation of nonpoint source “best management practices” by state and local governments and private landowners to ensure a focus on and a commitment to meeting water quality standards.
- The state will encourage voluntary activities to address water quality problems. Immediate corrective and compliance actions will be taken by the state where appropriate.

ESA and CWA integration

- The focus will be on reaching a commitment of certainty for landowners and governmental agencies under the ESA and CWA. Certainty will require agreement on the goals, science-based criteria and targets, timeframes for implementation, and results expected.
- The state departments of Ecology, Fish and Wildlife, and Natural Resources will continue discussions with regional representatives from the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (USFWS), the Environmental Protection Agency (EPA) and with tribes to examine the issues, develop options and identify solutions for integration of ESA and CWA.
- The Governor’s Office will seek agreement from the White House Administration with the solutions reached regionally. Ecology and other state agencies will implement the agreements reached regarding ESA and CWA integration.

IV. Monitoring and Adaptive Management: *Are we making progress?*

The state will:

- Track progress toward implementation and resolution of the Endangered Species Act and Clean Water Act integration issues.
- Continue to conduct ambient monitoring and perform water quality assessments every two years, or as required by EPA, using its own data and other available data, to determine compliance with water quality standards.
- Along with local governments, identify and implement opportunities for enhancements to existing water quality programs to improve and prevent degraded water quality.
- Annually track the development and completion of cleanup plans against the targets set in the settlement agreement.
- Conduct effectiveness monitoring to evaluate the success of water cleanup implementation strategies in meeting water quality standards. If progress toward meeting water quality standards is inadequate, the implementation strategies will be evaluated and revised.

Should the state not develop the required water cleanup plans, the default is for the federal Environmental Protection Agency to develop and implement the required plans.

If the ESA and CWA integration issues are not satisfactorily resolved, the state would likely lose support for completing the water cleanup plans. The plans would then be developed by the federal EPA. If satisfactory progress is not made, it is also likely that further legal action would be pursued by the plaintiffs in federal court.

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Habitat is Key

Fish Passage Barriers: Providing Access To Habitat

I. Current Situation: *Where are we now?*

Salmon need access to spawning and rearing habitat. More than 100 years of human development in Washington's rivers and streams has created numerous physical barriers, interrupting adult and juvenile salmonid migrations in many watersheds. Barriers include culverts, diversion dams, debris jams, dikes, stream gradient, and other human-caused stream changes.

There are approximately 170,000 miles of public and private roads in the state. Only a fraction of these roads have been inventoried for fish passage barriers, and most of the inventories that have been completed are not prioritized from a watershed perspective.

Design of barrier corrections is site specific. There is limited availability of individuals with the expertise to organize and conduct fish passage inventory, design and construction.

Funding for barrier correction in the past has been insufficient to address the problem. The median barrier correction cost is approximately \$100,000. It will take time and funding to correct the multitude of barriers around the state; however, barrier corrections and screening programs are being implemented by state, federal and local governments, as well as private landowners.

II. Goals and Objectives: *Where do we want to be?*

Goal

- Ensure that usable or restorable habitat is accessible to wild salmon by removing existing barriers, preventing creation of new barriers, and screening all diversions.

Objectives

- Complete watershed-based inventories and prioritization of fish passage problems.
- Correct existing barriers and screen diversions and prevent new passage problems.
- Create a comprehensive long-term funding strategy that uses federal, state, local and private dedicated funds and project mitigation funds to expand correction programs and monitor effectiveness of those programs.
- Use volunteer-based organizations where appropriate to gain the best use of limited funds.
- Develop better understanding of fish passage needs, especially juvenile salmon migration habits and needs.
- Integrate fish passage and screening activities into implementation of watershed planning and other planning and restoration efforts.

III. Solutions: *What is the route to success?*

Although barrier correction programs are in place, a comprehensive program is needed to better understand the extent of the problem, to determine the priority of addressing fish passage versus other limiting factors in a particular watershed, and to monitor the effectiveness of barrier correction programs. To assure that the goal is met, the following actions will be taken:

Watershed-based inventory and prioritization:

- Use the manual recently completed by the Washington Department of Fish and Wildlife (WDFW) that details the protocol for locating, assessing and prioritizing barriers, and for conveying the necessary information to WDFW for incorporation into a centralized database.
- Expand inventory and prioritization of barriers on state lands and facilities (i.e., state highways).

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- Support fish passage inventory and prioritization efforts by counties and cities.
- Implement the element of the Forest and Fish Report which calls for inventory and assessment of barriers caused by forest roads. Fish passage concerns will also be included in the state Forest Practices Rules.
- Complete the limiting factors analysis for watersheds within the seven Salmon Recovery Regions.
- Continue to collect information and data on known and potential barrier and screening problems and locate them on a Geographic Information System (GIS).

State actions for correcting and preventing fish passage problems:

Address correction and prevention of fish passage problems comprehensively.

- The state will collaborate with the tribes, federal and local governments, irrigation districts, public utility districts and private landowners to identify, correct and/or remove human-caused fish passage and screening problems in freshwater, floodplain and estuarine habitats. The effort will also include continuous monitoring and maintenance of existing structures. This effort will be integrated into existing watershed management efforts.

Standardize fish passage design.

- WDFW engineers have completed a design manual. The agency will facilitate training and technical assistance to those conducting design work on fish passage barrier corrections.

Better understand fish passage and screening needs.

- Continue ongoing training and education programs to make professionals aware of current fish passage and screening statutes, barrier identification, prioritization and design criteria.

Advance knowledge about juvenile migration and design flows for passage.

- Culverts that are currently designed for adult migration may be insufficient for juvenile migration. For some species, little is known about the needs and extent of upstream movement and timing of juvenile salmonids. This knowledge is essential to the design of a comprehensive recovery strategy and determination of design flows for passage. To increase potential for success, juvenile passage design standards need to be developed and additional design options made available to those designing and conducting passage correction work.

Enhance efforts to streamline permitting process.

- House Bill 2879 passed in the 1998 legislative session allows permit streamlining for salmon habitat recovery projects, enabling some projects to move forward quickly. (See Permit Streamlining chapter.)

Use volunteers to support state and local efforts.

- The state and its partners must promote correction efforts through the direct involvement of citizens who live and work within watersheds. The state will enlist volunteers and coordinate programs that involve hands-on salmon restoration efforts combining stream restoration with barrier removal and fish screening.

Use of enforcement and incentives.

- The state will cost-share installation of screens to reduce hardships to landowners. Projects integrated with other watershed efforts may receive additional priority. A regulatory approach will be used in cases where harm to salmon is evident and the landowner resists compliance.

Implement a comprehensive funding strategy.

- State and federal funding has been provided for fish passage barrier identification and removal. State and federal funding will be coordinated and targeted through the newly created Salmon Recovery Funding Board to address priorities. Funding for a fish passage correction program on state facilities (WSDOT highways and roads) provided by the legislature will be also coordinated.

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IV. Monitoring and Adaptive Management: *Are we making progress?*

Monitoring the success of barrier removal projects has had little attention. Baseline and post-correction data must be collected and analyzed through an established funded program. The monitoring program will include the following:

- Establish a procedure for review of corrected problems and progress of correction programs to ensure effectiveness.
- Sample corrected barriers to determine upstream and downstream migration by adults and juveniles and sample screened diversions to ensure fish protection.
- Standardize fish barrier and diversion databases, coordinate data collection and centralized data access, and coordinate work among watershed planners, road managers, resource agencies, tribes and non-governmental organizations within watersheds. The priorities of all barriers and diversions can be compared and the most cost-effective projects done first.
- Develop and maintain a GIS-based, Internet accessible database of fish blockages and diversions statewide.

Harvest

Harvest Management to Meet the Needs of Wild Fish

I. Current Situation: *Where are we now?*

Fish harvest management plays a critical role in developing and implementing a comprehensive strategy for protecting and restoring wild salmon. Greater harvest controls are being undertaken to complement habitat protection and restoration efforts. The Washington Department of Fish and Wildlife (WDFW) and northwest treaty Indian tribes developed the Wild Salmonid Policy (WSP) to provide leadership and a commitment to fish management that ensures sufficient wild spawners escape fisheries and reach spawning grounds. In addition, the Pacific Fishery Management Council in 1998 adopted a revised Salmon Management Plan, affecting stocks in California, Oregon and Washington that strengthened requirements for stock status monitoring and put in place strict rules for preventing overfishing, and correcting overfishing when it occurs. Regional state-tribal fishery management plans throughout the state are being reviewed and revised in order to implement harvest and hatchery management plans consistent with wild salmonid recovery.

Many Washington salmon populations are abundant and have surplus production that can be harvested to support the many commercial, cultural, economic and recreational benefits and values traditional in the Pacific Northwest. We must ensure that, while pursuing those healthy, harvestable fish, harvest occurs in ways that minimize impacts on depleted populations and provide adequate spawning populations. For example, the presence of adipose-clipped hatchery steelhead, coho and chinook in fisheries can and are providing the ability to selectively harvest hatchery fish with lower impacts to wild fish.

Still, we must be mindful that it's not necessarily how many fish that spawn (though there clearly must be adequate numbers of spawners), but how many adults are produced from those spawners that determines whether fish populations will rebuild. Where habitat productivity and access are adequate and the genetic resources of the wild population have been maintained, sufficient numbers of wild spawners to the stream will recover wild stock abundance. However, where habitat is poor, providing an adequate number of spawners may not be as important as increasing the productivity of those spawners in their habitat. For this reason, it is vital that harvest management and habitat management be closely linked.

To allow sufficient numbers of wild spawners to escape harvest, managers use a variety of tools to determine the total estimated run size and the allowable numbers of fish that can be caught. The key to sound harvest management is the ability to: 1) target harvest on wild stocks with surplus production, and 2) produce and harvest hatchery fish in ways that protect weaker stocks until their productivity improves. Recent actions to improve harvest management include:

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- Comprehensive management planning by the state and Puget Sound tribes to develop a species management framework for coho, with accompanying guidelines on exploitation rates and fishery regimes. This is one of the first salmon species activities in Washington to incorporate harvest, hatchery and habitat issues into one comprehensive plan.
- State and tribal staffs are currently developing a Comprehensive Chinook Management Plan for Puget Sound. This framework will provide the basis for the National Marine Fisheries Service to develop a “4(d) rule” under the Endangered Species Act (ESA) that authorizes and limits “take” that will actively support the recovery of Puget Sound chinook under ESA and further rebuild runs to levels that will provide sustainable harvest opportunities. A comprehensive review and development of appropriate fishery impact guidelines is a cornerstone of this effort.
- U.S. — Canada Pacific Salmon Treaty: In 1998 the “Locke/Anderson Agreement” between Washington and Canada broke through a major impasse in the Pacific Salmon Treaty process by striking an agreement that: (1) reduced impacts on Fraser River coho; (2) reduced impacts on Puget Sound chinook; (3) will provide Canadian support for Washington’s mass marking and selective fisheries initiative; and (4) provides for a more active collaboration between the two countries in planning annual fisheries to protect depleted salmon populations. This breakthrough was followed in 1999 by newly renegotiated fishing agreements between the two countries. The new annex significantly reduces Canadian chinook fishery impacts on Puget Sound stocks from the treaty’s original provisions in 1985, and establishes for the first time an abundance-based approach for determining Canadian coho harvests.
- The “U.S. vs. Oregon Columbia River Fisheries Management Plan” is currently being reviewed and negotiated by the states, tribes and federal government to implement appropriate changes in harvest and hatchery approaches.
- Fisheries that differentially harvest healthy stocks or species have been expanded from past years. The first use of the adipose-clipped mass marking for marine coho salmon sport fisheries occurred in 1998 in the Columbia River and adjacent marine area. In 1999 these selective recreational coho fisheries were expanded to all Washington ocean areas, the Strait of Juan de Fuca and South Puget Sound.
- In 1998 and 1999, most chinook retention was prohibited in the Strait of Juan de Fuca and northern Puget Sound fisheries because hatchery and wild fish could not be differentiated.
- Puget Sound commercial sockeye fisheries in 1998 were constrained to limit impacts on other species, notably chinook. These limitations continue in 1999 with new fishing measures required to reduce release mortalities by non-Indian purse seine fishers and a log book program implemented in non-Indian commercial fisheries, verified by WDFW on-water bycatch monitoring efforts.
- Commercial salmon fishery restructuring: WDFW, in cooperation with NMFS, completed a \$4.5 million salmon license buyback program in 1998 that continued to address the over-capitalization in Washington’s commercial fishing industry. The program retired 391 licenses, representing a 17% reduction in current Puget Sound licenses. Furthermore, as a result of recent Pacific Salmon Treaty renegotiations, WDFW and the commercial stakeholders are poised to further reduce the commercial fleet to a sustainable level.
- WDFW, as mandated in ESHB 1309 and SB6150, recently completed an evaluation of the capacity of current and alternative fishing methods and gears to release non-target species with low mortality and transform fishing methods to become more selective in protecting depleted species and stocks. They’ve also completed a report assessing the current status of resident fish resources, major activities and accomplishments, and noting problems and strategies to address in the future.

Many forces drive how the state manages fisheries harvest, including state policies, court orders, treaties, and annual fish harvest negotiations. Significant reforms have, and are continuing to take place to accommodate needs of wild fish. WDFW, tribes and federal fish managers will continue to work together to ensure all elements of protection and recovery are integrated to produce long-term resource health.

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II. Goals and Objectives: *Where do we want to be?*

Goal

- To protect, restore and enhance the productivity and diversity of wild salmonids and their ecosystems to sustain ceremonial subsistence, commercial, and recreational fisheries; non-consumptive fish benefits; and other related cultural and ecological values.

Objectives

- Stewardship of salmonid populations will be the first priority in managing the resource.
- Status and productivity of wild salmonid populations and their habitats will be regularly monitored to evaluate the performance of protection and recovery actions.
- Fishery approaches will be implemented and evaluated to protect depleted populations while providing more stable and sustainable access to healthy species and stocks.
- Commercial and recreational fisheries will continue to be restructured to improve their stability, management and profitability.
- Washington will work with Canadian, tribal, federal and other state managers to resolve the inter-jurisdictional impediments to salmon recovery.

III. Solutions: *What is the route to success?*

The Wild Salmonid Policy (WSP) provides the blueprint for ensuring fish population management meets the needs of wild fish. Significant policy guidance is provided in the WSP covering spawner escapement, genetic diversity, ecological interactions, incidental catch and use of selective fisheries.

New activities in harvest management define the changing face of fishery management, and describe how WDFW intends to meet the obligations outlined in the Wild Salmonid Policy.

Short-term implementation will revolve around ESA compliance and WSP objectives, and includes:

- Initial frameworks and associated ESA 4(d) rule proposals for harvest, hatcheries and assessment activities will be completed in 1999 for Puget Sound chinook and Hood Canal/Strait of Juan de Fuca summer chum in cooperation with NMFS and the tribes. The harvest, hatchery and assessment elements of watershed recovery plans will be completed in 2000 for Nooksack, Dungeness and Elwha chinook within Puget Sound. These plans/rules will include specific limitations on harvest impacts for listed stocks.
- During 1999 and 2000, transitional management plans will be completed for lower Columbia River coho and chinook, Willapa Bay coho and chinook, Nooksack coho, and South Puget Sound coho that outline specific timelines for specific harvest and hatchery actions that will meet the intent of the Wild Salmonid Policy.
- Implementation of chinook mass marking will continue during 1999 and 2000 for major portions of Washington. Selective fisheries will be implemented for marked hatchery coho. A comprehensive coho management plan will be fully evaluated for adoption.
- The commercial license buyback begun in 1998 will be continued and expanded with plans developed for additional license reduction, depending on funding.
- Incentives and opportunities for selective commercial fisheries will be implemented in several areas throughout the state; as funding is available, effectiveness of new approaches will be evaluated through increased bycatch monitoring.
- The Salmon and Steelhead Stock Inventory (SaSSI) will be updated. Plans will be implemented to link habitat inventory and assessment data with population status information through an integrated Salmon and Steelhead Habitat Information and Assessment Project (SSHIAP)/SaSSI system.

Long-term actions include restructuring recreational and commercial fisheries to increase the ability to protect depleted stocks and species while improving sustainable access to hatchery fish and healthy species. New statewide smolt monitoring and habitat inventory programs will provide the tools to measure performance of specific habitat, hydropower, harvest and hatchery actions.

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IV. Monitoring and Adaptive Management: *Are we making progress?*

Effective monitoring and evaluation is necessary to track progress toward recovery goals. Progress in recovery ultimately will be determined by the abundance of naturally produced salmonids in functional ecosystems that are well adapted and have high reproductive performance. Fish managers have a variety of tools available for evaluating stock status and rebuilding. Two basic monitoring elements are annual counts of adult spawner abundance relative to the spawner escapement goals, and measures of stock productivity, such as the number of fish from a particular stock that is harvested and the numbers of juvenile fish produced. Updates of the Salmon Stock Inventory (SaSI) provide another essential tool to measure the progress and effectiveness of harvest management changes.

In addition, recovery progress can be measured by the reduction of risks and hazards identified in the Wild Salmonid Policy and other recovery and comprehensive management plans. For example, if the size and age decline of salmonids is being caused by fishing practices, then management changes which reduce the pressures for decline can be monitored by the reduced risk to stocks where those management actions have taken place. Also, changes and responses to harvest management actions among populations could be measured by protecting some populations from effects of harvest using a “sanctuary” approach.

Key components for measurement are:

- Accurate catch and bycatch accounting;
- Enumeration of spawners;
- Differentiation of hatchery and wild origin fish in fisheries and on the spawning grounds;
- Measurements of juvenile and adult freshwater and marine survival/production;
- Adequate coded wire tag sampling; and
- Evaluation of genetic characteristics.

Specific actions in all monitoring and evaluation categories have been developed and include:

Implementation

- identify a sufficient number of natural production monitoring sites in each ESU
- review SASSI designations and determine additional data needs
- monitor fishery impacts on populations and associated biological characteristics
- review the effectiveness of existing recovery programs
- establish spawning goals for stocks in all areas that have existing or recoverable habitat
- assess the watershed distribution of juveniles and adults
- examine the diversity of genetics and life-history characteristics
- compare program modification pace with timelines

Strategy effectiveness

- annual determination of changes in the stock status of wild fish populations statewide (SaSI update)
- annual reviews of recovery program effectiveness toward goal of ending the need for a particular activity
- contrast stock status with recovery plan expectations
- determine if changes in stock life-history attributes lead to increased productivity
- evaluate the effectiveness of targeted fisheries providing harvest while protecting certain stocks

Validation

- examine the freshwater productivity and marine survival of selected wild stocks
- examine the reproductive success of adults produced through recovery programs
- determine if harvest rate changes are sufficient to meet rebuilding time frames
- ascertain if fishery benefits have changed due to wild stock recovery efforts
- evaluate the harvest rate and distribution information provided from coded wire tag indicator stock or other programs

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Default strategies

If strategies designed to protect and/or restore wild salmonids are not successful, then alternative actions need to be taken. The type of response must be directed at those factors limiting recovery. For instance, if a fishery management action has had its expected effect but spawning populations are not increasing because habitat productivity is degraded, the need for more effective habitat protection and/or restoration strategies would be indicated. This highlights the critical need to implement and evaluate integrated harvest, hatchery and habitat actions where cause and effect responses can be measured.

In any case, the default actions outlined below assume that the harvest or monitoring action is not having its desired effect or is not being implemented as planned. The magnitude of response is related to the level of risk and uncertainty of meeting desired recovery objectives. In many cases, severe harvest restrictions already have been implemented and the only alternative available for increased protection would be complete closure. If state and tribal managers did not meet their commitments and obligations as outlined in this chapter, the most severe consequence would occur in areas affected by ESA listings. In these areas, actions by the fishery managers would not be in compliance with associated take permits or exemptions. These permits or allowances presumably would be relinquished until the fishery managers implemented and enforced the appropriate restrictions or closures. In addition to federal oversight, fishery monitoring and evaluation information will be readily available for an open public review of performance.

Spawner escapement

The Wild Salmonid Policy requires continual performance monitoring and adjustments of spawning escapement goals to ensure that they are appropriate for maintaining healthy, self-sustaining populations of wild salmonids, given necessary habitat conditions. If the goals are not meeting this intent, then they will be modified accordingly and management plans adopted to ensure compliance, including further fishery restrictions or closures, if appropriate. In cases where major changes are being made to past escapement goals (i.e., changing from hatchery to wild harvest rates), an implementation plan and schedule will be adopted. If monitoring indicates genetic selection is impeding achievement of objectives, then modification to fishery regulations will be implemented as appropriate. Changes in hatchery and habitat management strategies may also be indicated.

Differential harvest strategies for hatchery and wild fish

Both the Wild Salmonid Policy and legislative mandate require mass marking of hatchery fish to ensure performance assessment of hatchery management guidelines and provide for selective fishery opportunities. If these marking programs cannot be successfully implemented, then: (a) hatchery programs to augment salmon harvest will likely be modified or discontinued; (b) programs to coded-wire tag hatchery fish to estimate fishery exploitation rates and survival of wild stocks will be re-evaluated if hatchery releases are reduced or discontinued in some areas; and (c) recreational and non-Indian commercial fisheries that rely on hatchery chinook and coho will be limited by their ability to selectively harvest available hatchery fish in the absence of a mass mark.

Population monitoring

If WDFW and others are unable to monitor responses in fish population abundance, biological characteristics, habitat quality and quantity, and ecosystem health, then a sound foundation will not exist for evaluating performance of recovery programs. The consequence of this could be severe restrictions of all activities affecting fish population status, including land and water use, harvest, hatcheries and hydropower. Strict regulations would replace adaptive management strategies.

Fishery impact assessment

If impacts to depleted stocks cannot be assessed, specific non-treaty fisheries will be appropriately restricted, depending on a resource risk and uncertainty assessment to be completed by WDFW. Alternatively, available harvest opportunities will be preferentially allocated to those fisheries that have adequate monitoring or the least risk of not meeting management objectives.

Transformation of fishery gear and methods to optimize differential harvest

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WDFW will continue to regulate and restrict fishing opportunities consistent with stock protection needs and prevailing harvest approaches. WDFW is working with representatives from the non-treaty fishing industry for collaborative development of expanded selective fishery methods.

Hatcheries

Hatchery Management to Meet the Needs of Wild Fish

I. Current Situation: *Where are we now?*

Hatchery management plays a critical role in the development of a comprehensive strategy for protecting and restoring our state's fish resources. All "4 Hs" — Habitat, Harvest, Hatcheries and Hydropower — must be managed in concert to reach the Salmon Strategy's goal of protecting and recovering wild fish. The Washington Department of Fish and Wildlife (WDFW) and western Washington treaty tribes developed the Wild Salmonid Policy to provide leadership and a commitment to fish management that ensures hatcheries are operated in ways that are "fish friendly." WDFW, the Fish and Wildlife Commission, the Tribes, the National Marine Fisheries Service (NMFS), and the U.S. Fish and Wildlife Service ensure harvest and hatcheries are managed to conserve and recover wild salmonids. The Joint Natural Resource Cabinet will focus on outstanding habitat and hydropower issues, and will closely monitor hatchery management to make sure it is consistent with concurrent efforts to improve and restore habitat conditions.

The early objective of most fish management programs was to maximize consumptive use of the resource — similar to an agricultural model of "crops." Fish not harvested were considered a "wasted" resource. Because managers lacked basic life history and genetic information, efforts at using hatchery fish to increase natural populations had little success. Those that were successful probably had some negative effects on any naturally spawning populations existing in the same habitat. During this time, hatcheries were promoted as effective substitutes for natural fish habitat, leading to complacent attitudes about habitat conservation and large-scale habitat degradation.

Today, managers recognize the importance of wild salmonid stocks and attention is focused on specific hatchery practices and related fish management objectives. Improved protection and recovery of wild stocks is now the goal of hatchery management actions. Many forces drive how the state manages hatcheries, including state policies, court orders, treaties, mitigation agreements, and annual harvest negotiations. Significant reforms have occurred recently to achieve the new goals of hatchery management, including:

- WDFW and tribes are conducting a comprehensive evaluation of the hatchery program. The results will be used to ensure hatcheries are managed consistent with wild salmon protection and to increase the survival and contribution of cultured fish to fisheries.
- Federal, state and tribal co-managers, often in cooperation with citizen groups, are active in many statewide, multi-regional, long-term or programmatic activities such as discontinuing releases of hatchery fish which have competed with wild salmon fry.
- Hatchery steelhead, coho and chinook are being mass marked so that fishers can identify them easily and can release unmarked wild salmon.
- Plans for rebuilding fifteen separate stocks are completed or under development.

II. Goals and Objectives: *Where do we want to be?*

Goal

- To protect, restore and enhance the productivity, production and diversity of wild salmonids and their ecosystems to sustain ceremonial, subsistence, commercial, and recreational fisheries, non-consumptive fish benefits, and other related cultural and ecological values.

Objectives

- Hatcheries will use stable, cost-effective programs to provide significant fishery benefits.
- Wild spawner escapement will be provided.

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- Genetic diversity will be conserved.
- Wild salmonid stocks will be maintained at levels that naturally sustain ecosystem processes.

III. Solutions: *What is the route to success?*

WDFW and co-managers will work together using science-based, adaptive management to ensure:

- wild salmonid populations are healthy and productive at levels that permit fisheries; and
- hatchery programs and the harvest management regimes which they support are compatible with naturally self-sustaining wild salmonid populations.

Successful programs will be expanded and other programs will be reformed based on the comprehensive review currently underway.

Continuing implementation actions to improve hatchery operations and compatibility with wild stocks can be viewed in short-term and long-term time frames. The longer-term actions are those that require improvements to facilities or other capital investments, while the shorter-term efforts reflect those changes that can and will be made immediately as indicated through a variety of program reviews, recovery planning and risk assessment.

- **Short-term:** Hatchery releases likely will occur under some form of ESA permits or take allowances for a large share of the state (Columbia River, Puget Sound and portions of the coast) beginning in 1999. Recovery plans will identify different phases of actions that will be taken over time according to risk of inaction and implementation costs.

Similar reviews will occur in areas not listed under ESA via the hatchery programmatic review, watershed plans and revisions of state/tribal management plans. Again the short-term actions will tend to be those that address the highest risk areas and do not require immediate investment of large amounts of capital.

- **Long-term:** Review efforts will identify hatchery implementation actions that require significant capital investment. Examples of such actions would be construction of acclimation and adult return sites that could be used to minimize interbreeding of hatchery and wild fish; modifications to weirs or trapping facilities to allow sorting of hatchery and wild fish; or retrofitting existing hatchery facilities. These longer-term activities will be identified and prioritized according to opportunity and risk, with a schedule developed for various regions and watersheds over the next two years. It should be realistic to expect that these kinds of changes could be completely implemented over a five to ten-year period once funding is available.

Following is a brief overview of current efforts to achieve hatchery management goals:

- **Stock restoration:** Chinook restoration (Dungeness, White River, Nooksack, Tucannon and upper Columbia) as well as summer chum recovery in Hood Canal and pink salmon recovery in the Strait of Juan de Fuca point to the continuing future of hatcheries to help rebuild wild populations. These programs may include captive brood rearing for very critical stocks, or the more traditional forms of hatchery supplementation, such as taking eggs and planting either fry or smolts from carefully collected wild broodstock.
- **Disease control:** Fish and egg transfers are increasingly restricted to prevent disease transmission. Better rearing conditions and less reliance on antibiotics are now used to control fish diseases. Preventing disease by improving rearing conditions (such as reducing density), diets, and feeding practices is becoming more commonplace. These strategies help reduce the operating costs needed for disease treatment and often increase survival to the adult stage, but they also increase the production cost per fish produced by requiring more ponds to grow the same number of juvenile fish.
- **Genetic issues:** The value of wild fish as a genetic storehouse and the role of locally adapted populations are now better understood by fish resource managers. Guidelines direct field staff on operational issues such as utilizing methods of fertilization that help preserve as much genetic variation as possible in hatchery brood strains. Genetic risk assessment methods are currently being developed and refined as scientific knowledge advances.

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- **Ecological interactions:** Minimizing competition between hatchery and wild fish is beneficial to both. The planting of fish at some hatcheries is now delayed prevent overlap with the out-migration of local native populations. Studies are now in progress to better understand interactions and behavioral differences between fish of the same species produced in a hatchery and in the wild (critical for addressing ESA issues). Returning hatchery salmon carcasses to the stream to provide nutrients is another example of how scientific research has pointed hatcheries in a different direction. Ten pilot projects were started in 1996. The future will include more of these projects as hatcheries become more a part of the natural cycle of aquatic life in the Northwest.
- **Fishery enhancement:** New tools are being developed and implemented to make programs designed to produce hatchery fish for harvest more compatible with protecting wild populations. For example, marking hatchery fish so they can be visually identified by fishers enables managers to require the release of wild fish while permitting retention of hatchery fish. In this way, wild and hatchery fish may be harvested at different rates, based on their differing levels of allowable harvest. Use of sterilized hatchery fish to support fisheries and prevent interbreeding with wild fish is also being evaluated. It is clear that maintaining fisheries for coho, chinook salmon and steelhead (especially in marine areas) will depend on our ability to selectively harvest hatchery-origin fish.
- **Public outreach:** Hatcheries play a vital role now and in the future as a place where citizens can be educated and involved with the fish resource. Volunteer groups often acquire fish, fish food and advice from local hatcheries (123 groups currently do so now). Thousands of school children get to touch their first salmon by visiting local hatcheries or by being involved in classroom incubation projects (more than 300 exist throughout the state). Because hatcheries are located across the state and usually in remote areas, they often serve as important contact points with the public. In this role, hatcheries will increasingly serve as places for sharing information regarding natural resources and conservation efforts.

IV. Monitoring and Adaptive Management: *Are we making progress?*

The state, in cooperation with co-managers, will closely monitor the effectiveness of management actions and report to the Joint Natural Resource Council on the success of these hatchery strategies.

The hatchery program review will address many aspects of WDFW's fish culture operations. The key components related to hatchery monitoring and evaluation are to: 1) identify the need and appropriateness for each fish culture activity; 2) evaluate genetic and ecological impacts to wild stocks through a thorough risk evaluation process; and 3) provide the ability to track recovery and health of wild stocks. The primary method to accomplish these components is the ability to identify hatchery origin fish. These tasks need to be coordinated with habitat monitoring locations and activities.

Hydropower

Hydropower and Fish: Pursuing Opportunities

I. Current Situation: *Where are we now?*

Hydropower facilities and other dams have had profound negative impacts on river systems and on anadromous fish. There are, unfortunately, no simple solutions to fixing hydropower projects.

More than 160 hydroelectric projects are federally licensed or being considered for licenses in Washington; twenty-two dams (not all of these are in salmon habitat) have Federal Energy Regulatory Commission (FERC) licenses due to expire between now and 2010 and will be subject to a relicensing process. Relicensing provides the opportunity for the state and federal fish and wildlife agencies to recommend and/or require measures to mitigate the effects a hydropower facility has had on salmon.

The regional Northwest Power Planning Council, consisting of two members each from Washington, Oregon, Idaho and Montana, helps to oversee fish recovery measures in the Columbia-Snake River system. Washington's members, together with other state agencies' staff, are responsible for advising the Governor and meeting with

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constituencies on all issues pertaining to the operation of the dams. The Washington Council members are part of the Joint Natural Resources Cabinet and therefore coordinate with the Statewide Strategy to Recover Salmon efforts.

Outside the Columbia-Snake River system the state uses the FERC process and its own authority under the Clean Water Act to pursue modification of the operations at federally licensed hydroelectric projects to implement salmon protection, mitigation and enhancement measures.

II. Goals and Objectives: *Where do we want to be?*

Goal

- Achieve no net impact for each salmonid species affected by hydropower projects.

Objectives

- Restore or improve fish passage, implement less disruptive water release schedules, ensure that projects meet water quality standards, and mitigate habitat loss and degradation.
- Use the state's existing authority to reduce and mitigate impacts of dams on fish and to prevent taking of fish under the Endangered Species Act.
- Hold hydropower project owners responsible to ensure that projects meet the goals and objectives of the Statewide Strategy to Recover Salmon.

III. Solutions: *What is the route to success?*

State action on new projects

- The state will oppose all proposals for new hydroelectric projects with the potential for degrading salmon habitat.

State action during relicensing

There are 22 dams — 14 projects — that will require a new license by 2010. Nine of these projects have already started the relicensing process, most of them pursuing new FERC licenses rather than Habitat Conservation Plans. The state will recommend or require conditions to restore and mitigate impacts of hydropower projects.

The relicensing of the projects is allowing the state and federal agencies to review the project as if it were a new one. The state will:

- Identify the dams which have significant impacts on anadromous fish populations and the specific problems at those dams. Specific mitigation and restoration actions will then be identified to address the impacts at each dam, based on the severity of harm to salmon.
- Collaborate with FERC and other federal agencies to assist in achieving a settlement between all parties for FERC approval.
- Encourage applicants in areas with more than one hydropower project to conduct studies at the watershed level to address cumulative impacts and to design the most effective and comprehensive environmental improvements and restoration actions.
- Recommend that fish and wildlife protection measures are included in new licenses.
- Give approval for hydropower projects with conditions for instream flow releases and provisions to meet water quality standards, especially temperature and dissolved gases.
- Object to a project that negatively affects coastal resources.
- Encourage licensees to implement interim mitigation measures during prolonged relicensing proceedings.
- Where appropriate for salmon recovery, recommend that FERC use its authority to decommission a project during the relicensing process.
- Closely monitor implementation of mitigation measures required as a condition in the license issued by FERC.

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State action on projects not due for relicensing

For projects not subject to relicensing for a number of years, there is no clear process to bring about changes in project operation. In areas with ESA listings or likely listings, the state will:

- Identify the dams which have significant impacts on anadromous fish and the specific problems at those dams. Specific mitigation actions will then be identified to address the impacts at each dam.
- Work with dam owners to seek voluntary implementation of mitigation and restoration measures.
- If voluntary efforts fail, petition FERC to reopen the license.

IV. Monitoring and Adaptive Management: *Are we making progress?*

The state will closely monitor implementation of mitigation measures required as a condition in the license issued by FERC.

V. Toolbox for Recovery

Educating the Public About the Needs of Salmon

I. Current Situation: *Where are we now?*

More than 20,000 volunteers are working with state agencies on habitat restoration and water pollution prevention, and taking other actions to support salmon survival. Thousands more work through county and city governments, conservation districts and civic groups.

The state resource and education agencies offer programs to help citizens develop knowledge and skills necessary to take personal responsibility for protecting salmon. The state is committed to helping build local knowledge in communities and among landowners, and to couple that with scientific information, education, skill-building and technical support.

Continuing Efforts

Every one of the state's resource and educational agencies has responded to the growing salmonid crisis by increasing educational efforts, placing additional emphasis on salmon in current education and volunteer programs, and developing new tools for education and public participation in salmon recovery.

To expand these efforts, the state proposes to:

- Expand the Governor's Council on Environmental Education to include a Volunteers and Education committee to coordinate state agency volunteer activities.
- Create a program to train volunteers.
- Support a statewide information clearinghouse on salmon recovery and related volunteer activities.

II. Goals and Objective

Goal

- To inform, build support, involve and mobilize citizens to assist in restoration, conservation and enhancement of salmon habitat.

Objectives

- Organize a statewide coalition of individuals, groups, associations and governments that will work together to educate the public about salmon recovery.

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- Inform the public about the condition of steelhead and salmon, and how the public can be involved in their recovery.
- Inform the public about the ramifications of having Endangered Species Act (ESA) listed salmon, steelhead and trout in their watersheds.
- Promote and enhance volunteer resources needed to implement recovery efforts.

III. Solutions: *What is the route to success?*

Enhance Existing Efforts

- The Governor's Council on Environmental Education will be expanded to include a Volunteers and Education committee, reflecting the key element of successful environmental education: giving people the knowledge, skills and support to do something positive about salmon recovery.
- The Governor's Salmon Team has played the key role in organizing a broad collaboration of agency and civic groups to work on education and outreach statewide. (The coalition is described in the next section of this chapter.)
- The Washington Department of Fish and Wildlife (WDFW) is the agency with primary responsibility for fish, and considers salmon education a major priority in its continuing programs.

Washington Department of Fish and Wildlife provides technical assistance and other resources to fisheries enhancement groups — volunteers whose major focus is salmonid restoration and propagation. These enhancement groups are eligible for funds from the Aquatic Lands Enhancement Account to undertake projects ranging from removal of fish passage barriers to habitat restoration.

WDFW also maintains a "Salmon in the Classroom" program, which puts refrigerated aquaria and salmon eggs into classrooms to help students learn about salmon life cycles and help restore habitat. In some cases, this has led to salmon returning to streams after absences as long as 30 years.

The agency continues to offer angling education, with a heavy emphasis on water quality and other habitat aspects. This program focuses on training adults who then teach other adults and youth.

Under WDFW's Education and Outreach theme of "Helping People Help Fish and Wildlife," the following education activities are completed or underway:

- Selective fisheries brochure
- Salmon Volunteer Management: Tips on How to Make it Easier
- "Salmon Smart," the WDFW volunteer manual.
- Aquatic WILD Teacher training: Offering more than 15 workshops to teachers per year with emphasis on wild salmon
- "Your Impact on Salmon," a salmon self-assessment tool for multiple audiences to examine how they impact salmon and determine how they can change their behavior to help salmon.
- Salmon Education Trunks: With three themes: Salmon Are Essential, Salmon Are Endangered, and Salmon Recovery with WDFW, these are activity packets with materials provided for the educator/employee to use to teach children, youth and novice adults.
- Speaker's Bureau on Salmon Recovery: including a WDFW slide show on salmon recovery for eastern and western Washington audiences.
- Salmon Rescue: a children's coloring book on salmon in danger, and what individuals and communities can do for salmon.
- WDFW's Salmon Recovery Display: a 7'x9' salmon recovery display which is interactive and appeals to multiple audiences.

New initiatives include:

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- Master Watershed Stewards: a volunteer training and management program that WDFW has successfully piloted with WSU Cooperative Extension over the past three years and wants to now develop into a full extension and outreach program.
- Nature Mapping for Fish and Streams: Complements the WDFW “Nature Mapping for Wildlife” program which has citizens (youth and adults) collecting data and monitoring wildlife. The WDFW priority is to find out which salmon recovery monitoring data are needed that volunteers can collect, and incorporate this into the volunteer program and the Master Watershed Stewards training.
- Hatcheries as Salmon Environmental Learning Centers: WDFW will be working to provide educational programs to school groups and adults visiting hatcheries.

The Department of Ecology is the agency with primary responsibility for water. Ecology supports watershed education for adults in select counties, provides technical education for small businesses which deal with hazardous chemicals (photo shops, dry cleaners, auto service businesses, etc.), and underwrites community education through many Centennial Clean Water Fund grants to local groups.

For teachers and youth, Ecology offers training to teachers in using Project WET, a watershed education program for classrooms, and two other classroom-oriented curricula on wetlands, waste reduction and recycling. Ecology has helped launch water festivals in several communities, which include teaching about and celebrating salmon.

Ecology also maintains Watch Over Washington, an electronic Web site aimed at environmental volunteers who monitor water quality, wildlife, fish and wildlife habitat, and other environmental parameters.

Ecology offers a wide range of public educational programs at Padilla Bay National Estuarine Research Reserve, teaching people of all ages about natural environmental processes, including salmon. Ecology is a key partner with local agencies in using posters and ads on all media about pollution prevention in Puget Sound.

Finally, Ecology leads an annual autumn interagency and civic collaboration called WaterWeeks, which supports and publicizes community education and events focused on water and watersheds.

The Puget Sound Water Quality Action Team (PSWQAT) coordinates efforts to clean up Puget Sound. Through the Public Information and Education (PIE) program, contracts are awarded to local governments, tribes, businesses, civic and neighborhood groups to educate about local problems and bring about local solutions.

Contractors have organized and trained volunteers and professionals to restore salmon habitat by:

- replanting riparian areas
- building fish ladders
- removing fish passage barriers in selected streams
- adding large woody debris to salmon streams
- stopping or preventing water pollution from on-site sewage systems
- reducing chemical use in homes and private and public gardens
- adopting streams
- using best methods during construction to reduce run-off and pollution from building sites
- monitoring chemical and biological water quality
- inventorying wetlands and streams and nearshore areas for restoration and protection
- planting eelgrass for fish habitat
- reducing water use in businesses and homes
- enabling citizens to bring sewage treatment systems into communities to replace failing septic systems

PSWQAT will continue a special effort to educate local government officials on the importance of nearshore areas to salmonids and ecosystem health.

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The State Parks and Recreation Commission provides environmental education and training on park lands, often in cooperation with local environmental education and natural science groups. As a result, trained volunteers now monitor intertidal zones on beaches, manage nature centers and offer science and local history programs to the general public, undertake beach and park clean-ups, and teach restoration to others in their communities.

The Washington Department of Transportation (WSDOT) has several efforts relevant to salmon recovery. The Environmental Affairs Office trains college students to monitor wetlands created as mitigation for road construction, and provide data to WSDOT. This new program is being expanded from a single university to others in the state. WSDOT is also a major supporter and participant in planning WaterWeeks with the Department of Ecology.

The Washington Department of Natural Resources (DNR) educates and trains youth and adults about forest ecosystems, geology, agriculture, fire ecology, aquatic lands and many other topics.

DNR's volunteer coordination program works with civic groups to have them adopt trails, revegetate lands and other actions. DNR provides training, staff support and tools. For example, DNR works on a continuing basis with students, schools and communities in the Hood Canal area to map, revegetate and restore riparian areas and streams where wild salmonids still exist, and to monitor those efforts for success.

Educational components of existing programs include teaching stewardship to small woodlot owners, supporting school programs which integrate environmental knowledge and skills, and coordinating and promoting Arbor Day tree-planting programs. In addition, DNR offers workshops and classroom materials to teachers of sixth through twelfth grade, called "Discover Washington's Natural Resources." The curriculum focuses on the integration of natural resource topics, including salmon, and offers suggestions for stewardship projects.

DNR provides grants through the Aquatic Lands Enhancement Account to local governments and tribes, ports and state agencies for improving public access to water, habitat improvement and acquisition. The current grant cycle criteria will prioritize projects focused on critical components of salmon habitat.

The Washington Department of Health (DOH) is preparing new water conservation materials for distribution by water purveyors and users who lack access to other information sources. The materials will be given to water companies and others for distribution to the general public through mailings and at public meetings and events. DOH supports protection of water quality by educating water purveyors, county health departments, private and public owners of beaches and swimming waters, and other entities whose activities are related to human environmental health and which influence salmonid health.

Washington State University Cooperative Extension offers adult education about watersheds, soil and water, agriculture and home gardening, forest stewardship and salmonids, and other aspects of environmental and human health. Cooperative Extension has a team of water quality agents who specialize in water-related education.

In several counties, WSU Cooperative Extension provides comprehensive watershed courses tailored to the local ecosystem to teach about local environmental processes, economics and society. These classes, known generically as Master Watershed Stewards, require students to share their knowledge after completing the classes. Stewards subsequently undertake habitat restoration, water quality monitoring and nearshore monitoring, and provide education to others in conjunction with local, state and federal agencies, and civic groups.

WSU Cooperative Extension has also established an Email listserv as a source of good information on salmon including restoration, ESA, meetings and conferences, workshops, grants and other resources and events.

Washington Sea Grant (based at the University of Washington), and Cooperative Extension are jointly sponsoring classes in basic knowledge about salmon for professionals who are teaching adults and youth, and who need to incorporate salmon knowledge into their own teaching.

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Washington State University's Center for Environmental Education works with schools, communities and tribes on habitat restoration and water quality protection in the Snake River watershed and in other parts of the Columbia watershed.

New Efforts: New Coalition

Under the Government Council on Natural Resources (GCNR), an Education and Outreach Committee was created to develop comprehensive and cooperative public education and volunteer support programs. The committee is made up of representatives of state, federal and local government agencies and councils, tribes, public utilities, regional fisheries enhancement groups, non-profit groups, and others working on education, volunteer efforts, information and public involvement activities for salmon recovery.

The coalition's overall mission is to inform, build support, involve and mobilize citizens to assist in restoration, conservation and enhancement of salmon habitat. The three main goals are:

- Inform the public about the condition of steelhead and salmon, how it affects their own lives and how they can be involved in salmon recovery.
- Inform the public about the impacts of the Endangered Species Act — listed salmon, steelhead and trout in their watersheds.
- Promote, expand and enhance volunteer resources needed to implement recovery efforts.

The coalition has established a Puget Sound area information clearinghouse on salmon recovery, with a toll-free phone number and a Website for the general public.

IV. Monitoring and Adaptive Management: *Are we making progress?*

Effectiveness measures will be developed and monitored by the coalition, based on the following intended results:

- An informed public that understands:
 - The condition of wild salmonids
 - The consequences of having ESA-listed salmonids in their watersheds
- A mobilized public that:
 - Works in support of salmon restoration
 - Contributes resources toward salmon restoration
 - Changes current practices and behaviors to support restoration and preservation

The GCNR Education and Outreach Committee has recommended a model for measuring program effectiveness. This model would:

- Establish criteria to evaluate the end result (changes in the factors that impact salmon recovery, such as habitat restoration).
- Identify the audience(s) and document and evaluate responses to the activities of programs provided.
- Assess the ability of the strategy and programs to acquire the necessary resources (staff time, volunteer time, money, materials, etc.) to offer the educational activities or tools to audiences.

A subgroup of the coalition is working on a plan to implement the model as the evaluation tool for the education and outreach strategy.

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Enforcement of Existing Laws Related to Salmon

I. Current Situation: *Where are we now?*

Overview

The State of Washington faces major challenges relating to salmon and trout resources that, if not effectively addressed, will have serious ecological, economic and social consequences. Accelerated declines in fish populations are occurring throughout the state. Habitat loss, environmental degradation, and significant illegal activities, including illegal harvest, are among the most significant factors that have contributed to precipitous declines in fish populations and have led to Federal Endangered Species Act (ESA) listings. (See Background: Setting the Context chapter.)

Successful recovery and restoration of salmon will hinge upon implementation of, and compliance with, state environmental and resource regulations. However, enforcement efforts by the regulatory agencies is highly variable, leading to significant compliance problems in a number of critical environmental and resource programs. The various natural resource compliance programs (water resources, nonpoint water quality, forest practices, hydraulic permits, harvest and mineral resources) reflect a broad range of staffing levels and approaches, ranging from complaint-based responses to having dedicated staff located throughout the state providing variable levels of service (education, monitoring, enforcement, etc.).

Recent court decisions in Washington and the Pacific Northwest make it clear that voluntary programs and good intentions alone will not be enough to satisfy federal standards and species protection and recovery. The state must have a credible compliance and enforcement element in any salmon recovery strategy (statewide, regional or watershed).

Natural resource law enforcement at Washington Department of Fish and Wildlife:

Washington Department of Fish and Wildlife (WDFW) carries out its hydraulics permit issuance through biologists in the field, who also handle first response to problems. Enforcement programs are carried out by the Department's commissioned officers working in communities around the state. These officers are responsible for enforcing all of Department of Fish and Wildlife's programs including: Hydraulic Project Approvals, fishing and hunting regulations, habitat protection, and resolving potentially dangerous human and wildlife conflicts. The Department's enforcement philosophy is to seek voluntary compliance through education, outreach, and technical assistance before using direct enforcement mechanisms.

Environmental law enforcement at Washington Department of Ecology: Ecology is generally organized by environmental programs such as air and water. Enforcement personnel are located in each program in four regional offices, and typically carry out several other responsibilities (write permits, conduct facility inspections). In recent years, emphasis has been placed on using education and technical assistance to gain compliance with environmental laws.

Natural resource law enforcement at Washington Department of Natural Resources: Department of Natural Resources (DNR) carries out its forest practices compliance program through field foresters in the seven DNR regions, as well as technical specialists in regions and in Olympia headquarters. Compliance philosophy emphasizes a graduated approach starting with education and assistance but including civil penalties for repeat offenders. DNR also carries out regulatory programs related to surface mining land reclamation and outdoor burning.

Current Applicable Policies

The Departments of Fish and Wildlife, Ecology, and Natural Resources set and enforce the majority of Washington's statewide natural resource programs. These programs authorize the agencies to protect, regulate and control use of waters of the state, discharge of pollutants into state waters, forest practices, outdoor burning, surface mining, construction in state waters, fish passage, screening of water diversions and harvesting of fish. In some

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cases the responsibility is shared with local governments. The authorizing statutes and programs to implement the statutes are described below. Further description of these programs can be found in the chapters discussing the core elements.

Shoreline Management

- Implementation and enforcement of the Shoreline Management Act is a joint cooperative responsibility of counties and cities and Department of Ecology (Ecology).
- Counties and Ecology have a role in monitoring compliance with Shoreline Master Plans.

Water Resources —Surface Water and Ground Water Codes

- Primary responsibility to regulate and control waters of the state rests with Ecology.
- Violations addressed through educational efforts, technical assistance, regulatory orders and field citations. Civil penalties and criminal sanctions sought through court action.

Water Quality — Water Pollution Control Act

- Primary responsibility for implementation and enforcement rests with Ecology in managing point source and non-point discharges and protecting water quality standards, both surface and ground water.
- Violations addressed through education and technical assistance, notice of violation, regulatory orders and civil penalties. Resource damages may be recovered from the violator.

Forest Practices Act

- Primary responsibility for implementation and enforcement rests with DNR.
- Enforcement occurs through voluntary compliance, remedial enforcement, and civil and criminal statute.

Fish and Wildlife Enforcement Codes

- WDFW is responsible for ensuring compliance with state statutes and rules of the Fish and Wildlife Commission and Director.
- Violations may trigger technical assistance, warnings and penalties.
- When acting within the scope of these authorities and when an offense occurs in the presence of a Fish and Wildlife Enforcement Officer, the Officer can enforce all criminal laws of the State of Washington.

Overview

State natural resource agencies play the lead role in efforts to achieve a high degree of compliance with environmental and natural resource regulations. This includes compliance with laws and regulations designed to protect water quality and instream flows, regulate alteration of riparian, forest and stream habitat, and prevent illegal take through harvest or other methods.

A fundamental principle of the Statewide Strategy to Recover Salmon is that agencies will promote collaborative, incentive-based approaches, coupled with enforcement of existing authorities, to protect salmonid species and salmonid habitat. Programs will strive first to use voluntary compliance and support through comprehensive interaction and problem-solving at the community level. However, collaborative problem-solving takes time and is not always successful. Immediate enforcement actions will be taken in ESA areas to protect and prevent further harm to salmon. In the meantime, long-term strategies for compliance will be developed and implemented statewide. Default enforcement actions will also be defined and will be taken if collaboration is unsuccessful.

The enforcement strategy includes:

- Increase coordination and collaboration among the three principle state regulatory agencies — Departments of Fish and Wildlife, Ecology, and Natural Resources.
- Prioritize compliance and enforcement programs to improve the least effective enforcement programs and build credibility. Also, target enforcement to geographical areas with ESA listings and potential listings, where

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limited effort is being made to comply with existing laws, or where performance measures are not being met after a reasonable period of time.

- Encourage continued support and commitment to compliance from a wide variety of interests. Also increase public awareness and understanding of applicable laws and regulations.
- Enhance enforcement of natural resources laws and regulations where necessary to improve compliance and enforcement of existing environmental and resources laws.
- Enhance resources to build capacity within state agencies.
- Assist local governments to improve performance and increase compliance. Land use laws need to be better enforced at the local level.

II. Goals and Objectives: *Where do we want to be?*

Goal

- Enhance compliance with environmental and resource laws that support salmon protection and restoration.

Objectives

- Maintain and strengthen existing laws and regulations to reduce illegal activities.
- Implement statewide enforcement that is predictable and consistent in application, but targeted first to priority areas and problems.
- Coordinate enforcement responsibilities among agencies.
- Generate public support and commitment to compliance.

III. Solutions: *What is the route to success?*

Compliance and enforcement are approaches that use a mix of cooperative/voluntary tools and traditional regulatory techniques. Voluntary compliance efforts include the use of educational, technical assistance, economic and market-based incentives. When voluntary compliance efforts are unsuccessful, enforcement tools will be employed that include administrative processes such as inspections, warnings, orders, sanctions, injunctions, and civil penalties and criminal sanctions.

Efforts by state and local agencies to improve compliance will consist of a variety of actions:

- First, efforts are needed to enhance monitoring and tracking, coordination of compliance programs, technical assistance, public awareness and community involvement, and use of legal instruments as deterrents.
- Second, efforts will be prioritized and targeted across geographic regions, among a variety of resource protection programs, and throughout all stages of a regulatory system.
- Third, while most of the natural resources agencies have generally adequate authorities to enforce their laws and regulations, enhancement of the authorities and tools is needed for some programs.
- Finally, because there is a very limited enforcement capability to handle the growing number of apparent violations, additional resources are needed to increase effectiveness in achieving salmon protection and recovery.

Increased Coordination and Collaboration

Currently, Ecology and WDFW carry out their compliance monitoring and enforcement responsibilities independently but with some interaction between the agencies. DNR and WDFW coordinate permit issuance and, to some degree, compliance activities. WDFW occasionally files complaints with Ecology regarding possible water right violations, or regarding the need to protect instream flows by enforcing water right conditions imposed on junior water right holders.

Increased coordination and collaboration among the three regulatory agencies will be carried out by developing and implementing consistent enforcement terminology, agreements to coordinate technical assistance and compliance monitoring, and work sharing.

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Consistent enforcement terminology: Natural resource violations often involve multiple jurisdictional issues regulated by the Departments of Fish and Wildlife, Ecology, and Natural Resources. Each agency has its own enforcement language and uses various enforcement tools differently. Often, terminology and applications unique to agencies is confusing to the public and does not always result in appropriate responses.

Enforcement tools could include standardized names, form use, and application within intended guidelines. The three main natural resource agencies will develop standard enforcement terminology and protocols to improve public understanding, enhance the ability of agency field representatives to respond, interpret and react consistently statewide.

Improved coordination of technical assistance and compliance monitoring: Interaction between the agencies does occur but cross-agency coordination needs to be significantly enhanced for the following reasons:

- Solutions to the natural resource problems related to the decline of salmon are inherently cross-agency in nature.
- All agencies have limited resources and must prioritize activities.
- Coordinated actions will solve problems more efficiently.

To improve coordination among each other the agencies will implement the following:

- **Coordinate salmon-related activities.** The activities to be coordinated include compliance monitoring, data exchange and technical assistance to achieve compliance and enforcement.
- **Implement geographic scale of coordination.** Activities could be coordinated at a county, Water Resource Inventory Area (WRIA), multi-WRIA, or Evolutionary Significant Units (ESU) level. Coordination at the watershed level (e.g., WDFW watershed districts and Ecology watershed management areas) is recommended.
- **Process proposed for coordination.** Strong initial and on-going endorsement by agency directors/commissioners is needed to address:
 - Key problems and limiting factors that could improve compliance with natural resource laws;
 - Options for solving compliance problems, including options on how to avoid, minimize, and/or mitigate the problems generated from non-compliance;
 - Development of a strategy considering education, technical assistance, civil enforcement, criminal enforcement; and
 - Role of each agency in implementing enforcement strategies.
- **Products:**
 - Enforcement strategies will be agreed upon by the agencies and will be built into each agency's work plans.
 - Agreements may be drawn among the agencies to share education, technical assistance, compliance monitoring and enforcement responsibilities.
 - Agencies will produce performance reports.

If the process proves to be successful the coordination may be expanded to include tribal and local governments that have enforcement responsibilities related to natural resources.

Work sharing:

Work sharing among natural resources agencies is necessary for three reasons:

- Enforcement of natural resource laws should be as efficient as possible to maximize use of state resources.
- The unique aspects of each agency's enforcement program should be considered to develop the most effective overall program.
- Because new resources are being considered for enforcement programs, now is the time to consider where to place the resources and what enforcement powers to confer.

The initiative to implement work sharing among the three natural resource management agencies includes:

- **Expand the role of WDFW Enforcement Officers in environmental enforcement:**

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- The WDFW enforcement program could be easily adapted to other natural resources law enforcement needs.
- WDFW has an existing law enforcement infrastructure, which would maximize the efficient use of state resources. Their involvement can significantly improve compliance with existing laws and restoration of federally listed and proposed to be listed fish species.

Given the limited current effort on compliance and enforcement within the water resources and water quality programs in Ecology, options for long-term work sharing will be first explored between Ecology and WDFW. Future interagency agreements, possibly including DNR, will be considered as progress is monitored.

- ***Options for work sharing***

All options considered call for Fish and Wildlife Officers to play an enhanced role in Department of Ecology habitat protection responsibilities. Four different “levels of involvement” for Fish and Wildlife Officers are related to Ecology’s key habitat related statutes. They are:

- ***Level 1: education***
Act as educational liaisons, informing local constituencies of the need for and benefits of compliance with habitat related regulations.
- ***Level 2: compliance monitoring***
Conduct systematic and routine field monitoring and tracking to determine compliance with regulations and permits. Report instances of non-compliance to Ecology for necessary follow-up.
- ***Level 3: compliance monitoring with case report***
Conduct Level 2 compliance monitoring plus, based on guidance from Ecology, prepare a detailed case report to document a formal enforcement action. Possible role as expert witness if action is appealed.
- ***Level 4: coordinated enforcement***
Conduct compliance monitoring plus participate in a jointly developed strategy to resolve significant non-compliance. This could include Fish and Wildlife officers directly enforcing habitat-related laws and regulations, if statutory authority were expanded by the Legislature.

Prioritizing and Targeting Enforcement

Given the limited resources available, it is critical to prioritize compliance and enforcement programs to improve the least effective enforcement programs (e.g., water resources) and build credibility. Also, enforcement must be targeted to geographical areas with ESA listings and potential listings, where limited effort is being made to comply with existing laws, or where performance measures are not being met after a reasonable period of time.

Some areas of the state have a significant amount of water being used (1) without authorization from Ecology; (2) in excess of the quantities allowed under a water right; (3) in excess of the acreage allowed to be irrigated; and/or (4) outside the authorized place of use. Ecology has found these forms of illegal activity to some degree in most areas of the state that it has investigated.

Much water use in the state occurs under water right claims rather than under state issued rights. One problem is that many claims are erroneous, clearly invalid, or claim a right for future use. Ecology believes that it can under the law make a tentative determination as to the validity and quantification of a claim for purposes of determining whether the use is illegal or excessive. However, the state Supreme Court has disallowed Ecology from making such a determination for purposes of regulating among conflicting uses.

Another major problem for regaining control over illegal and excessive use is the lack of compliance resources within Ecology’s Water Resources Program. Major budget cuts in 1994 caused the near elimination of the water rights compliance program. New resources and statutory authority are necessary to allow for coordinated enforcement employing WDFW enforcement officers.

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Strategic enforcement against illegal uses will be taken in prioritized and targeted areas starting first in the “highest priority basins” for protection and restoration of instream flows.

Recommendations to Address Lack of Compliance

For each basin with ESA listings or likely listings and with known illegal activities, an action plan will be developed and fully implemented according to the priorities outlined in the chapter on Ensuring Adequate Water in Streams for Fish. These plans will address all or some of the following items:

- Requiring installation of meters to measure and report water use.
- Restricting quantity and timing of water use, and requirement of all water supply utilities (e.g., irrigation districts and municipal suppliers) to develop a water conservation plan and identify the potential for saved water.
- Identifying alternative water sources such as use of reclaimed water.
- Enforcing standards for beneficial use and waste.
- Enforcement actions to be taken by the state to stop any further water withdrawal.
- Assigning “water masters” or “stream patrollers” to deter future violations.
- Increasing geographically dispersed enforcement presence (e.g., contracting with uniformed Fish and Wildlife Officers).
- Linking funding and financial assistance to compliance.
- Coordinating enforcement activities and consolidating field compliance monitoring to ensure consistency by state, federal, tribal and local governments.
- Educating and involving the public in watershed planning and restoration.
- Providing additional enforcement resources for local enforcement.

Role of the General Public

The ultimate success of salmon recovery will rest on the hidden dimension — the human element. Drafting the Statewide Strategy to Recover Salmon will not automatically lead to successful actions. Success will depend more upon the human interactions and behaviors among the diverse groups that have a stake in salmon recovery. To that end, agencies need to design programs to inform and involve the public in salmon recovery.

Communication with interested citizens — “community ombudsman”

Many citizens have questions about compliance with natural resources laws in their neighborhoods; sometimes citizens also have information useful to agencies. Often there are not efficient ways for agency compliance staff and citizens to communicate. Citizen complaints or questions based on poor information about the requirements of environmental laws can lead to wasted time. On the other hand, well-informed citizens can provide valuable information both to agency staff and to other citizens.

Most natural resource regulatory programs experience regular involvement by representatives of key citizen interest groups, who over time become well-informed both about the regulatory requirements of the program and about local on-the-ground practices. Agencies should find ways to make better use of that citizen expertise in the overall compliance effort.

Public involvement in monitoring and tracking —“grassroots efforts”

Agencies need to generate support and commitment to compliance from a wide variety of interests. They also need to increase public involvement in environmental and resource management and protection activities. It is critical for the agencies to empower the public to take action to improve salmon conditions. The following initiatives are proposed:

- Build collaboration between the agencies and communities to solve natural resource problems by placing emphasis on community outreach and involvement and on voluntary compliance.
- Facilitate grassroots efforts through volunteer monitoring and tracking. This is a way for the public to help agencies track trends on the health of a watershed and it is a proven path to natural resource stewardship by groups of citizens.

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- Develop local stakeholder groups within watersheds and salmon recovery units.

Stakeholders groups

Agencies will need to develop strategies to reach broad-based and diverse constituency groups that actively participate in decisions and implementation. Based upon legal, fiscal and geographic demands of salmon recovery, state and local officials will act as the specialists that facilitate formation of stakeholder groups.

Group participants will need to represent a cross section of interest groups including: state, federal, city and county officials, agricultural and industrial organizations, sport and commercial salmon groups, environmental groups, key influential and other identified stakeholders. Because of the complexity and diversity of recovery issues, formation of unique stakeholder groups within each recovery unit would be beneficial.

Enhancement of Authorities

Generally, agencies have the authority to enforce natural resource laws to protect salmon. However, certain laws may need to be enhanced to improve and streamline compliance and enforcement efforts. The following are changes to existing statutes that are needed:

- Authority to enforce among competing water rights.
- Penalty for violations of the Water Code. Currently Ecology is authorized to levy civil penalties up to \$100 per day for violations of the Water Code. Penalties are too low to deter some violators. Changes are needed to establish a graduated structure with three categories of violations — minor, serious and major — depending on the severity of the violation.
- Add requirements for performance bonds for shoreline permits and possibly other permits as well. Performance bonds will be used as incentive for permit holders to comply with conditions of permits and ensure that environmental protection is implemented on the ground.
- Expand the appointment of stream patrollers and water masters. Stream patrollers and water masters are appointed by Ecology to divide, regulate and control the use of water and prevent illegal uses of excess use of water. Legislative changes are needed to remove barriers to the appointment of stream patrollers.

Funding and Staff Resources

The level of resources devoted to compliance and enforcement efforts among several major regulatory programs related to salmon is highly variable. Some programs carry out a moderate level of compliance and enforcement activities, while other programs with regulatory powers currently do little enforcement.

The 1999-2001 state budget recognizes the importance of enhancing enforcement of existing natural resources laws to protecting and recovering salmon and provides a modest increase in staff and resources to WDFW, Ecology and DNR.

IV. Monitoring and Adaptive Management: *Are we making progress?*

Monitoring Effectiveness

Performance measures for compliance and enforcement programs are needed as part of the Statewide Strategy to Recover Salmon and to use in producing the State of the Salmon Report. A combination of measures both quantitative and qualitative, statistical and narrative must be used.

Effectiveness of compliance and enforcement activities will be measured as follows:

- The levels of compliance or rates of noncompliance in areas that are inspected, or targeted for special initiatives, or designated as high priority area or sector;
- Improvement by the regulated entities, such as amount of water conserved, amount of pollutant reduced, numbers of fish present;
- Responses to significant violations such as average number of days for significant violators to comply, or enter into enforceable plans and agreements, and number of recurring violations;

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- General information on number of inspections, responses to complaints, investigations conducted, number of notices of violations issued, civil and criminal enforcement actions initiated and concluded and number of individuals or entities reached through compliance tools; and
- Effective coordination and building capacity such as number of agreements or delegation orders signed, and number of cross-agency training programs.

Permit Streamlining

I. Current Situation: *Where are we now?*

Overview

Land development, transportation and many other types of projects that involve work in or near streams, estuaries, or nearshore marine waters have inherent risks to salmon habitat. Projects for the sole purpose of protecting or restoring salmon habitat can also create incidental risks of harm to salmon. Because of these risks, projects that involve work in or near aquatic resources are highly regulated through a large number of federal, state and local permit programs. It is essential to salmon recovery that these permit programs be well-coordinated and provide a consistent level of protection to prevent or mitigate the potential impacts on salmon habitat. Effective and efficient permit programs also benefit project sponsors, including sponsors of habitat protection and restoration projects.

Many agencies have programs that either sponsor or regulate habitat protection and restoration projects. Until the Salmon Recovery Planning Act (1998) and the Salmon Recovery Funding Act (1999), there was no overall program framework for undertaking salmon habitat protection and restoration projects. The design review and regulation of these projects has not been consistent and, all too often, permit procedures have been time-consuming and expensive.

This chapter addresses two strategies related to permitting and are part of protecting and restoring salmon habitat: 1) streamlining permit procedures for habitat protection and restoration projects, and other projects affecting aquatic resources; and 2) developing and applying design guidelines for habitat protection and restoration projects, and other projects affecting stream corridors.

These strategies have a direct bearing on the implementation of habitat protection and restoration projects. The results of these efforts will be more efficient processes for approving habitat protection and restoration projects and greater assurance that on-the-ground or in-the-stream projects will achieve results beneficial for habitat.

Current Policies and Programs

Examples of major state programs involved in reviewing and permitting projects that may impact aquatic resources include:

- State Environmental Policy Act (SEPA) — SEPA checklist, project reviews, assessments and impact statements, use of substantive authority.
- Hydraulic Project Approvals (HPA) — for projects that propose to use, obstruct, divert or change stream beds or flows.
- 401 Water Quality and Coastal Zone Management Consistency Certifications — address project compliance with state water quality standards and state coastal zone management policies for federal projects or projects requiring federal permits.
- Forest Practices Permits — for timber harvest and other practices involved in forestry operations.
- National Pollutant Discharge Elimination System (NPDES) Permits — for projects that discharge wastewater or stormwater to surface waters.
- Pesticide Application and Management — for applying or supervising the use of pesticides for commercial agriculture.
- Surface and Ground Water Withdrawals — for review and approval of water rights to use surface or ground water.

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A new statewide framework for habitat protection and restoration projects has been established through the Salmon Recovery Planning Act of 1998 (ESHB 2496) and the Salmon Recovery Funding Act of 1999 (2E2SSB 5595). These new laws have established a framework and process for habitat protection and restoration projects.

This framework includes: using state and local technical expertise to identify and assess limiting habitat factors and potential projects within a region (i.e., one or more Water Resource Inventory Areas); designating local leadership as lead entities to establish local priorities; and allocating resources and approving projects for funding based upon statewide objectives. These objectives will be established through the Statewide Strategy to Recover Salmon and by the Salmon Recovery Funding Board.

Other legislation passed in 1998 laid a foundation for improved permit processes for habitat protection and restoration projects. An Act Facilitating the Review and Approval of Fish Enhancement Projects (2SHB 2879) authorized approaches to streamline state and local permit requirements for habitat protection and restoration projects.

The strategies to address permit streamlining and design guidelines for habitat protection and restoration projects have a common theme of building upon existing efforts that have been underway for some time. The solutions being undertaken are intended to increase the level of support for these efforts and make them more effective. As these separate but interrelated efforts proceed, it is also important for them to be well coordinated. That need is acknowledged and is an integral part of the strategy.

II. Goals and Objectives: *Where do we want to be?*

Goals

- Ensure projects affecting waters of the state, including habitat protection and restoration projects, are designed to be fish-friendly and are reviewed consistently.
- Ensure permit decisions for projects affecting waters of the state, including habitat protection and restoration projects, are made efficiently.

Objectives

- Make permit requirements and procedures for projects affecting waters of the state, including habitat protection and restoration projects, more effective and efficient. Continue to improve permit processes to ensure that beneficial habitat enhancement and restoration projects, and projects that incorporate effective habitat protection measures and flood hazard reduction features can proceed efficiently.
- Provide consistent and specific guidelines for the design and review of projects affecting waters of the state, including salmon habitat protection and restoration projects.

II. Solutions: *What is the route to success?*

Permit Process Streamlining

Overview of 2SHB 2879

2SHB 2879 provides for streamlined permitting for certain types of fish habitat enhancement and restoration projects. Projects that meet the criteria established in the law, and which do not have adverse environmental impacts that cannot be mitigated by a Hydraulic Project Approval (HPA), are exempt from local permits and fees and do not require review under the State Environmental Policy Act (SEPA).

Fish habitat enhancement projects eligible for streamlined review are limited to those that:

- Eliminate human-made fish passage barriers;
- Restore eroded or unstable stream banks, using bioengineering; or

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- Provide instream structures that benefit naturally reproducing fish stocks.

The legislation streamlines permitting for many habitat enhancement and restoration projects. There are projects, however, that do not meet the criteria and so cannot take advantage of the streamlined process. In addition, projects may meet the criteria, but may require federal permits or local permits (e.g., road construction) and may have significant adverse environmental impacts requiring review under SEPA. This type of project would not qualify for the streamlined process.

There are, of course, many projects that are not “enhancement” or “restoration” projects that create impacts to fish and habitat. It may be possible in some cases to provide incentives, including streamlined permitting, to encourage project proponents to make choices that cause less impact.

Emergency permitting

Criteria and procedures for emergency permit exemptions and funding can lead to projects that adversely impact fish and habitat. The ability to get emergency permit exemptions and emergency funding can drive project decisions, including construction alternatives and timing, that harm fish and habitat. To be eligible for emergency funding from the Federal Highway Administration, Federal Emergency Management Agency or Natural Resource Conservation Service, for example, projects typically must be completed within 40 - 180 days of the emergency event. Also, projects must include only the amount of work necessary to correct the damages caused by the event.

Past and current activities contributing to permit streamlining

Ecology, Washington Department of Fish and Wildlife (WDFW) and the Department of Natural Resources (DNR) worked with cities, counties and federal agencies to develop a single joint permit application form to combine what was originally seven to nine different application forms and more than ten different permit actions.

The use of Joint Aquatic Resource Permit Application (JARPA) is expected to become more widespread. Its use in eastern Washington, rural western Washington and southern Puget Sound is almost universal, but some communities with major populations aren't using JARPA. The application use to date strongly suggests a consolidated permit process could be developed for well-designed, watershed-based stream rehabilitation and fish habitat recovery proposals as a first step toward more widespread permit streamlining. Such consolidation could be made under multiple current authorities, with appropriate legislation. However, use of rigorous watershed-based stream corridor management criteria and guidelines is essential to the success of permit consolidation.

An Interagency Permit Streamlining Workgroup (IPSW), which includes staff from the Department of Ecology (Ecology), Washington Department of Fish and Wildlife (WDFW), Washington Department of Transportation (WSDOT), local governments, and federal regulatory and resource agencies, has been meeting informally for more than two years. The IPSW has identified problems and solutions that would streamline all required permits for projects that affect waters of the state, including salmon habitat protection and restoration projects. It has long been recognized that there needs to be more consistent guidelines for designing, reviewing and approving projects in stream corridors.

Development and Application of Integrated Stream Corridor Management Guidelines

Context

The context for salmon habitat restoration work is provided by completion of a comprehensive characterization of the watershed. Such a characterization identifies resource issues within the watershed as they relate to salmon habitat recovery. This characterization is an essential step because it will help watershed communities direct limited

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financial and human resources to the projects that best address the habitat needs of at-risk salmon stocks within the overall basin or sub-basins. An early emphasis on watershed characterization can save time and expense.

Areas that, if restored, would best address known habitat deficiencies for salmon (such as limited winter rearing habitat, providing base flow support to streams, or alleviating flood impacts) can be identified and targeted for project sponsorship and funding.

Following an understanding of the watershed through characterization and limiting factors analysis, the next level of guidance needed is specific to the type(s) of habitat protection and restoration work being implemented. These protection and restoration actions cover a range of habitat elements and processes, including such areas as headwater spawning beds, stream corridors, wetlands and shorelines. All of these features require specialized guidelines to provide ecologically sound and consistent direction for the design of habitat protection and restoration activities.

Salmon habitat restoration or rehabilitation projects will be done by programs and projects that may focus on various scales: specific habitat needs, stream corridor function, and/or ecological health of watersheds or river segments. There is a pressing need to assure these efforts are based on a good understanding of the physical and biological dynamics of stream corridors to:

- successfully recover salmon stocks;
- avoid inadvertent damage to existing riparian and fish habitat;
- avoid causing undesirable new flooding impacts elsewhere on the stream.

Regardless of the scale of restoration, it is more likely to be successful if done through a process of four restoration elements: 1) watershed characterization and assessment; 2) protection of existing habitat; 3) science-based remedial action; and 4) monitoring, evaluation and feedback.

Guidelines needed

The approach being recommended addresses the need for integrated guidelines for carrying out salmon habitat restoration and fully mitigating habitat damage by in-stream and stream corridor modifications, construction and developments. Such guidelines would address the technical details that people can apply in the field to restore or rehabilitate habitat or stream corridor function, or minimize future damage.

Restoration elements, such as watershed characterization and assessment, remedial action and feedback, must be developed concurrently so they can relate and interact. Characterization, assessment and monitoring protocols must relate directly to the guidelines that tie them together. A common analogy is the patient with clogged arteries: it does the patient no good to apply a band-aid over his heart and then monitor his condition by taking his temperature. A patient assessment is needed that leads to specific remedial actions and monitoring that are relevant to the case along with maintaining healthy body functions.

Restoration is considered to be restoration of natural conditions. This is not possible in most situations. Rehabilitation is considered to be the modification of habitats to achieve a functional goal. Stock recovery can be achieved without necessarily meeting the desired condition of some habitat parameters. The “goal” is a standard that a rehabilitation project must accomplish to effectively recover a specific stock; it is likely a watershed and species specific parameter. For example, the optimum width of a floodplain for restoration of a specific stream type might be 200 feet but, based on the topography and geomorphology of the channel and floodplain, a specific goal might vary and be substantially more or less than 200 feet in places.

It is important to remember that it will be crucial to fund, schedule and carry out performance monitoring of restoration projects to assure success of the project and the techniques and technologies utilized.

Strategy for integrated stream corridor guidelines

There are numerous stream habitat elements for which habitat restoration guidelines are needed.

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Integrated stream corridor management guidebook. This would consist of a series of specific documents that provide detailed guidelines for all significant restoration and protection activities. The stream corridor management guidelines must mesh with and be complemented by larger scale and more broadly scoped ecosystem and watershed protection approaches and strategies. Other future activities that will need to be coordinated with this proposal include:

- Review and amendment of federal standards, such as Natural Resource Conservation Service (NRCS) Field Office Technical Guides (FOTGs);
- Habitat Conservation Plan developed by WDFW for its Hydraulic Project Approval permitting program;
- Design and approval process for projects under 2SHB 2879 permit streamlining;
- Rule changes as necessary under the Shoreline Management Act, Floodplain Management Act, and the Hydraulics Code; and
- Project selection and funding for habitat restoration.

An example of habitat protection guidelines is WDFW's Integrated Streambank Protection Guidelines (ISPG). These draft Guidelines describe a process for bank erosion assessment and stabilization design. While it is generally agreed that streambank stabilization can be detrimental to fish, some stream reaches will continue to be stabilized. Therefore it is necessary to develop habitat mitigation and restoration guidelines for this activity. Some restoration activities may also require streambank stabilization to which these guidelines would apply directly.

The Integrated Stream Corridor Management Guidelines will be implemented through a variety of means, such as:

- "Best available science" for interpretation of permit conditions and mitigation under the Shoreline Management Act and the Hydraulics Code;
- Minimum standards for permit streamlining; and
- The basis for state-federal agreements on interpretation of the Natural Resource Conservation Service's (NRCS) Field Office Technical Guides (FOTG).

Interagency stream corridor workgroup and workplan

A workplan has been developed building upon the on-going efforts of the Interagency Stream Corridor Workgroup. The ISCW includes members from WDFW, Ecology, WSDOT, and the USDA Natural Resources Conservation Service (NRCS). The long-term goal of achieving integrated stream corridor management guidelines for the state, which are also agreed to by federal agencies, will require additional funding to enable continuation and timely completion of the work of the Interagency Stream Corridor Workgroup. The ISCW will be seeking funding for these activities through the Salmon Recovery Funding Board.

Twelve general project types have tentatively been identified as needing technical guidelines. Specific guidelines will be identified through a technical scoping process and workshops that will include design engineers, resource managers, contractors, regulators, interested parties and other technical experts.

Guiding principles will first be developed as a basis for the technical guidelines. The proposal includes development of the guidelines themselves, integration with related standards and rules at other levels of government, initial and continued technical outreach and training, and periodic updates as information comes in from restoration monitoring activities.

In addition to providing the best science for specific project design, the guidelines will be used in the evaluation of projects for funding decisions, permit streamlining, and in making permit decisions more consistent and predictable.

IV. Monitoring and Adaptive Management: Are we making progress?

The general success of project permitting, permit streamlining and integrated stream corridor guidelines will be measured by monitoring positive or negative changes in habitat conditions as part of the overall Statewide Strategy to Recover Salmon.

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The specific success can be monitored through a coordinated tracking and reporting system for habitat protection and restoration projects being developed by the Interagency Committee for Outdoor Recreation and the Governor's Salmon Recovery Office.

VI. Adaptive Management and Monitoring

I. Current Situation: *Where are we now?*

The Statewide Strategy to Recover Salmon focuses on conservation strategies associated with the “four Hs” — habitat, hatcheries, harvest and hydropower, in the context of a dynamic natural environment. There is much we do not understand about fish and how they interact with their ecosystems, and how well our individual and collective conservation actions will produce the intended effects in each watershed and region. Therefore, the strategy uses a science-based approach to assess how well strategy elements are working and to make changes based on new information. This science-based approach will deliberately shape management actions to generate needed information.

The strategy is also based on adaptive management. This approach sets deliberate courses of action in the face of uncertainty to address critical questions. It also generates information needed to make improved decisions about what works and what doesn't. This will provide a continuous management system where specific objectives are identified, actions monitored and evaluated, and direction affirmed or changed based on new results. This will improve the overall quality and efficiency of management decisions and actions over time.

A comprehensive monitoring program is a critical element of the Statewide Strategy to Recover Salmon that allows us to determine trends in fish populations, to determine how well the elements of the strategy are working, to test key assumptions, and to implement an adaptive management approach. In terms of importance, the National Marine Fisheries Service (NMFS) has identified monitoring, along with substantive conservation actions and implementation certainty, as essential ingredients of conservation plans prepared in response to listings under the Endangered Species Act.

Monitoring is currently performed by agencies and others, but it is typically not well coordinated and integrated, nor is it clearly focused on key salmon strategy components and questions. Examples of obstacles that exist include inadequate communication and coordination, conflicting or non-complementary agency interests or mandates, underlying technical issues, data integration and sharing, and funding.

The purpose of this chapter is to provide an overview of general approaches, relationships and issues for consideration in development of the comprehensive adaptive management and monitoring component of the Statewide Strategy to Recover Salmon. Most components of the strategy focus on individual conservation elements (e.g., instream flow, agriculture, fish harvest, forest practices), which may individually contain adaptive management and monitoring systems. However, development of the adaptive management and monitoring component for the strategy cuts across all elements and sectors.

II. Goals and Objectives: *Where do we want to be?*

Goals

- Develop and implement a decision-making system that is guided by the best available science and that uses new information generated from conservation actions.
- Accurately assess the responses in salmon, steelhead and trout populations and their habitats to specific strategies undertaken.

Objectives

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- Establish a scientific foundation for the Statewide Strategy to Recover Salmon and the monitoring component.
- Develop and promote the use of appropriate analysis and assessment tools, monitoring plans and guidance to support the strategy and related watershed and regional responses.
- Develop and promote complementary, integrated and flexible approaches for the collection, analysis and sharing of monitoring information within and across sites, watersheds and regions.
- Provide leadership, coordination and technical assistance to agencies and other Statewide Strategy to Recover Salmon partners.
- Provide information needed to prepare the biennial “State of the Salmon” report.

III. Solutions: *What is the route to success?*

Development of the comprehensive adaptive management and monitoring program will be difficult. There are few examples where adaptive management systems have been successfully implemented and sustained. As stated above, there is much we do not yet understand about how to best help salmon recover. There are many differences between salmon species and stocks, and between regional and watershed conditions. Monitoring and evaluation technologies themselves may often be limited and information from them can be of poor quality. Costs are always a concern.

The Joint Natural Resources Cabinet expects that each agency/partner will commit to monitor the implementation of its respective conservation actions. Through the development of the comprehensive monitoring program, needs and priorities will be clarified, and a phased approach will be developed to direct available funding and cooperative partnerships. At a minimum, the Joint Natural Resources Cabinet stresses the need for coordination, integration and, where possible, reprioritization of existing agency/partner monitoring activities to meet priority needs.

The 1999 legislature passed, and the Governor signed, 2E2SSB 5595 which recognized the need for development of a coordinated and integrated monitoring process to track and assess the effectiveness of salmon habitat projects and recovery activities. That legislation identified a role for the Independent Science Panel to provide recommendations related to various aspects of monitoring and data quality, and to summarize their findings in a report to the legislature and the Governor by the end of the year 2000.

As work continues on the specifics of the adaptive management and monitoring “solution,” the following key components have been identified:

- Conservation actions should use best available science to recognize uncertainty and address salmon recovery needs. This will include ocean conditions, estuaries and nearshore marine areas, large freshwater rivers and smaller streams in urban, rural and upland areas. It will also take into account the appropriate scope and scales and timeframes (e.g., at the site, watershed, or region level; short vs. long-term).

A science-based foundation has been drafted that will provide the necessary context for design and implementation of effective monitoring plans. This foundation will support identification and assessment of factors affecting salmon productivity, capacity and diversity at the watershed and regional levels.

- Trends in escapement and overall abundance of salmon stocks must be tracked over time.

Monitoring the status of fish stocks over time is the responsibility of the Washington Department of Fish and Wildlife (WDFW) and tribal fishery co-managers. Information is obtained from both new and ongoing juvenile and adult fish monitoring activities. A statewide Salmon and Steelhead Stock Inventory (SASSI) was prepared by WDFW and western Washington treaty tribes in 1993. A similar inventory (now termed SaSI, or Salmonid Stock Inventory) was prepared by WDFW for the state’s bull trout and Dolly Varden char in 1998 and another is currently being prepared for coastal cutthroat trout. These efforts will continue to provide a foundation of information for stock status assessments.

- Types of comprehensive monitoring include:

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- Implementation — determining whether we did what we said we'd do, and do it correctly.
- Effectiveness — how well actions taken achieve their objectives.
- Validation — research and evaluations to examine key assumptions associated with conservation actions, especially to learn more about cause-and-effect relationships.

Implementation monitoring of conservation and related regulatory actions should be tracked over time; agencies and partners will provide this function.

Strong strategy effectiveness and validation monitoring plans require clarification about the scope and objectives of the strategies. As specific target conditions or benchmarks are identified, scientifically sound monitoring approaches can be developed and implemented. Monitoring of trends in key resource measures (e.g., fish populations, habitat characteristics) provides essential information for effectiveness monitoring.

All three types of monitoring are needed for adaptive management to be effective. Strategy effectiveness monitoring is the most technically complicated but it is essential. Knowing whether conservation actions achieved their targeted objectives or benchmarks is critical to understanding the usefulness of strategies and actions.

- Some effectiveness questions (e.g., barriers to fish passage) can be answered relatively straightforwardly, but most questions will be difficult to answer. Questions about how habitat conditions are responding to implemented strategies in watersheds will be difficult because of the complexity of interacting factors, and the long assessment timeframes required to separate effects of strategy implementation from natural variation. Therefore, it will not be practical or possible to monitor the effectiveness of all strategy elements in all watersheds.

A system of index or representative watersheds among regions will be identified where coordinated and integrated long-term validation monitoring and evaluations will be performed. An approach to identification of these systems has been outlined which builds on existing efforts and which addresses needs to monitor fish and habitat parameters. The departments of Fish and Wildlife, Ecology, and Natural Resources, along with Indian tribes and other partners, will participate in cooperative monitoring to collect the necessary data in these systems.

- Priority fish and habitat “indicators” will be identified and monitored to track trends.

Similar to the ongoing efforts to track long-term trends in fish stock abundance on a statewide basis, a system of key indicators is needed to assess trends in quality and quantity of salmon habitat.

- A monitoring planning structure is needed to resolve general direction, technical issues, and needs and approaches for integrating and sharing information.

A means of encouraging communication and cooperative planning is needed to simplify coordination of monitoring among agencies and partners. A steering committee could guide statewide monitoring policy planning and identify priorities for the salmon strategy in coordination with the Joint Natural Resources Cabinet. A technical committee could provide support and coordination for implementing the monitoring strategy, seek resolution of issues, and coordinate with monitoring steering committee on unresolved issues. A data/GIS support services committee could provide guidance and support for developing and implementing integrated information systems, facilitate interagency/partner standardization, data sharing and retrieval, and long-term synthesis. It is not intended that these committees would force burdensome new layers of planning, but that they would draw together involved agencies and interested parties to add value and assistance to monitoring programs.

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- The monitoring program should track and integrate information on priority performance measures for all three types of monitoring (implementation, effectiveness, validation).

Performance measures need to be developed for each element of the salmon strategy that would be rolled into a comprehensive set reflecting the entire strategy. Examples of performance measures have been drafted. Additional details will be added as refinement of the strategies and the framework to address performance measures continues.

- Coordinated data and information management systems must support a diversity of adaptive management and monitoring efforts at various scales (e.g., site, watershed, region or state).

Coordinated data and information management systems must support the adaptive management and monitoring effort. A wide range of data systems and standards are currently in use by agencies and other entities. A key challenge will be to identify, coordinate and develop systems for managing and sharing information focused on the Statewide Strategy to Recover Salmon, regional responses, and watershed and project-level efforts.

To at least partially address this challenge, recent legislation requires that salmon monitoring data provided by lead entities, regional fisheries enhancement groups, and others shall be included in the data base of SaSSI and the Salmon and Steelhead Habitat Inventory and Assessment Project (SSHIAP). SSHIAP was initiated in 1995 by the Northwest Indian Fisheries Commission and is being cooperatively implemented by the western Washington Treaty Tribes, the Department of Fish and Wildlife, and other partners. The objective of SSHIAP is to assess and document current conditions and trends of salmon habitat in certain WRIAs, and to incorporate this data into a GIS-based information management system. Efforts are underway to expand SSHIAP coverage to the rest of Washington.

To summarize, key features of the comprehensive monitoring approach proposed by the Joint Natural Resource Cabinet are listed below.

Activities and outcomes:

- Gather and assemble information on the status of fish and their habitat.
- Document changes in fish populations and habitat conditions over time.
- Produce and synthesize information on current conditions, and assess cumulative effects on fish resources on a priority basis.
- Document whether conservation and regulatory compliance activities were implemented as intended (all agencies).
- Perform effectiveness monitoring on a priority basis.
- Coordinate focused validation monitoring efforts on a priority basis.
- Analyze information on a set schedule for use in the “State of the Salmon” report, and for feedback to the adaptive management process.

State services provided:

- Technical assistance and study design support to agencies/partners.
- Standard monitoring methods and protocols.
- Quality assurance support.
- Database and information services support.
- Leadership and coordination for strategy effectiveness, validation and project monitoring.
- Synthesis of watershed, regional and statewide information.

Design elements:

- Ensure adequate monitoring of fish stock status over time.
- Complement fish status monitoring with monitoring of key habitat indicators at regular intervals.

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- Use a system of reference and “index” areas/watersheds for multi-disciplinary effectiveness and validation monitoring efforts.
- Coordinate with the Interagency Science Advisory Team and Independent Science Panel to ensure scientific quality and integrity.
- Submit monitoring data from habitat projects and other recovery activities to the Salmon and Steelhead Habitat Inventory and Assessment Project.
- Implement sector-oriented adaptive management and monitoring systems, such as the Forests and Fish Report.

Potential implementation structure:

- Monitoring steering committee
- Technical monitoring committee
- Data/GIS support services committee

IV. Monitoring and Adaptive Management: *Are we making progress?*

Monitoring in support of effective decision-making systems is an essential element of the Statewide Strategy to Recover Salmon. An integrated system of monitoring the performance and effectiveness of each element of the strategy will be developed. Each agency/partner will be expected to monitor the implementation of its respective conservation actions.

The first Biennial State of the Salmon Report will be prepared in December, 2000. It will emphasize results from implementation monitoring, but will also contain recommendations on monitoring from the Independent Science Panel. It should also serve as a platform from which to address key salmon population and habitat trend information, including key effectiveness and validation monitoring issues and results. It will help focus on issues and adaptive responses that might be addressed in subsequent years.

Activities underway include:

- Progress and findings from monitoring activities will be published in the Governor’s Biennial State of the Salmon Report in December, 2000.
- The Independent Science Panel will develop recommendations for standardized monitoring indicators and data quality guidelines and will report its findings on monitoring to the legislature and the Governor by the end of the year 2000, or in the Governor’s Biennial State of the Salmon Report.
- The Department of Fish and Wildlife and Treaty Indian fisheries comanagers will continue to monitor trends in the status of fish populations as part of SaSI (Salmonid Stock Inventory).
- Data on salmon projects and recovery activities will be submitted to the Salmon and Steelhead Habitat Inventory and Assessment Project (SSHIAP).
- A system of index watersheds for integrated effectiveness and validation monitoring will be implemented.

If a comprehensive monitoring program is not developed, the default is for the National Marine Fisheries Service and/or the U.S. Fish and Wildlife Service to step in and develop plans. Given the central need for credible and reliable monitoring and decision-management systems, the state would likely lose support for its conservation strategies and actions, increasing the risk of federal intervention and involvement, and reduction in funding support.

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A. List of People who Provided Comments to the Drafts

The Joint Natural Resources Cabinet has encouraged full public participation in the development of this strategy. To date, there have been dozens of work sessions and meetings across the state. We have received pounds of correspondence, and additional feedback through the Internet. The Joint Cabinet and Salmon Recovery Office take comments very seriously, and we have incorporated changes which contribute to the goals of salmon recovery and ESA certainty into this draft. We will begin to update and improve both the strategy and the early action plan in September 2000. We thank everyone who has taken the time to provide us with their thoughts and suggestions.

Mayor Whitney Evenhus, City of Rock Island

Jerry McDonald, Citizen

Pete Fretwell, Citizen

George Simpson, Citizen

Bruce Wulkan, PSAT, Citizen

Jill Will, Jail Industries Board

Kirk B. Mayer, Manager, Washington Growers Clearing House

Tom N. Tucker, Citizen

Dick Pelto, Citizen

Betsy Lyons, IAC, Citizen

John Blanusa, Mayor, City of Buckley

Doug Fricke, Citizen

Jerry Liszak, Ecology, Citizen

Jim Stolarzyk, Citizen

Harriet Beale, Jefferson County Planning Port District

Karla Kay Fullerton, Exec. Vice Pres., Washington Cattlemen's Assoc.

Al Latham, District Manager, Jefferson County Conservation District

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Mason County Conservation District

Kathy Fletcher, Exec. Dir. People for Puget Sound

Pierce County, Office of the County Council

Chuck Mosher, Deputy Mayor, City of Bellevue, Suburban Cities Association

King County

Washington Agriculture & Forestry Education Foundation (WAFEF) Accountability/Restoration Policy Group

Douglas R. Levy, Government Affairs Director, City of Everett

Clallam County Board of Commissioners

Bob Morton, State Senator

John Rants, Mayor, City of Tukwila

Robert Imhof, Whatcom County Council Chair

Troy Colley, District Administrator, Thurston Conservation District Evergreen Students

Jim Kramer, Project Director, Puget Sound Waterways

Dave Clayton, District Manager, Eastern Klickitat Conservation District

Dave Clayton, District Manager, Central Klickitat Conservation District

Kurt Beardslee, Exec. Dir., Washington Trout

Bill Broughton, Washington Rangeland Committee

Thomas A. Waite, Counsel, on behalf of Tri-County Business Coalition

Thurston County Board of County Commissioners

Patricia A. McCleary, Exec. Dir., Washington Water Trust

John W. Hemplemann & Donald E. Marcy - Law Offices of Cairncross & Hemplemann, P.S.

Joel R. Rupley, Board of County Commissioners, Cowlitz County

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Campaign for the Northwest

Betty Sue Morris, Chair, Clark County Board of Commissioners

Cara Berman, EPA Region 10

Bryan Harrison, Director, Pacific County Dept. of Community Development

Thomas Waite, Counsel, The Boeing Company

Parker Blackman, Exec. Dir. Washington Public Interest Research Group

(WASHPIRG) **Letter campaign 1600 postcards and 48 letters**

Billy Frank, Jr. Chairman, Northwest Indian Fisheries Commission (NWIFC)

Jodi C. Walker, Legal Counsel, Building Industry Assoc. of WA (BIA)

Katherine Byrom, Citizen

Dave Raby, Citizen

David S. Mann, President, Washington Environmental Council

Alexandra Russell, Citizen

Tim Purcell, Chairman, Whidbey Island Conservation District

Jim Druffel, Chairman, Palouse Conservation District

Hank Sitko, Exec. Dir., Northwest Marine Trade Assoc.

Wahkiakum County Conservation District

Thomas M. Pors, Foster Pepper & Shefelman PLLC

Robert Turner, Washington Area Director, NMFS

Washington Agriculture & Forestry Education Foundation (WAFEF) - ANS/Salmon Task Force

Jeff Keane, Pres. Douglas County Cattlemen's Association

Eric Espenhorst, Friends of the Earth

Foster Creek Conservation District

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Jim Davis, Citizen, Farmer

Kristen L. Boyles, The Pacific Rivers Council

Butch Ogden, Chairman, Cowlitz Conservation District

Marc Duboiski, Lewis County, Community Development Dept.

Don Brunell, Pres., Assoc. of WA Business (AWB)

Linda M. Johnson, Farm Bureau

The Adopt-A-Stream Foundation, Northwest Stream Center Campaign Co-chairs

Allen Miller, Citizen

Tim Stearns, Policy Director, Save Our Wild Salmon (SOS)

Rachael Paschal, Center for Environmental Law & Policy (CELP)

Lisa L. McShane, Salmon Campaign Coordinator, Northwest Ecosystem Alliance

American Rivers, Northwest Regional Office

Bruce Beckett, Manager, Weyerhaeuser

Stillaguamish Flood Control District

Paul Parker, Policy Director, Washington State Association of Counties

Larry Cochran, President, Washington Association of Conservation Districts (WACD)

Steve Sande, Citizen

DeWayne Granacki, Chairman Legislative Steering Committee, Washington Association of REALTORS

Steve Clagett, Executive Director, 1000 Friends of Washington

Joe Florek, Jr., Chairman, Wahkiakum County Conservation District

William D. Ruckleshaus, Madrona Investment Group

Bellevue Chamber of Commerce

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Sharon Price, Citizen

David Moore, The Pond Shop, Business/Citizen

Jerry Parker, Citizen

Washington Water Power (WWP) - soon to be called Avista Corporation

Ron Figlar-Barnes, Citizen

Lincoln Loehr, Puget Sound oceanographer, Citizen

Dean Dossett, Mayor, City of Camas

Steve McGonigal, Exec. Dir., WA State Nursery & Landscape Association

Bob Wilson, Columbia River Conservation League

Jeff R. Stewart, Citizen

Paul Schell & Margaret Pageler, City of Seattle

Robert D. Lonn, NW Council of Governments & Associates (NWCOGA)

David V. Taylor, Planning Director, Kittitas County Planning Department

Christopher Shaffer, Chairman & Alex McGregor, President, Washington Association of Wheat Growers

Tom Mackay, President, Columbia-Snake River Irrigators Association (CSRIA)

Nick Somero, Chairman, Pacific Conservation District

Roy Kinsman, Chairman, Lewis County Conservation District

Skip Richards, Catalyst Consulting

Scott Yates, Washington Council of Trout Unlimited

Mark C. Blosser, PE, Public Works Dept. City of Olympia

Joseph Bogaard, Save Our Wild Salmon

William J. Viers, Citizen

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David Pearsall, Field & Stream Habitat Enhancement Co.

Ms. Keeva Kroll, Citizen

Richard Wojt, Chair, Hood Canal Coordinating Council

Benton County Commissioners - Resolution

Skip Richards, Catalyst Consulting - 2nd set of comments

Alison Studley, Program Coordinator, Skagit Fisheries Enhancement Group

Randy D. Scott, Evergreen Student

James Jones, Citizen

John D. Schmidt, Citizen

Alfredo Quarto, Co-Director, Mangrove Action Project

Lisa and Steve Walters, Citizens

Daniel A. Hall, Director, Forest Biodiversity Program, American Lands Alliance

Bill Turner, Citizen

Marvin Vialle, Citizen

John R. Murrery, Citizen

Bill Bakke, Director, Native Fish Society

Mike Guerreiro, Citizen

Dave Asker, Citizen

Drs. Thomas and Margo Wyckoff, Citizens

Guillemette Regan, President, Water Conservation Coalition of Puget Sound

Nancy DeVaux, Citizen

Thea Levkovitz, Vice-President, Washington Wildlife Federation

Richard Kennon, President, Clark-Skamania Flyfishers

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Thurston County Board of Commissioners

Steve Fox, Natural Resources Specialist, Whatcom County

Joanne Schuett-Hames, Ecology

Elizabeth Bryer, Citizen

Kurt and Noelle Van Etten, Citizens

Gretchen Starke, Conservation Chair, Vancouver Audubon Society

William A. Franz, P.E. Environmental Engineer, City of Lynnwood

Campaign for the Northwest **Write-in campaign 35 e-mails, 1 fax, 1,364 signatures on petitions**

Julie Muyllaert, Citizen

Steve John, Citizen

Scott A. Martin, DDS, Citizen

Elsa M. Bruton and David L. Edwards, Citizens

David Bean, Director, Wild Salmon Nation

Jacques White, Habitat Project Director, People for Puget Sound

Eric Espenhorst, Friends of the Earth

Steve Johnson, Executive Director, Washington Public Utility Districts (PUD) Assoc. Jim Fox, Interagency Committee for Outdoor Recreation (IAC)

Wm. L. McDowell, Chairman, Board of County Commissioners, Island County

Brady Engvall, Oyster Farmer, Friends of Grays Harbor and Chehalis River Council, Citizen

David Bradley, Ecology

Nancy A. Anderson, Kirk J. Thomson, Thomas A. Waite, Boeing Company

Douglas R. Levy, Government Affairs Director, City of Everett

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Bill Clarke, Assistant Director, Legal and Environmental Affairs, Washington Association of REALTORS

Paul Marshall Parker, Policy Director, Washington State Association of Counties

Rodd Pemble, Citizen

Paul Allen, Citizen

Don Wardlow, Citizen

Mark Follett, Citizen

John E. Galley, Citizen

Brad J. Johnson, District Manager, Asotin County Conservation District

Kerry Peterson, Citizen

Washington Agriculture & Forestry Education Foundation (WAFEF), Salmon Task Force 2nd set of comments

Owen Carter, Co-Chair, Infrastructure Coordinating Committee of Snohomish County (ICC)

Barbara S. Fahey, Mayor, City of Edmonds

Gary E. Mueller, Citizen

Donald M. Bykonen, Citizen

John M. Calhoun, Director, Olympic Natural Resources Center

Katherine P. Ransel, American Rivers

Rod Swanson, Dept. of Public Works, Environmental Services, Clark County

John A. Goldsbury, Benton PUD

Brian Lynn, Nearshore Habitat Work Group Lead

Katie Gordon, Washington State Potato Commission

Cindy Moore, Water Quality Protection Manager, Dept. of Agriculture

James R. Anderson, Executive Director, Northwest Indian Fisheries Commission

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Mike Devlin, Citizen

Rochelle D. Smith, Student

Western Washington Farm Crops Association

Jim Mansfield, Citizen

Clement Savaikie, Citizen

Chuck Clarke, Regional Administrator, United States Environmental Protection Agency

Charles D. Haire, Citizen

Scott A. Martin, DDS, Citizen

Tod Bristol, Citizen

Ramon L. Kent, Stewardship Forester

Frances L. Lynn, Citizen

Julia Riera, Student

David L. Bovy, Citizen

R. Millbach, Citizen

Nick Konwent, Citizen

Dena Cox, Citizen

Craig Richards, Citizen

Donald R. Clark, Citizen

Jack Kaeding, Executive Director, Fish First

Michael Cowin, Citizen

Fred Price, Citizen

M.D. Morgan, Citizen

Wildcat Steelhead Club, Inc.

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Jim Malinowski, Clark County ESA Task Force, Citizen

Jim Reimann, WSPC Chair, Pat Boss, WSPC Executive Director

Peter M. Rackov, Citizen

Gritfish

Maxine Keesling, Citizen

Art Gardener, Citizen

Bruce Tipton, Citizen

Jane Kelley, Citizen

Lynn Cash, Citizen

Cathy Lear, Clallam County, Citizen

Bruce Verhei, Citizen

Michael Hagen, Hagen Consulting, Citizen

Leslie Drozen, WashPIRG Environmental Associate

J. Arn Thoreen, Citizen

Margaret E. Delp, American Rivers

Fred V. Habenicht, Citizen

Francois X. Forgette, President, Board of Directors, Tri-City Area Chamber of Commerce

Joe Ginsburg, Citizen Response

Stewart Hartman, Citizen Response

John Squires, CPR-FISH, Cowlitz Plan for Restoration FISH

Edward D. Hansen, Mayor, City of Everett, AWC President

Louis Kannenberg, Citizen

Amy Parker, Citizen

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George Follmer, Citizen

Ed Johnson, Citizen