Strategy

STATEWIDE STRATEGY TO RECOVER SALMON

EXTINCTION IS NOT AN OPTION

November 1999

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

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Laura Johnson, Director, Interagency Committee for Outdoor Recreation

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Jeff Koenings, Director, Department of Fish and Wildlife

Nancy McKay, Chair, Puget Sound Water Quality Action Team

Steve Meyer, Executive Director, Conservation Commission

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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

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
PFP	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

Key Near-Term Milestones for Washington State Salmon Recovery Strategy

1997 | 1998 | 1999 | 2000

- May - Joint Natural Resources Cabinet formed
- Sept - Government Council on Natural Resources created

- Jan - State Salmon Strategy Framework developed and released
- March - Joint Cabinet submits Final Draft of the Lower Columbia River Steelhead Conservation Initiative to NMFS.
- April - Legislature provides $36 million in state budget for salmon recovery; passes two major salmon bills; and creates Governor's Salmon Recovery Office
- May - Governor requests through Washington Senators Murray and Gorton and Representative Dicks $30 million federal funds for state salmon recovery efforts

- July - Governor's Salmon Recovery Office established
- July - Watershed Planning initiated (HB2514) Objective: assess water use, needs, and availability and develop strategies to meet future water needs. Options: address instream flows, water quality, and fish habitat.
- Sept/Oct - Working draft of State Salmon Recovery Strategy released
- Sept/Oct - Joint Cabinet has working meetings with other governments and tribes, key stakeholders
- Nov/Dec - Governor announces proposed Salmon Recovery budget priorities
- Dec/Jan - State presents draft Recovery Strategy to Legislature

- Jan - State receives $20 million federal funds for state salmon recovery efforts
- Jan/May - Legislature passes Timber and Fish Bill (HB 2091); also creates Salmon Recovery Funding Board (2E2SSB 5595)

- July –First meeting of state Independent Science Panel
- Sept/Oct –Joint Cabinet releases first draft of early action (implementation) plan
- Sept - Formal talks begin on protection guidelines for agricultural lands

- Dec - State of Salmon Report

I. A Sense of Urgency

Overview

Salmon, steelhead and trout[1] 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.

Much has been written on salmon biology and their environmental needs and the increasingly adverse impacts on salmon populations and habitats caused by human activities. (See Chapter VII. C for list of references.) 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;

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[1] For the purposes of the Strategy, the term "salmon" will be used to refer to all species of salmon, steelhead, trout and char native to Washington State.

- high quality estuarine, nearshore and marine habitats;
- adequate supply of food, cover and refuge from predators;
- unimpeded access to and from freshwater.

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 (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 approval to new projects.

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. Table 1. shows the salmonids listed, proposed for listing, or likely to be listed under the ESA by Salmon Recovery Region.

Table 1. Washington Salmonids (salmon, trout, and steelhead) listed, proposed for listing, or likely to be listed under the Endangered Species Act

Salmon Recovery Region	Species of Concern
Puget Sound	• Chinook listed as "threatened" (3/24/99; 64 FR 14308) • Bull Trout proposed as "threatened" (6/10/98; 63 FR 31693) • Hood Canal Summer Chum listed as "threatened" (3/25/99; 64 FR 14508) • Coho designated as a candidate for listing under the ESA (7/14/97; 62 FR 37560)
Washington Coastal	• Bull Trout proposed as "threatened" (6/10/98; 63 FR 31693) • Lake Ozette Sockeye listed as "threatened" (3/25/99; 64 FR 14528) • SW WA Coho potential as "threatened;" Olympic Peninsula coho potential for re-opening status review. • Cutthroat Trout proposed as "threatened" 4/05/99; 64 FR 16397)
Lower Columbia River	• Steelhead listed as "threatened" (3/19/98; 63 FR 13347) • Chum listed as "threatened" (3/25/99; 64 FR 14508) • Chinook listed as "threatened" (3/24/99; 64 FR 14308) • Bull Trout listed as "threatened" (6/10/98; 63 FR 31647) • Cutthroat Trout proposed as "threatened" 6/05/99; 64 FR 16397) • Coho designated as a candidate for listing under the ESA (7/14/97; 62 FR 37560)
Upper Columbia River	• Steelhead listed as "endangered" (8/18/97; 62 FR 43937) • Spring run Chinook listed as "endangered" (3/24/99; 64 FR 14308) • Bull Trout listed as "threatened" (6/10/98; 63 FR 31647) • Westslope Cutthroat Trout high potential for listing as "threatened"
Mid Columbia River	• Steelhead listed as "threatened" (3/25/99; 64 FR 14517 • Bull Trout listed as "threatened" (6/10/98; 63 FR 31647) • Westslope Cutthroat Trout high potential for listing as "threatened"
Northeast Washington	• Bull Trout listed as "threatened" (6/10/98; 63 FR 31647) • Westslope Cutthroat Trout high potential for listing as "threatened"
Snake River	• Sockeye listed as "endangered" (11/20/91; 56 FR 58619) • Spring/summer Chinook listed as "threatened" (4/22/92; 57 FR 14653) • Fall Chinook listed as "threatened" (4/22/92; 57 FR 14653) • Steelhead listed as "threatened" (8/18/97; 62 FR 43937) • Bull Trout listed as "threatened" (6/10/98; 63 FR 31647)

II. Background: Setting the Context

A. 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.

1. Salmon Species in Washington

The life cycles of salmon, steelhead, and trout vary widely. (See Figure 1. Salmon Life Cycle.) 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 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 “evolutionarily 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.

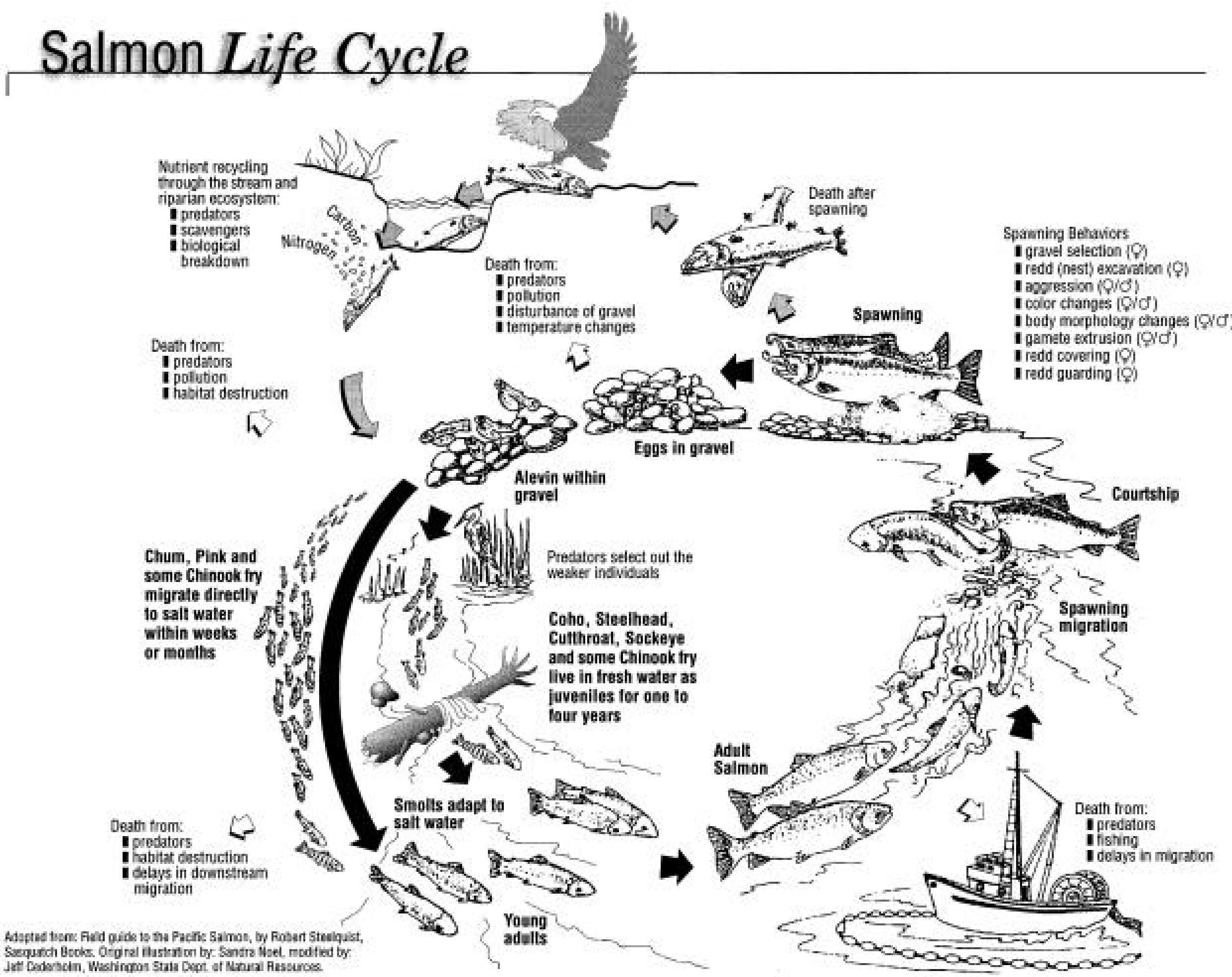
Steelhead
Steelhead are the anadromous form of rainbow trout. They belong to the same scientific genus as other Pacific salmon and coastal cutthroat trout. They are highly prized by anglers. Steelhead spawn in mainstem and upriver tributaries, and juveniles typically rear in freshwater from one to three 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 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 re-colonize 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.

Figure 1.



2. Critical 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.

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 size
- 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. (See References - NMFS Coastal Salmon Conservation, 1996)

Freshwater Habitat

Freshwater habitat consists of four major components: 1) habitat for spawning and incubation; 2) juvenile rearing habitat; 3) juvenile and adult migration corridors; and 4) 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, salmon 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 input, 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.
- Food - Aquatic plants, organic litter, and insects are the main 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 support 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, reduce flooding by retaining stormwater during high-flow periods, and maintain a natural flow discharge into marine waters because of their capacity to store flood waters and release them slowly over time.

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. In addition, coastal marshes are important for the absorption of toxic compounds, nutrients, and bacteria.

Human activities induced major changes to estuarine and nearshore habitats from shoreline armoring, port development (deepening), over-water structures, passage barriers like docks and dams, and degradation of water quality from adjacent upland uses.

3. 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). More than 75% of the state will likely be affected by ESA listings of salmon. (See Table 1. Chapter I. A Sense of Urgency.)

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. Puget Sound stocks are intermediate between coastal and Columbia River stocks.

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), include spring/summer chinook, coho, sockeye, sea-run cutthroat and steelhead, and non-anadromous species. They 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.

Table 2. is a summary of salmonid stock status. [1]

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[1] **Healthy**- A stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock.

Depressed – A stock of fish whose productions is below expected levels based on available habitat and natural variations in survival rates but above the level where permanent damage to the stock is likely.

Critical – A stock of fish experiencing production levels that are so low that permanent damage to the stock is likely or has already occurred.

Unknown – There is insufficient information to rate stock status.

Extinct – A stock of fish that is no longer present in the original range, or as a distinct stock elsewhere. Individuals of the same species may be observed in very low numbers consistent with straying from other stocks.

Table 2. Regional and statewide summary of salmon and steelhead[2] and Bull trout and Dolly Varden[3] stock status

	HEALTHY		DEPRESSED		CRITICAL		UNKNOWN		EXTINCT[4]	
PUGET SOUND	**Salmon/ Steelhead**	**Bull Trout Dolly Varden**	**Salmon/ Steelhead**	**Bull Trout Dolly Varden**	**Salmon/ Steelhead**	**Bull Trout Dolly Varden**	**Salmon/ Steelhead**	**Bull Trout Dolly Varden**	**Salmon/ Steelhead**	**Bull Trout Dolly Varden**
North Puget Sound	27	2	12	0	4	0	28	7	0	0
South Puget Sound	40	0	7	0	1	0	13	6	1	0
Hood Canal	17	1	11	0	1	0	7	2	0	0
Strait of Juan de Fuca	9	1	14	0	5	0	12	3	0	0
TOTALS	**93**	**4**	**44**	**0**	**11**	**0**	**60**	**18**	**1**	**0**
COASTAL										
North Coast	35	1	4	0	0	0	33	5	0	0
Grays Harbor	21	0	3	0	0	0	4	1	0	0
Willapa Bay	9		1		0		5		0	
TOTALS	**65**	**1**	**8**	**0**	**0**	**0**	**42**	**6**	**0**	**0**
COLUMBIA										
Lower Columbia	18	0	35	1	0	0	7	0	0	0
Upper Columbia	11	9	35	1	1	6	4	34	0	0
TOTALS	**29**	**9**	**70**	**2**	**1**	**6**	**11**	**34**	**0**	**0**
515 TOTAL STOCKS	**187**	**14**	**122**	**2**	**12**	**6**	**113**	**58**	**1**	**0**
% OF TOTALS FOR SALMON AND STEELHEAD	**43%**		**28%**		**3%**		**26%**		**0%**	
% OF TOTALS FOR BULL TROUT AND DOLLY VARDEN	**18%**		**3%**		**8%**		**72%**		**0%**	

[2] Source from 1992 Washington State Salmon and Steelhead Stock Inventory (SASSI)
[3] Source from 1998 Salmonid Stock Inventory (SaSI)-Bull Trout/Dolly Vardon Appendix
[4] The Extinct rating is included here to identify any current and future losses of stocks identified during the annual review and inventory of Washington's wild salomonid stocks.

B. Factors Contributing to Salmon Declines

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

1.   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 human activities that affect salmon, grouped as harvest, hatcheries, habitat, or hydropower. 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, estuarine, and shoreline ecosystems. Salmon recovery planning should be based on an understanding of these natural phenomena, the likelihood and frequency of their occurrence, and their implications for salmon production.

Wild salmon have evolved in conjunction with their natural predators, including marine mammals, birds and fishes. 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. Human actions can also directly affect predation abundance and predation rate on salmon.

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.

Climatic changes can affect 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 seasonal, annual, decadal, and longer time scales. Our ability to predict climate 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. Dr. Robert Francis of the University of Washington puts it this way:

> "I know some people will look at the data (declining salmon runs) and say it's the ocean' fault. I would say that it's clearly not the ocean's fault. Salmon have survived changing ocean conditions for thousands of years, but the big decline in the runs occurred in recent decades. So you have to ask yourself, what's occurred during that time - what's different? And the clear answer is man's impact - dams, habitat destruction, over fishing, hatcheries. We can't use the ocean as an excuse to stop our efforts to improve passage, spawning, and rearing conditions."

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 longer term 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 array of invertebrate life, and support 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, 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 role in limiting the recovery of wild salmonid stocks.

Scientific information indicates that populations of seals and sea lions in the Pacific Northwest 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.

Various efforts have explored seal and sea lion predation on salmonids but quantifiable data on consumption rates are scarce, as noted in a National Marine Fisheries Service (NMFS) report published in 1997. This report summarized the findings of an interagency group working on the issue ("Impacts of California Sea Lions and Pacific Harbor Seals on Salmonids and on the Coastal Ecosystems of Washington, Oregon, and California"). The report suggested that although predation by the seals and sea lions is not the principal factor causing the decline of salmon population, it is a factor that may effect salmon recovery. The NMFS report indicated that concern was warranted where known or potential predation impacts are known to occur, and in areas with depressed or significantly declining salmonid stocks exist.

The National Marine Fisheries Service (NMFS) submitted, as a follow-up to its 1997 report, 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 seal 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 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 relatively high in recent years and they are natural predators on salmon. 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, murres, 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. 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 Caspian Tern Working Group comprised of federal, state, and tribal entities is actively involved in developing a strategy to address predation risks posed by the terns and a relocation program is being prepared for implementation. In the spring of 1999 Department of Fish and Wildlife (WDFW) and local volunteers helped National Marine Fisheries Service and U.S. Army Corps of Engineers erect hundreds of rows of plastic mesh fences across seven acres of Rice Island to discourage terns from nesting. The idea is to move the birds 17 miles downstream to East Sand Island, a natural island in the Columbia River. This will allow the birds to feed off other species such as sculpins and shiner perch because of the closer proximity to the ocean.

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.

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.

2. 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; over-fishing 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.

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, altered stream habitat, 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.

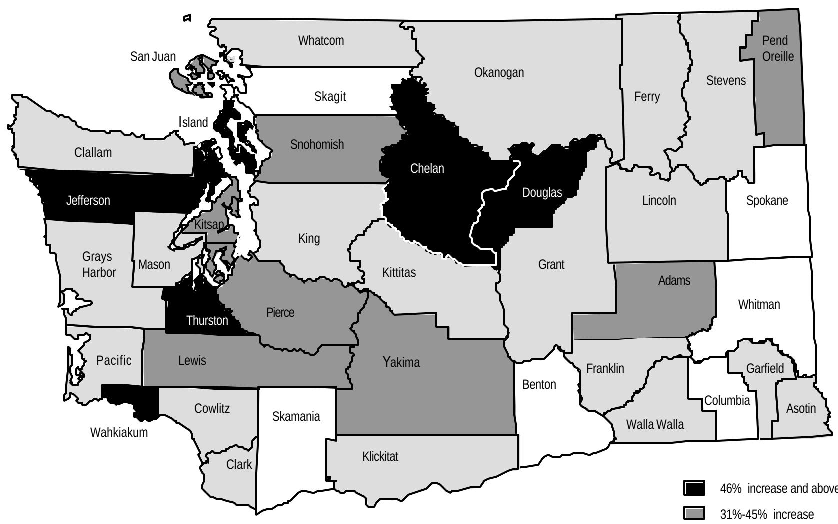
Forest management activities such as road building, timber harvest near streams or on steep or unstable areas, and the application of chemicals have damaged fish habitat and water quality. The most profound impacts include: increased stream temperature, diminished opportunities for large woody debris 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. Map 1 shows the increase in urban land over a ten year period due mostly to the population growth experienced during that period.

Map 1 – Increase in Urban Land*
Percentage Change (1982 – 1992)



46% increase and above
31%-45% increase
16%-30% increase
1%-15% increase

*Total increase of urban land use (non-federal) is 294,000 acres. Urban land includes urban areas greater than 10 acres in size as defined by the Natural Resources Conservation Service.

SOURCE: National Resources Inventory, Natural Resources Conservation Service, 1992.

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.

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.

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.

Research conducted by the University of Washington, and experiences recorded by King County on small Puget Sound lowland watersheds and larger watersheds (e.g., Cedar River) have demonstrated that the biological and physical health of stream and wetland systems are degraded by urbanization. The geographic extent and degree of degradation is roughly equivalent to the geographic extent and degree of urbanization that has occurred upstream. The incremental degradation is most rapid in the first stages (up to 10% of total impervious area created) of development within a watershed. The rate of degradation becomes more constant as urbanization progresses. Alteration of the watershed hydrologic regime is the leading cause for the degradation, with increases in the frequency and duration of high and low streamflows the most obvious problems. The loss of adequate riparian zones, chemical and physical water quality degradation, and construction of fish passage barriers are also products of urbanization that contribute to habitat degradation and loss. (*Salmon in The City, May 20 – 21, 1998, Mount Vernon, WA, Abstracts*)

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. Changes in the frequency and duration of both floods and low flows due to land use and water development activities 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. (See map included in Chapter IV. A. 5. Ensuring Adequate Water in Streams for Fish.) 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 not provide sufficient 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 (due to loss of riparian canopy or water withdrawal) and higher concentrations of pollutants (due to land use impacts), 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 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 eleven major hydropower dams on the Columbia River within Washington State now block or impede the progress of fish on their way to and from the Pacific Ocean. Furthermore, thousands of square miles of salmon habitat are inundated or inaccessible due to the reservoirs behind the dams.

Construction and management of hydropower dams have dramatically altered flows and riparian habitat by diverting and impounding rivers and streams throughout Washington State. Dams and hydropower operations modify the level, timing, frequency and duration of stream flows; block fish movement both upstream and downstream; dewater stream segments below dams; cause loss of upstream habitat; and increase predation in reservoirs. Smolts and juvenile fish migrating downstream through the reservoirs encounter slower moving water, which increases the time it takes for them to reach the ocean. These altered migration patterns increase 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 and hydropower operations impact downstream habitat. Channel structure and erosion sedimentation patterns are drastically altered.

Dams reduce water quality by altering water temperature and decreasing oxygen levels. 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. 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.

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 Washington Aquatic Nuisance Species Planning Committee published the1998 Washington State Aquatic Nuisance Species Management Plan, approved by the Governor. The strategies outlined in the plan together with those of the Puget Sound Water Quality Exotic Species Work Group identified ways to reduce the impact of aquatic nuisance species while protecting salmon habitat in the process. The state strategies for prevention and control of invasive species include:

- *Prevention and control action* - Identify 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. Develop an action plan to deal with potential aquatic invasive species before they enter state waters. Work with specific industries and user groups to modify existing practices or to implement new protocols. Evaluate current eradication and control programs (state, federal, local programs) and either maintain or elevate funding when necessary. Control the spread of Spartina and working toward eradicating known infestations. Place potential invasive plants and animals on a quarantine list that prohibits their sale or transport within Washington. Contain large populations of established aquatic nuisance species to reduce their size and expansion. Enforce current laws governing aquatic nuisance species.

- *Monitoring and data collection* – Assemble a task for to design and develop a monitoring and response plan to prevent further aquatic nuisance species invasions. Design and conduct a risk assessment for each invasive species to identify waters that are at risk of infestation by the species. Monitor freshwater non-indigenous plants and animals in lakes and rivers. Develop and maintain lists of non-native species known to occur in Washington. Make baseline survey and distribution data for aquatic nuisance species available to local, state and federal governments and other interested parties.

- *Education* - Develop and provide information on aquatic nuisance species to appropriate resource managers and key decision-makers. Develop and distribute educational information targeted at specific pathways of introductions that involve the public. Develop and provide information on aquatic nuisance species identification and biology to appropriate resource managers. Compile, develop, and coordinate the dissemination of educational materials on aquatic nuisance species to increase public awareness of the aquatic nuisance species problem.

- *Coordination* – Review and enforce current laws governing aquatic nuisance species and salmon in Washington State and identify gaps, overlaps, and contradictions that may exist. Make recommendations to improve the ability to protect Washington waters from the introduction and spread of aquatic nuisance species. Identify all local, state, and federal agencies responsible for the management of aquatic nuisance species in Washington waters and created a forum for these agencies to work together and coordinate resources and efforts.

In addition to the above state actions on February 3, 1999, the President of the United States issued Executive Order 13112 on Invasive Species. The Order supplements federal activities authorized under the 1990 Non-indigenous Aquatic Nuisance Prevention and Control Act and the 1996 National Invasive Species Act. The Order establishes an Invasive Species Council (with members representing Departments of Commerce, Interior, Agriculture, Defense, State, Treasury, and Transportation) to oversee the implementation of the Order and to ensure that activities of federal agencies concerning invasive species are coordinated effective and cost-efficient. The Council has 18 months to issue the National Invasive Species Management Plan to advance methods to prevent the introduction and spread of exotics in order to minimize the impacts of invasive species.

Table 3. summarizes how fresh water habitat alterations discussed above affect salmon. The table is reprinted with the permission of the author, Bisson. It is taken from the article "Degradation and loss of Anadromous Salmonid Habitat in the Pacific Northwest", by Stanley Gregory and Peter Bisson (1997). The last column illustrates activities that are likely to cause alteration and degradation of habitat conditions.

Table 3. Types of habitat alteration and effects on salmonid fishes in the Pacific Northwest. Reproduced with permission of the author, Bisson[5]

Ecosystem feature	Altered component	Effects on salmonid fishes and their ecosystems	Activities Likely to affect salmon and their ecosystems
Channel Structure	Floodplains	Loss of overwintering habitat, loss of refuge from high flows, loss of inputs of organic matter and large wood	Activities that remove and alter riparian vegetation, remove or alter rates of large woody debris, increase sediments, alter shorelines and streambanks, alter the channel and stream beds, divert water, alter or contribute to loss of wetlands and floodplains -Forest practices, agricultural practices, urbanization, road construction, sand and gravel removal, water diversions and flood control are likely to cause the impacts listed in column 3.
	Pools and riffles	Shift in the balance of species, loss of deep water cover and adult holding areas, reduced rearing sites for yearling and older juveniles	
	Large wood	Loss of cover from predators and high flows, reduced sediment and organic matter storage, reduced pool-forming structures, reduced organic substrate for macroinvertebrates, formation of new migration barriers, reduced capacity to trap salmon carcasses	
	Substrate	Reduced survival of eggs and alevins, loss of interstitial spaces used for refuge by fry, reduced macroinvertebrates production, reduced biodiversity	
	Hyporheic zone	Reduced exchange of nutrients between surface and subsurface waters and between aquatic and terrestrial ecosystems, reduced potential for recolonizing disturbed substrates	
Hydrology	Discharge	Altered timing of discharge-related life cycle cues (e.g., migrations) changes in availability of food organisms related to timing of emergence and recovery after disturbance, altered transport of sediment and fine particulate organic matter, reduced biodiversity	Diversion of water for irrigation, municipal and industrial uses, flood control structures, compaction of soils, creation of impervious surfaces, discharge of stormwater, sewer, and runoff, dams and hydropower operation, removal of vegetation, and fish passage barriers- Agricultural irrigation, forest practices, urbanization, dams and hydropower operation, and sand and gravel removal are examples of activities affecting the hydrologic needs of salmon.
	Peak flows	Scour-related mortality of eggs and alevins, reduced primary and secondary productivity, long-term depletion of large wood and organic matter, involuntary downstream movement of juveniles during freshets, accelerated erosion of streambanks	
	Low flows	Crowding and increased competition for foraging sites, reduced primary and secondary productivity, increased vulnerability to predation, increased fine sediment deposition	
	Rapid fluctuations	Altered timing of discharge-related life cycles cues(e.g., migrations), standing, intermittent connections between mainstream and floodplain rearing habitats, reduced primary and secondary productivity	
Sediment	Surface erosion	Reduced survival of eggs and alevins, reduced primary and secondary productivity, interference	Vegetation removal, stormwater discharge, return flows and runoff, streambank and

[5] The first three columns of the table are excerpted from Gregory and Bisson (1997) table1. Contained in the article on "Degradation and Loss of Anadromous Salmonid Habitat In the Pacific Northwest".

	Mass failures and landslides	with feeding, behavioral avoidance and breakdown of social organization, pool filling Reduced survival of eggs and alevins, reduced primary and secondary productivity, behavioral avoidance, formation of upstream migration barriers, pool filling addition of new large structures to channels	shoreline alteration,- forest practices, agricultural practices, shoreline development, urban Stormwater, residential, industrial and commercial development are among the activities causing sedimentation.
Water quality	Temperature Dissolved Oxygen Nutrients	Altered adult migration patterns, accelerated development of eggs and alevins, earlier fry emergence, increased metabolism, behavioral avoidance at high temperatures, increased primary and secondary production, increased susceptibility of both juveniles and adults to certain parasites and diseases, altered competitive interactions between species, mortality at sustained temperatures >23-29ºC, reduced biodiversity Reduced survival of eggs and alevins, smaller size at emergence, increased physiological stress, reduced growth Increased primary and secondary production, possible anoxia during extreme algal blooms, increased eutrophication rate of standing waters, certain nutrients(e.g. non-ionized ammonia some metals) possibly toxic to eggs and juveniles at high concentrations	Removal of riparian vegetation, removal of large woody debris, alteration of streambank and channel, water diversions, hydropower operation, alteration of wetlands, estuaries, and floodplain- Forest practices, agricultural practices, urban stormwater, water diversion, dams, and hydropower are among the activities resulting in increased water temperature, decreased level of oxygen in the water and excess nutrients.
Riparian forest	Production of large wood Production of food organisms and organic matter Shading Vegetative rooting systems and streambank integrity Nutrient modification	Loss of cover from predators and high flows, reduced sediment and organic matter storage, reduced pool-forming structures, reduced organic substrate for macroinvertebrates Reduced heterotrophic production and abundance of certain macroinvertebrates, reduced surface-drifting food items, reduced growth in some seasons Increased water temperature, increased primary and secondary production, reduced overhead cover, altered foraging efficiency Loss of cover along channel margins, decreased channel stability, increased streambank erosion, increased landslides Altered nutrient inputs from terrestrial ecosystems, altered primary and secondary production	Removal of vegetation, mass wasting, sedimentation, removal of large woody debris, and conversion of forest land are key contributors to this effect on salmon.
Exogenous materials	Chemicals Exotic organisms	Reduced survival of eggs and alevins, toxicity to juveniles and adults, increased physiological stress, altered primary and secondary production, reduced biodiversity Increased mortality through predation, increased interspecific competition, introduction of disease, and increased habitat degradation	Increased sediment discharge, use of pesticides and herbicides, urban and industrial stormwater, waste water discharge, mining dredging, road maintenance- Forest and agricultural practices, residential, commercial and industrial developments and human introduction of exotic species are causes of this effect.

C. 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 (including development of recovery plans);
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.

Under the ESA a species is defined to include "any subspecies of fish or wildlife or plants, or any distinct population segment of any species of vertebrate fish and wildlife which interbreeds when mature". The National Marine Fisheries Service (NMFS) has adopted a definition to further clarify the meaning of subspecies and distinct population segment. The definition of species is based on the concept of "evolutionary significant units" or "ESUs" (Waples 1991). The goal of the ESU concept is to ensure viability of the biological species by conserving the genetic diversity of species and the ecosystems that species inhabit, two of the fundamental goals of ESA (Waples 1991). The decision to list is made under section 4 of the ESA, by either the USFWS (for terrestrial species) or by NMFS (for all marine species with few exceptions).

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 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.

Since 1973 private, state, local, tribal and federal actions have increasingly been impacted by the regulatory requirements of ESA and have been subject to many consequences for not complying with those requirements. The followings are pertinent examples of ESA consequences:

- Restrictions on the ability of farmers to use water: Courts have held in California that state water rights do not prevail over the requirements of the ESA when there is a conflict. For example, a court forced an irrigation district with a very senior (1883) water right to change its practices regarding use of a water diversion channel (U.S. v. Glenn Colussa, 1992). In another instance, the National Marine Fisheries Service (NMFS) required an irrigation district to install a fish screen to protect a listed species (Anderson-Cotton Irrigation District, 1991). In other California cases, irrigators lost use of significant allocations of water, despite contracts with the federal Bureau of Reclamation, because of the needs of ESA- listed species (Orange Cove, 1997; O'Neill v. U.S., 1995; Westland Water District, 1993). In an administrative action, NMFS prevented an Oregon agriculture corporation from further exercising its water right by preventing the corporation from installing a pump to withdraw water from the Columbia River.

- Restrictions on dam operations and power generation: Operations of the Snake and Columbia River dams were modified significantly because of listed fish in the Columbia River Basin. As a result, water that would be used for power generation was kept in river to speed the down river migration of listed fish species, costing annually well over a hundred million dollar in foregone revenue from power generation.

- Restrictions on commercial fisheries: In Alaska, the National Oceanic and Atmosphere Administration determined that one of the world's most lucrative fisheries was reducing the availability of food for the Stellar sea lion, a protected species under the ESA. As a result, significant restrictions were placed on the pollack fisherey, costing commercial fishermen millions of dollars in lost revenue.

- Restrictions on private citizens and state and local governments: In a series of court cases around the country, the reach of the ESA extended to the local level. In Massachusetts, state officials were found in violation of the ESA by issuing licenses and permits allowing fishing in a manner which jeopardized the northern right whale, an ESA listed species (Strahan v. Coxe, 1997). In Florida, local government was held liable for failing to regulate actions which harmed threatened sea turtles (Loggerhead Turtle v. Volusia County Counci, 1995). In another Massachusetts case, a court issued a permanent injunction to ban off-road vehicles (ORVs) from using a beach until the local government follows guidelines to protect piping plovers, a listed shorebird (U.S. v. Town of Plymouth, 1998). In a landmark case establishing the clear authority of the ESA over habitat, a court in Hawaii held that the state" practice of allowing goats and sheep in the habitat of the endangered palila bird was a violation under the ESA (Palila v. Hawaii Department of Natural Resources, 1988). In Oregon, a federal judge threw out a state conservation plan to protect coho in an effort to prevent an ESA listing; the court said that Oregon's plan was based on voluntary actions, which provide no certainty that the fish would be protected.

- Restrictions on timber harvest: In the Pacific Northwest, a federal judge issued an injunction resulting in the shutdown of timber harvest on federal forest land until the federal government drew up a timber harvest plan that protected the northern spotted owl, an ESA listed species. Such a plan was drawn up for the federal forest, resulting in significant reductions in timber harvests with corresponding economic impacts on timber companies, loggers and rural communities. The ESA requirements for the spotted owl also resulted major reductions in harvest from millions of acres of private and state forest land in the Pacific Northwest.

D. Summary

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

- First, 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.
- Second, 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.

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.

A. Current Conditions

1. 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 to proceed. 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 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.

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 1999 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 salmon recovery strategy, 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.

2. Co-Manager Cooperative Efforts
Since 1992, the Department of Fish and Wildlife (WDFW) and the tribal co-managers have been implementing a Wild Stock Recovery Initiative, including a Salmon and Steelhead Stock Inventory (SASSI) 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 includes comprehensive hatcheries planning. In December 1997 the WDFW 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.

3. 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. (See map 2 Salmon Recovery Regions)

- ***Regional Salmon Recovery Entities***

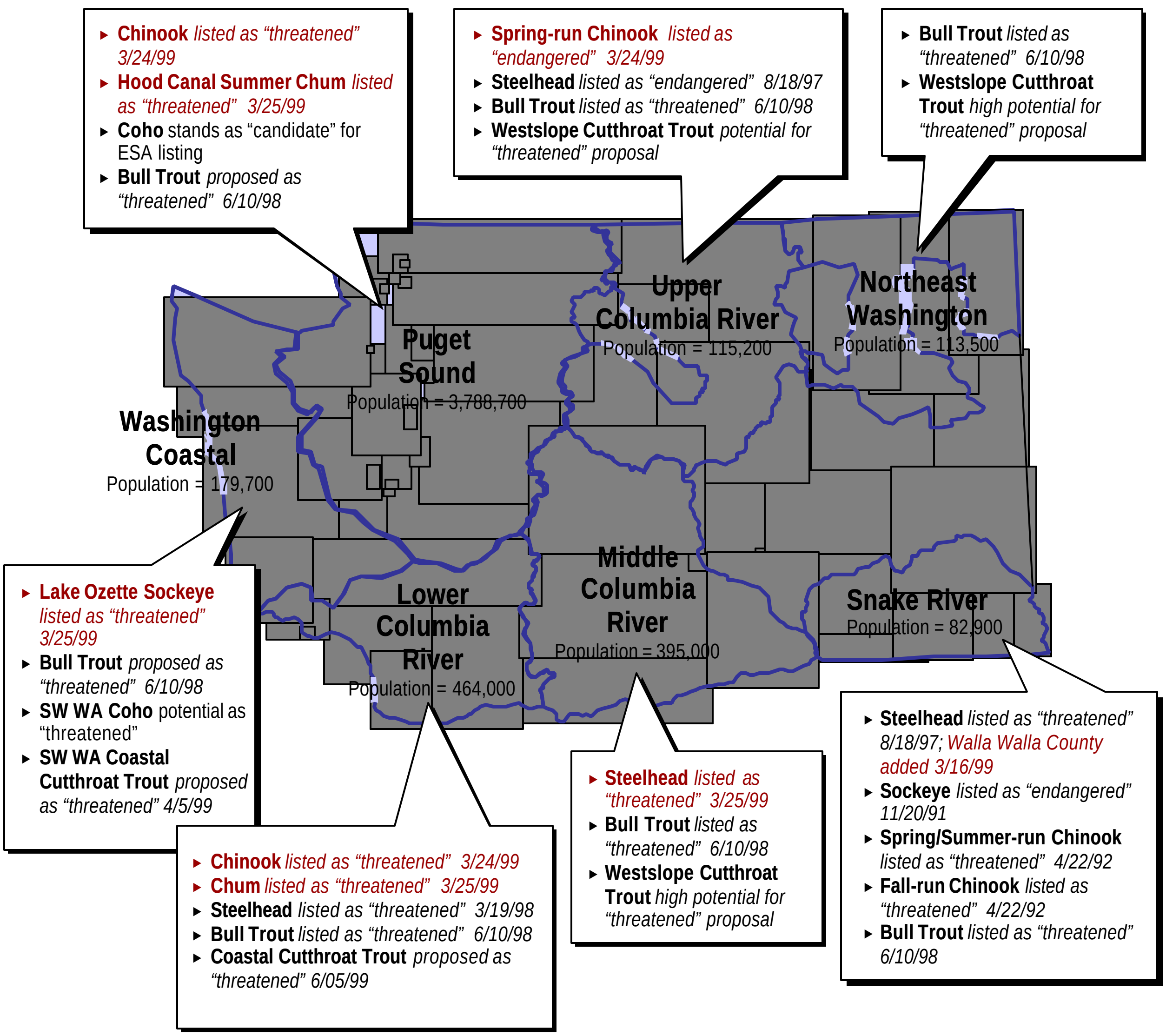
Although at this time there are not many incentives for the various governmental jurisdictions to pool their salmon recovery resources and create regional entities to oversee effort, some regional efforts are underway. These include:

> *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. The Board is forming a partnership with the Lower Columbia River Estuary Program to address salmon recovery issues for the lower Columbia River and estuary.
>
> *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.
>
> *North Central Washington Resource Conservation and Development Council* - Recently appointed by stakeholders to coordinate habitat components of salmon recovery, this entity represents the Upper Columbia Salmon Recovery Region.

Map 2

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**



WASHINGTON STATE
Governor's Salmon Recovery Office
August 4, 1999

***New listings** as of April 1, 1999.*

Human population estimates, April 1, 1998, from the Office of Financial Management.

B. Science is our Guide

1. Role of Science

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.

Incorporating science into the complex natural resource policy and management decisions required in salmon recovery planning presents enormous challenges and unknowns. For example, although agencies and other scientists have been conducting research on salmon, steelhead, and trout and their habitats for many years, such work has typically been conducted over periods of relatively short duration and has not been aimed at comprehensive recovery issues in a long-term context. Moreover, the natural world is extremely complex and dynamic and does not lend itself well to the type of studies performed in laboratories where variables can be controlled and examined one at a time. Attributes of watersheds, the broader ecosystems of which they are a part, and the species that inhabit them, change in multiple ways and over long time scales. These time scales are much longer than budget cycles, terms of office, or the professional careers of scientists. Natural systems and human institutions are full of surprises. They often do not respond as we might expect.

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.

2. 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.

3. 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.

An example of a scientific foundation aimed at protection and restoration of fish and wildlife in the Columbia River Basin, as drafted by the Northwest Power Planning Council in 1998, includes the following principles:

- *The abundance and productivity of fish species reflect the conditions they experience in their ecosystems over the course of their life cycle.*
- *Natural ecosystems are dynamic, evolutionary and resilient.*
- *Ecosystems are structured hierarchically.*
- *Ecosystems are defined relative to specific communities of plant and animal species.*
- *Biological diversity accommodates environmental variation.*
- *Ecosystem conditions develop primarily through natural processes.*
- *Ecological management is adaptive and experimental.*
- *Human actions can be key factors in structuring ecosystems.*

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. Further discussion of the scientific foundation is contained in Chapter VI. Adaptive Management and Monitoring.

4. 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 does not have authority to make policy decisions. Members were appointed by the Governor in May, 1999. Science review at the project level are anticipated as required by the 1999 Salmon Recovery Funding Act.

Plans are also underway to integrate various scientific review 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 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.

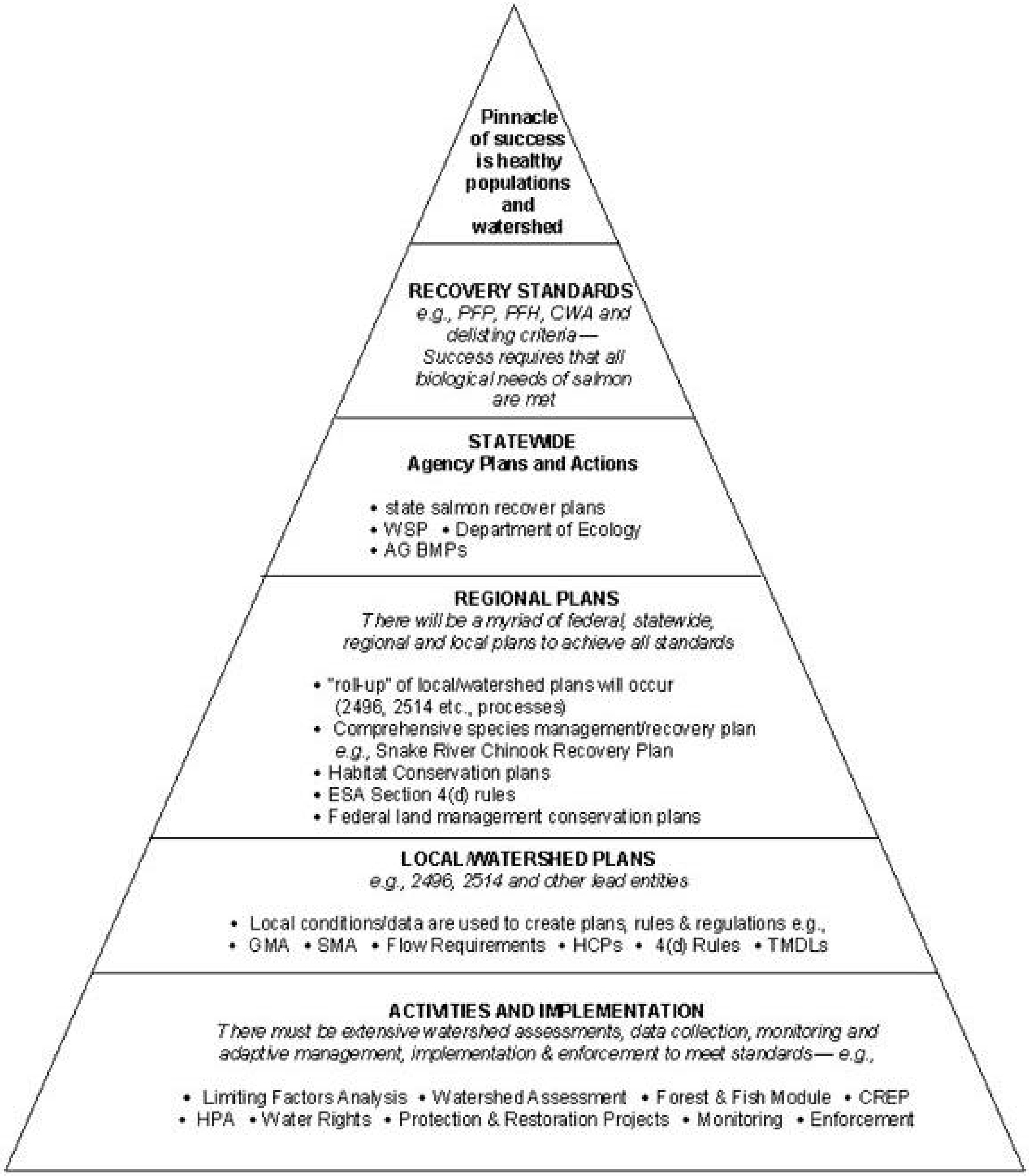
As will be discussed further in the strategy, the use of scientific review groups is not the only mechanism through which the Statewide Strategy to Recover Salmon will receive and use scientific information. State agencies and other partners can draw upon their scientific resources in developing recovery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

C. 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, where locals are in conformance with state standards and guidelines, 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. Essential building blocks for recovery are illustrated by the pyramid "Building Blocks of Salmon Recovery and discussed on the following pages.

Figure 2. Building Blocks of Salmon Recovery



1. 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 pyramid. 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."

2. 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. 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.
- 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 best available 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 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 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.

State Approach to Achieving ESA Compliance

The approach is as follows:

- 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.

The 1999 Salmon Recovery Funding Act (2ESSSB 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 1998 Watershed Management Act (ESHB 2514), the 1998 Salmon Recovery Planning Act (ESHB 2496), and the 1999 Salmon Recovery Funding Act (2E2SSSB 5595) will determine priorities for habitat protection and restoration projects and actions within Water Resources Inventory Areas (WRIAs) or watersheds. To ensure coverage of marine as well as freshwater habitat issues, planning processes for WRIAs 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.

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 a statewide, regional, and watershed scale. It is important to remember that regional salmon recovery will reflect an ongoing and evolving process, not an endpoint.

3. 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.

4. 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.

D. Extinction is Not an Option

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 Statewide Strategy to Recover Salmon:

- *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.

IV. Core Elements

➢ HABITAT
Habitat is Key

AGRICULTURAL STRATEGY TO IMPROVE FISH HABITAT

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

Background
Agriculture in Washington State is a large, diverse and complex industry and a significant contributor to the state's economy. Agricultural lands cover 15.7 million acres or 37 percent of the state. There are 37,000 farms, which produced 108,000 jobs and $5.8 billion worth of products in 1996. Over 200 commodities are grown on these farms. More than half of Washington's farms are less than 50 acres in size and have sales of less than $10,000 annually, while others are large corporate entities. Food processing is a $7.7 billion industry providing another 41,000 jobs. Thousands of other people are employed in related support jobs. The challenge of developing and implementing a comprehensive agricultural strategy for salmon recovery while preserving industry viability is daunting because of this magnitude of complexity and diversity.

Despite forty years of effort by farmers, conservation districts, and state and federal agencies, the number of waterbodies not meeting water quality standards in agricultural areas continues to increase. Irrigation diversions have led to extreme low flow condition in several areas of the state. Agricultural activities have contributed to the degradation and loss of salmonid habitat. In addition to the threat to salmon from poor agricultural practices, over the past twenty-five years agricultural lands have been converted to other uses (i.e., roads, industrial, commercial and residential developments) at an alarming rate. This conversion results in greater problems to salmon. A strategy to keep the land in agriculture and improve agricultural practices is very important to salmon recovery and ecosystem restoration. See Chapter I. A Sense of Urgency for detailed discussion on the impacts of agricultural practices on salmon.

Current Applicable Policies and Programs
Agricultural nonpoint pollution, water conservation, and habitat protection and restoration are currently addressed through voluntary, incentive-based programs. Most program delivery is through local conservation districts in partnership with the U.S. Department of Agriculture, the Natural Resources Conservation Service (NRCS). The state Conservation Commission

provides grant funds to the districts to carry out local implementation of conservation practices. NRCS staff provides technical assistance to private landowners and with conservation district staff work with landowners to develop resource management plans that protect the resources and the landowner's economic interests.

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

Most of the existing state laws and regulations dealing with agricultural practices are based largely on providing technical and financial assistance to farmers, applying incentive-based approaches. Key state laws and regulations include: Conservation Districts Law, Water Pollution Control Act, Surface and Ground Water Codes, Water Resources Act, Pesticide Application Act, Pesticide Control Act, Dairy Nutrient Management Act, Public Lands Act, and implementing regulations. In addition, policies and implementing regulations and programs adopted by counties and cities under the Growth Management Act and the Shorelines Management Act have some impact on agricultural activities. The Hydraulic Project Approval also regulates certain agricultural activities such as requirement for fish screen on irrigation diversions, construction or modification of diversion dams, and channel modification. [1]

The federal laws and programs related to farm conservation, administered by U.S. Department of Agriculture through the Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA) include:

1) Environmental Quality Incentives Program (EQIP),
2) Federal Farm Act of 1996,
3) Wildlife Habitat Incentives Program (WHIP),
4) Conservation Reserve Program (CRP),
5) Wetlands Reserve Program (WRP),
6) Grazing Lands Conservation Initiative (GLCI),
7) Conservation Farm Option (CFO), and
8) Conservation Reserve Enhancement Program (CREP).

The federal programs are also voluntary, incentive-based. Several of the programs are important to protection of ecosystems. For the purpose of the agricultural strategy, the key programs are the Conservation Reserve Enhancement Program (CREP), the Environmental Quality Incentives Program (EQIP) and the Conservation Reserve Program (CRP).

[1] Several of the state programs outlined above are addressed in other chapters of the strategy which are considered part of the agricultural strategy by reference, especially the chapters *Ensuring Adequate Water in Streams for Fish* and *Clean Water for Fish: Integrating Key Tools*.

II. Goal 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

- Provide regulatory certainty under the Endangered Species Act (ESA) and the Clean Water Act (CWA) for producers.
- Revise the Field Office Technical Guides (FOTG) to provide the tools needed to enhance, restore and protect habitat for fish and to address state water quality standards.
- Develop guidance for comprehensive Irrigation District Management Plans that address ESA and CWA concerns.
- 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 the 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.

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

It is important that the agriculture community work to enhance healthy watershed functions for salmon recovery through practices that meet performance and program standards. The Agricultural Strategy is a statewide approach that will look at both sector wide performance based programs and general performance outcomes. This approach provides agriculture with the opportunity to voluntarily enhance resource protection and meet the requirements of state and federal laws and regulations in a manner tailored to their operations.

The agricultural strategy is based on the belief that well-managed agricultural lands can contribute both to the state's economy and the recovery of salmon. The central part of the strategy is the use of economic incentives and technical assistance to improve and restore habitat conditions and keep agricultural land in production. This strategy builds upon 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.

There are three elements that the agricultural strategy is based on: Conservation Reserve Enhancement Program (CREP), use of the updated Field Office Technical Guides for comprehensive farm plans, and development of sector-based programs.

- **The Conservation Reserve Enhancement Program (CREP)** is a joint effort between the state of Washington and the US Department of Agriculture to restore riparian habitat on private agricultural lands adjacent to streams with depressed or critical salmon stocks, as defined by the Department of Fish and Wildlife's Salmon and Steelhead Stock Inventory (SASSI). The CREP program is administered by the federal Farm Services Agency (FSA). Landowners contract with the FSA to take land out of agricultural production and plant it with native trees and shrubs. In return FSA pays the landowner annual rental payments for fifteen years. State and federal cost-share funds pay up to 87.5 percent of the cost of restoration. Most of the work is done by local Conservation Districts. In October 1998, Governor Gary Locke and Dan Glickman, Secretary of the US Department of Agriculture, signed an agreement that provides 200 million dollars of federal money to implement the program. Combined with 50 million dollars of state cost share funding a total of 250 million dollars is available to restore and protect degraded salmon habitat. (See Appendix A for full text of the agreement.)

- **Field Office Technical Guides (FOTG).** The standards by which agriculture protects against nonpoint pollution and restores fish and wildlife habitat are contained in the Field Office Technical Guides (FOTG) maintained by the USDA, Natural Resources Conservation Service (NRCS). In March of 1998, a Memorandum of Understanding (MOU) was signed by the state of Washington, Washington Fish & Wildlife Commission, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Environmental Protection Agency Region 10, and Natural Resources Conservation Service. The MOU will lead to a "timely review of all applicable state and federal standards, including NRCS FOTG's, and make enhancements necessary to ensure the conservation of species of concern." (See Appendix A for full text of the MOU.)

- **Sector based Programs.** These are programmatic programs to respond to ESA and CWA requirements built around commodities such as wheat, or sector such as agricultural irrigation.

The approach of the strategy is to first 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 Guides. 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 the state of Washington and the U.S. Department of Agriculture to restore fisheries habitat on private agricultural lands adjacent to depressed or critical salmon streams. The $250 million in funding is enough to restore 6,000 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.

The following sections describe the approach in more detail:

1. Need for a Comprehensive Approach

The traditional approach of addressing separately the impacts of agricultural practices on ecological functions, such as water quality and quantity and riparian habitat, has had some results over the last forty years. But multiple fish listings under the ESA and the number of waterbodies not meeting water quality standards show the need for a more comprehensive approach. In the past, programs were implemented with some discretion on what to accept from farmers who receive federal or state financial assistance. Conservation districts have accepted what they could get from landowners in some cases, with the assumption that any level of conservation is better than nothing.

The proposed approach is the development and implementation of comprehensive programs constructed around either individual farms or agricultural commodities or sectors using updated conservation standards. As stated before the agricultural strategy is based on three major elements - implementation of the CREP program, implementation of farm plans (consistent with revised FOTGs), and comprehensive programs for a specific agricultural commodity or sector. Efforts will be focussed first in those areas most in need of protection and restoration. It is important to note, however, that elements of the agricultural strategy will be integrated with other strategies (i.e. restoring instream flows and removing barriers).

A collaborative effort between state and federal agencies, agricultural community, tribes, and environmental groups – "Agricultural, Fish, and Water" (AFW) forum has been launched in September 1999 to ensure active participation in the processes and products of the agricultural strategy such as the revision of the Field Office Technical Guides.

Some of the processes and products, such as the revision of technical standards, could serve the requirements of either section 7 consultation or section 4(d) rule exception under ESA. The intent is to develop the new standards with the participation of the appropriate federal agencies (i.e. NRCS, NMFS, USFWS, EPA, US Bureau of Reclamation, and FSA), state agencies (i.e. Departments of Ecology, Fish and Wildlife, Agriculture, and the state Conservation Commission) and agricultural producers, tribes and environmental groups.

Once the standards are approved by the federal agencies under ESA and CWA and once the farmer or producer implements a farm plan based on the requirements, protection from ESA and CWA regulatory actions will be provided to the farmer/producer. The ESA protection may take different form- incidental take under section 7, exception under a 4(d) rule, or incidental take permit under a section 10 HCP. The CWA protection has not been fully discussed but it may be similar to what will be provided to the timber industry (i.e., delay TMDL and monitor improvement to water quality).

2. Redesign Existing Systems into a Comprehensive Program with Monitoring and Accountability

Farm plans

The comprehensive program to develop farm plans will rely extensively but not solely on the efforts to revise the technical standards. As stated above other efforts such as the implementation of riparian standards under the CREP program and local watershed efforts to address water quality, quantity, and barriers are also important. The farm plan will include all practices an individual farm needs to achieve compliance with the Endangered Species Act, and Clean Water Act, and state laws and rules such as the Water Resources Act, Hydraulic Code, Growth Management Act, and Shorelines Management Act.

The state Conservation Commission will develop a tracking and database system to monitor implementation on a watershed or regional level and statewide. Farm plans will be tracked and monitored by conservation districts and the Natural Resources Conservation Service. MOU signatories will serve as a program oversight committee. Enforcement of farm plan compliance will be carried out by the Farm Service Agency or state agencies (e.g. Department of Ecology for dairies). The state is committed to enforce existing environmental laws including agricultural nonpoint pollution. Technical and financial assistance will be available to growers.

Figure 3 is a schematic diagram explaining the development, implementation, and monitoring pieces of the comprehensive program. As previously stated, this program centers on what is happening “on the ground” on each individual farm.

- First a “toolbox” of standards and practices that meet the requirements of the Endangered Species Act and the Clean Water Act is developed (see "B"). Building this “toolbox” is the most important foundation element of the entire comprehensive program. The toolbox must be complete enough to address all of the diverse farming activities in the state as well as meet the substantive requirements of the ESA and CWA. Also the FOTG’s, if implemented, should also meet state requirements around the Shoreline Management Act, the State Environmental Policy Act (SEPA), the Growth Management Act (GMA) and the Hydraulic Code.

- A workgroup, identified in Box “A”, is made up of those agencies that signed the MOU and will develop the toolbox, with participation from producers, tribes and the environmental community.

- Once the standards are in place, the program will start with individual producers or associations (Box “D”) working with their local conservation districts and NRCS (Box “C”) to identify from the toolbox which BMP’s are necessary for their individual farm. This process will produce an individual farm plan (Box “E”) that when implemented, will lead to issuance of a “certificate of participation” to the producer from NRCS. This certificate of participation will certify that the farm has implemented the farm plan.

- Monitoring and accountability of the program would have two tiers. The first tier is represented in Box “F”. The focus is on the individual farms actually <u>implementing</u> their farm plans. The first order of accountability would be with the conservation districts and NRCS to review farm plans and maintain a database on all of the farm plans on record. An oversight/audit committee made up of the MOU signatories would also be established to oversee the program and conduct random audits. These audits would insure that the farm plans are actually being implemented “on the ground.”

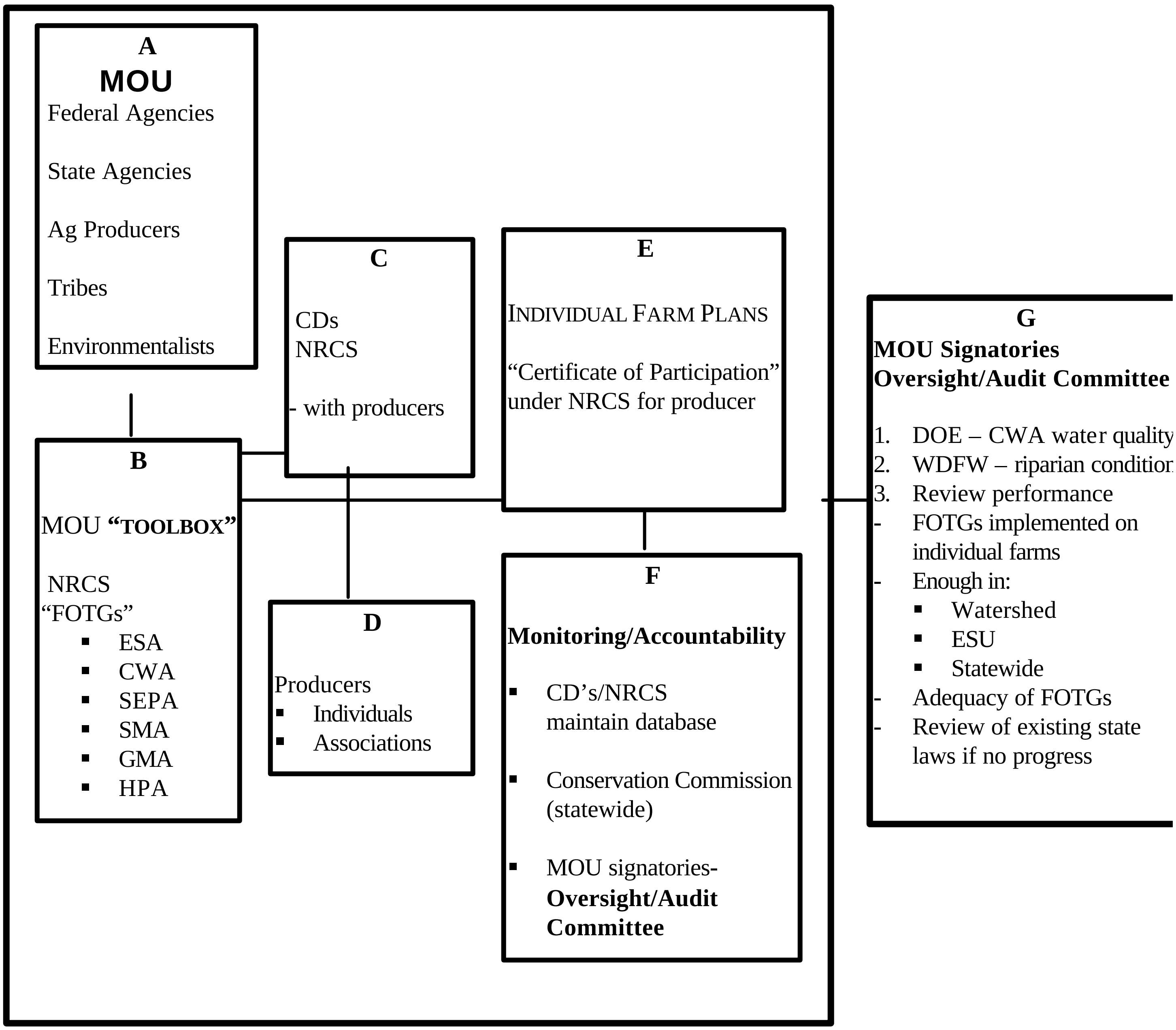
  The second level of monitoring and accountability would also be implemented by the oversight/audit committee, as illustrated in Box “G”. The committee will evaluate the level of implementation and effectiveness of the standards to determine whether our outcome measures are being met. This is part of an adaptive management process built into the strategy. A review will be done on a three year cycle, and if targets are not being reached, then other options will be considered, including regulatory.

Central to the success of this element is the development and acceptance of common standards by the various governmental agencies especially National Marine Fisheries Service and U.S.

Department of Fish and Wildlife, federal agencies with lead responsibilities for salmon recovery, as well as EPA and the Department of Ecology on water quality. These standards will be the performance measures that will be used to measure success or failure at the individual farm level and at the watershed and basin levels.

Additionally, Washington State University developed best management practices (BMPs) for irrigated agriculture. These BMPs describe the best available technology for this large and diverse sector of agriculture for water quality, quantity and land management activities. They were largely derived from the FOTG's and may be revised as applicable sections of the FOTG are revised through the MOU process.

Figure 3. Agricultural Strategy- Development, Implementation and Monitoring



Implementation of Conservation Reserve Enhancement Program (CREP)
The Natural Resource Conservation Service Forested Riparian Buffer Standard will be the conservation practice used to implement the program. This standard has been updated to meet the needs of the Endangered Species Act and the Clean Water Act through negotiations under an MOU between the State of Washington, Natural Resource Conservation Service, National Marine Fisheries Service, US Fish and Wildlife Service, US Environmental Protection Agency and the Washington Fish and Wildlife Commission.

The program is currently available to producers of agricultural commodities. This includes the traditional agricultural crops of grains and vegetables and also includes hay and pasture lands used for livestock production. It does not include land producing tree fruits, berries or grapes. Governor Locke has formally requested USDA to expand the program to include these crops. Such a change would greatly expand the benefits of the program in recovering salmon.

Sector Based Programs
In addition to the farm-by-farm approach described above, the Strategy encourages development of sector-based approaches. The state will provide technical and funding support to groups developing these programmatic strategies. Examples of current sector-based projects are given below:

- Irrigated Agriculture
The Washington State Water Resources Association (WSWRA), representing most of the irrigation districts in the state, is developing a process for a programmatic response to ESA and CWA issues relevant to irrigated agriculture. Irrigation districts will work with federal and state agencies, tribes and other stakeholders to develop guidance for Comprehensive Irrigation District Management Plans. Individual irrigation districts will then develop and implement plans that will address all ESA and CWA concerns within that district. The plans will have monitoring and oversight components. The Department of Agriculture has been working with a steering committee of WSWRA members on the initial model.

- Douglas County Habitat Conservation Plan
The Foster Creek Conservation District has taken the lead in developing a multi-species HCP for agricultural lands in Douglas County. The district has obtained the support of many local ranchers, farmers and orchardists in the county and has received funding for the fish portion of the HCP from FY 99 federal funds for salmon restoration.

3. Accountability System
An effective accountability system is necessary for the success of the state's strategy on agricultural lands. Because there are statewide and local implementation strategies, there are multiple levels of accountability that include the individual farmer, local conservation districts,

watershed councils, as well as, state and federal agencies that are signatories to the NRCS MOU. It is important to:

1) identify which entity is accountable for each element of the strategy,
2) use clear performance measures to monitor progress both on the individual farm and system-wide for improvements in water quality and fish habitat,
3) have an efficient method to report results, and
4) resolve problems that arise if improvements don't occur.

Individual farmers will be the first level of the accountability system. They must understand why certain agricultural practices need to change, what changes are needed, what options are available to them to achieve the desired results, how they can get assistance in making the changes, and the consequences of inaction. *<u>An extensive outreach process will be needed.</u>*

Accountability for implementation of the standards will be shared primarily between local farmers and conservation districts. The role of governmental agencies will be to provide leadership and resources, coordinate between the various entities, educate conservation districts, local governments, and farmers about the standards, and to stimulate farmers to implement the standards.

The conservation districts will work with farmers to ensure that the farm practices standards are incorporated into individual farm plans, develop a system to track implementation and report problems, and provide progress reports to government oversight agencies. Failure to carry out terms of agreements may result in loss of governmental assistance, financial or technical, and enforcement of existing laws when applicable.

To further strengthen accountability and credibility, an oversight group will be formed. This group will be composed of representatives of the agencies that developed the revised NRCS Field Office Technical Guides. This group will conduct random audits to ensure that farms are actually implementing and managing farm plans. They will also monitor water quality and habitat indicators to determine if the higher standards and new system are effective, and participate in the review of the system in three years.

Government agencies are accountable in several ways. First, there must be a commitment to expeditiously develop the performance standards that will be implemented via farm plans. The development and implementation of an extensive outreach program will also be needed. Agencies will be required to provide financial and technical assistance to the conservation districts and farmers. Agencies must also be prepared to address problems identified by the local conservation districts in getting farmer participation and compliance. Enforcement actions by federal, state, and local government may be required. Government agencies will also be accountable for interagency coordination.

Conservation districts will track and monitor implementation of state-approved standards and farm plans. They are on-site and will be doing most of the "on the ground" work and will also be working with local watershed groups. The state Conservation Commission will develop a database and tracking system to monitor progress on a statewide basis.

For sector-based programs (such as irrigation districts) using the comprehensive planning process to deal with ESA and CWA issues or the development of agricultural HCPs, accountability would lie in the hands of the federal agency approving the HCP and state agency with oversight responsibility (e.g. Department of Ecology for water rights or water quality).

3. Enforcement

Farm Plans

It is important to hold private landowners responsible for fully implementing practices they have committed to do and have received public resources to do. Enforcement of farm plan compliance will be done by a state regulatory agency or in some cases the Farm Service Agency if they have a contract with the landowner. Landowners who do not live up to their agreements should have to repay any cost share money they received and other financial incentives. Audits will be conducted to ensure standards are being implemented. Actual changes in water quality, habitat condition and fish populations will be measured by the statewide monitoring program.

State Environmental Regulations

There are currently limited state regulations relative to fish habitat or water quality on private agricultural lands. In Chapter I. A Sense of Urgency we listed several laws and regulations dealing with agricultural practices. Some of the regulatory programs, such as the Hydraulic Code, the Water Code and Water Resources Act, the Dairy Nutrient Management law, the Shorelines Management Act, state water quality standards, and some local ordinances, impact agricultural activities.

There are, however, limited requirements within the laws and regulations for enforcement; a good example is the limitation on enforcing state water quality standards on agricultural nonpoint sources pollution. In addition, most agencies, in particular the Department of Ecology, have few resources for enforcement. (See Enforcement Chapter V. B. for further discussion of enforcement strategy.) Enforcement strategy identifies the need to significantly increase staffing levels for Department of Ecology (water resources and water quality programs), Fish and Wildlife (Hydraulic Code), and grants to local government to enhance their enforcement capabilities. The legislature in 1999 provided some funding. The "Early Action Plan" outlines how and where the resources will be used.

The Statewide Strategy to Recover Salmon makes a strong commitment to developing a credible nonpoint enforcement and compliance strategy for the state as well as enforcing existing state environmental laws. A key regulatory driver is the fear of sanctions from the federal government or fear of regulatory impacts of ESA (i.e. loss of ability to divert water for irrigation) and CWA and fear of citizen lawsuits that can be brought under ESA and CWA.

4. Outreach and Education

The goal and the objectives of the Statewide Strategy to Recover Salmon will be achieved only through cooperative partnerships of local, state, and federal agencies, tribes, agricultural groups and organizations, and other key stakeholders. Improving our watersheds to restore wild salmon and meet water quality standards will require the agricultural community and other key stakeholders have a basic understanding of the background and tools necessary for protection and restoration of our watersheds. Local, state and federal government programs will provide regulatory and technical support to these efforts, but the bulk of the work to conserve, protect and restore watersheds will be done by the local landowner.

Outreach and education is a fundamental part of this locally-based action. Agricultural stakeholders must understand why certain practices need to change, specifically what changes are needed and what their options are for achieving the desired goals. They also need to know how and where they can get both technical and financial assistance and the consequences of inaction. They also need to be aware of the possibility of regulatory action or citizen lawsuits under the ESA and CWA.

Outreach efforts will be focused on involving the agriculture community, governments and citizens and partnering with them to support the approach; providing education for protection, restoration and/or enhancement efforts; and serving as a network to share information and ideas. Communication and education efforts are needed regarding the NRCS MOU and technical standards development, the Agricultural Strategy, and ongoing outreach during implementation.

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

Monitoring and performance measures

The overall goal of the agricultural strategy is to provide cool, clean water and good physical habitat for fish in agricultural areas. Conservation practices implemented by farmers will address the limiting factors associated with agricultural practices, such as sediment deposition and temperature. In some cases results will be seen soon after the practice is implemented. In others it will take some time to achieve the desired function and this will be taken into account in the monitoring program.

Benchmarks or performance standards are necessary to measure the success of the strategy and to determine if we need default approaches. Benchmarks for the agricultural strategy are divided into two components: 1) implementation and the success of the strategy in getting practices on the ground, and 2) environmental response. Many of the programs that will be used to implement practices on the ground will be targeted to priority areas and benchmarks will initially be applied to priority basins or watersheds for this reason.

It is the intent to track what, where, and how much is being done at a farm, watershed, and regional level. Landowners will be expected to meet their commitments. The MOU signatories Oversight Group will conduct audits to ensure farm plans are being implemented "on the ground" and participate in the three-year review and ongoing adaptive management. Basin assessments and limiting factor analysis will provide baseline data to determine the scope of work that needs to be done in a given basin. The agricultural strategy calls for effectiveness monitoring of conservation practices and changing them if they are not effective through adaptive management.

Comprehensive Farm Plans. Figure 3.outlines the monitoring and accountability system that will be put in place to monitor the development and implementation of the comprehensive farm plans. As stated above, farmers agree to implement practices that result in good water quality and fish habitat in return for technical assistance, financial incentives and regulatory certainty. The central question is whether the strategy can deliver enough fully implemented farm plans to provide the habitat and water quality necessary to recover salmonids in a given basin and statewide. Measurement of the number of conservation practices implemented relative to the number needed, in a given basin will be used to evaluate the effectiveness of this element of the strategy. Benchmarks for this will be:

- The number of farmers with farm plans relative to the number of farms needing plans, and

- The percent of farmers in compliance with farm plans.

Conservation Reserve Enhancement Program. Implementation and compliance monitoring for CREP will be done by the FSA and local Conservation Districts, with statewide tracking and monitoring being done by the state Conservation Commission. Effectiveness monitoring of the riparian standard implemented by the program will be part of the overall state monitoring program. (See Chapter VI. Adaptive Management and Monitoring: How will we recognize success?) Although CREP buffers can be implemented as one element of a farm plan or separately, they will be tracked and can be used as an example of benchmarking. If the basin assessment determines that 70 miles of riparian needs to be protected and restored, this is the baseline against which success is measured. The key elements are:

- How many miles or acres of CREP buffers are needed based on the assessment?

- How many miles or acres were actually enrolled in the program in three years?

- The percent of miles or acres implemented versus the miles or acres needed relative to the timeframe for the entire basin.

Sector based programs. The monitoring of the development and implementation of comprehensive sector based programs will be part of the requirement of ESA and CWA compliance.

The strategy calls for improvements in water quality and habitat as a measure of success, but these benchmarks cannot be used within a three-year timeframe. It takes several years for vegetation planted in a restored riparian area to establish itself and grow enough to provide the necessary functions such as shade and sediment retention.

The agricultural strategy calls for a monitoring program to show that water quality and habitat is improving as a result of its implementation. If measurable improvement does not occur, then adaptive management calls for a revision of the standards. This analysis needs to be done as part of the statewide monitoring strategy. (See Chapter VI. Adaptive Management and Monitoring: How will we recognize success?) With assistance from conservation districts and the Natural Resource Conservation Service, agricultural producers will use the Field Office Technical Guides and data from monitoring and adaptive management to achieve the following environmental outcomes:

1) Maintain productive aquatic habitats for salmonids and their food supply.
2) Meet or exceed state surface water quality standards for physical and chemical parameters such as temperature, dissolved oxygen, pH, turbidity, and suspended solids.
3) Meet or exceed standards needed for spawning areas.
4) Maintain channel bank stability on streams through natural methods or, if needed, bioengineering.
5) Assure side channels and other off-channel habitat, including wetlands; remain connected and passable by salmonids to the channel.
6) Maintain riparian areas and wetland protection that are compatible with the needs of fish .
7) Provide and maintain free and unobstructed passage for all wild salmonids, according to state and federal screening and passage criteria, and guidelines at all human-built structures.
8) Provide maximum opportunity for water use efficiency through conservation, re-use and re-regulating (non-mainstem blocking) reservoirs.

Similar monitoring data will be compiled for other state and federal programs focussed in a given basin and will provide the information necessary to measure the success or failure of the strategy and determine if default to another approach is needed.

Default Actions

The Statewide Strategy to Recover Salmon calls for agencies to use collaborative, incentive-based approaches when working with private and other governmental parties to achieve salmon recovery. It also calls for "default actions" in areas where no effort is being made to recover salmon or where performance measures are not being met after a reasonable period of time. For the agricultural strategy, if no significant progress is made after three years the state will seek new authority to ensure salmon protection in agricultural areas.

Three years into the implementation of the salmon strategy an analysis will be conducted to determine if the voluntary, incentive-based approach has been successful. The following three questions need to be answered to determine the success or failure of the strategy:

1) How successful was the strategy in priority areas as measured by percent implementation of conservation practices.
2) How long will it take to achieve full implementation if there are resource issues, and is the timeframe acceptable?
3) What is the cost/benefit ratio for the strategy in priority areas?

There are two initial default triggers for the agricultural strategy. 1) If the strategy is not supported by the majority of the agricultural leadership in the state; or 2) if the NRCS MOU process is not successful in developing standards acceptable to the National Marine Fisheries Service which are then incorporated into the NRCS Field Office Technical Guides.

At the end of three years all options will be considered; however, several regulatory options have been discussed. A final decision will not be made until default is imminent. The options being considered are summarized below:

1) A comprehensive Agricultural Practices Act. This would be modeled after the Forest Practices Act where the standards and best management practices would be in rule.
2) Require mandatory farm plans and implementation of state approved conservation practices in areas where fish or other species have been listed as threatened or endangered under the ESA or as critical or depressed by the state and in areas where CWA water quality standards are not being met. This approach should have the flexibility to allow its use in areas where voluntary implementation is not successful.
3) Develop a State Riparian Standards Act. This would require mandatory implementation of state approved riparian standards statewide or in areas where fish have been listed under the ESA or as critical or depressed by the state. This approach should also have the flexibility to be targeted at areas where voluntary efforts are not working.
4) Use the Growth Management Act and the Shoreline Management Act as tools to implement the Agricultural Strategy. The state would ask local government to adopt specific regulations or practices, such as those resulting from the NRCS MOU, and use

their regulatory authority to implement them. The state would be proactive in its role in administering the Shoreline Management Act and ensure that revised Master Program Guidelines address salmon issues. The state would not ask for relief under the ESA for those counties, which did not respond to the request.

ESA Compliance Strategy

Although the agricultural strategy is a voluntary, incentive-based approach, it can provide regulatory certainty under the Endangered Species Act (ESA) and the Clean Water Act (CWA) for producers who participate.

A farmer or a producer who implements a farm plan based on the approved requirements will receive protection from ESA and CWA regulatory actions. The ESA protection could take the form of an incidental take statement under section 7, an exception under a 4(d) rule, or incidental take permit under a section 10 Habitat Conservation Plan (HCP). CWA protection is under discussion, see Chapter IV. A. 6. Clean Water for Fish: Integrating Key Tools.

The sector-based (agricultural irrigation) or commodity-based strategy is focused on development of programmatic response to CWA and ESA issues. Federal agencies involved in the implementation of programs for irrigated agricultural such as the US Bureau of Reclamation and EPA will be involved in the development of comprehensive plans as well as NMFS and USFWS. The intent is to use the comprehensive plans to meet the requirements of ESA section 7 consultation, or section 4(d) exception or section 10 HCP.

IV. CORE ELEMENTS

➢ HABITAT
HABITAT IS KEY

FORESTS AND FISH

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

Background
Roughly half of the land area in Washington State, about 21 million acres, is covered by forests. About 12 million of these are non-federal forest lands owned by large and small private landowners and the state of Washington, and are managed primarily for timber production. These forests support many of the ecological functions affecting salmon and other aquatic species. Most salmon-bearing streams in Washington have their headwaters and in many cases a majority of their watersheds in forested areas. The benefits of riparian forest zones have been widely documented. They include shade, supply of logs, or large woody debris (LWD), sediment filtering, and bank stability. Other ecological functions supported by forests include reduction of flood-waters and off-channel habitat.

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. Increased stream temperatures, diminished opportunities for large woody debris recruitment, alteration of groundwater and surface water flows, and degradation or loss of spawning and rearing habitats are some of the effects that forest practices have on salmon habitat. These forest practices impacts are among those contributing to the listing or proposed listing of some salmon runs. See Chapter I A Sense of Urgency for a more detailed discussion on the benefits of forests and the impacts of their management on salmon and other aquatic species.

Forest management practices have undergone major changes to provide protection and conservation of forest ecosystems and the species that rely on them. Since the listings in 1990 of the spotted owl and marbled murrelet, recovery plans have been developed for federal and state forest lands and are being implemented for protection and restoration of listed species, including anadromous fish. A federal plan, covering federal forest land, was developed by an interdisciplinary scientific group, the Forest Ecosystem Management Assessment Team, commonly known as FEMAT. The “Forest Plan for a sustainable Economy and a Sustainable Environment,” also known as the “President’s Forest Plan,” was approved in 1994.

In 1997 Washington State Department of Natural Resources (DNR) completed a multi-species Habitat Conservation Plan (HCP) to address state trust land management issues relating to compliance with the Endangered Species Act (ESA). The HCP covers all species on state lands including several western Washington salmonids species (note: eastern Washington salmonids are not covered by the HCP). In addition to DNR, three large private timberland owners have negotiated HCPs with federal agencies (NMFS & USFWS)) under ESA to minimize and mitigate impacts to threatened and endangered species while conducting lawful activities such as forest practices.

This chapter focuses on conservation efforts on non-federal lands. Lands under Federally-approved habitat conservation plans providing protection for fish species will be managed according to the provisions in the HCP and Implementation Agreement.

Current Applicable Policies

Forest practices on state and private lands have been regulated since 1974 under the State Forest Practices Act, administered by the Department of Natural Resources with rules co-adopted by the Forest Practices Board and the Department of Ecology. Protection of water quality and fish habitat has always been an objective of these forest practices regulations. The first rules protecting riparian vegetation were adopted in 1976, when a streamside management zone was established to protect stream bank integrity and stream temperatures. In 1986, state, tribal, timber industry and environmental community leaders concerned about forest management on state and private lands and uncertainty created by litigation formed a consensus-based negotiating forum known as Timber Fish and Wildlife (TFW), which developed the first TFW agreement in February, 1987.

With the advent of listings of salmon runs, TFW participants were joined by federal representatives from the US Fish and Wildlife Service, the National Marine Fisheries Service, and the Environmental Protection Agency, and county representatives. They launched a new round of negotiations in 1996; near the end of the process, however, the environmental caucus withdrew from the discussions. The purpose of the negotiation was to create strengthened regulations and other measures necessary to meet fish conservation requirements of the Endangered Species Act and water quality requirements of the Clean Water Act, while maintaining a viable timber industry and providing long term regulatory certainty.

The discussions and their resulting recommendations are commonly referred to as the "Forestry Module," and have been adopted in the Statewide Strategy to Recover Salmon as the forest habitat component. The recommendations for development and implementation of rules, statutes, and programs are contained 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. The forestry module is 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 the Act states:

> ". . . (This 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 the use of the Forest and Fish Report to protect salmon habitat and water quality. Copies of the Forest and Fish Report can be obtained from the Department of Natural Resources (DNR) or can be accessed electronically through either the Governor's Salmon Recovery Office or DNR Web sites (http://www.governor.wa.gov/esa/ or http://www.wa.gov/dnr/).

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 overall objective is to improve and protect specific riparian ecological functions (i.e. water quality, large woody debris, and shade) through specific implementation measures in order to provide habitat for anadromous and resident fish and to meet water quality standards. Specific objectives for the key strategies are outlined in Section III. Solutions: *What is the route to success?*

The Forest and Fish Report which includes recommendations for the development and implementation of rules, statutes and programs, and ESHB 2091 are both designed to achieve the goals and to deal with the following topics:

$ Riparian protection for fish habitat and non-fish habitat streams.
$ Improvements for existing and new roads.
$ Protection for unstable slopes.
$ Wetlands protection.
$ Enforcement of forest practices.
$ Application to small forest landowners.
$ Use and modifications of watershed analysis.
$ Adaptive management and monitoring.
$ Overall funding and incentives.
$ Assurances and certainty under ESA and CWA associated with the agreement.

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

Understanding the effects of forest practices on aquatic ecosystems and watersheds is critical to the design of improved management solutions and implementation of conservation measures to protect and restore salmon habitat. Chapter I. A Sense of Urgency, presents briefly the ecological functions affecting aquatic species and the impacts of forest practices on those functions. The forestry module addresses the adverse impacts of forest practices and recommends conservation strategies addressing riparian zones, unstable slopes, roads, wetlands protection, and other needed measures for salmon protection and restoration.

The Forest Practices Board is authorized by the 1999 legislation (ESHB 2091) to take immediate action by promulgating emergency rules to put several of the Forest and Fish recommendations into effect until such time as permanent rules are adopted, on or before June 30, 2000. An environmental impact statement (EIS) will be prepared in support of the permanent rules.

1. Riparian Areas

The objective of riparian management and conservation is to achieve restoration of high levels of riparian function and maintenance of these levels once achieved.

Riparian areas will be protected through buffers and limits on management activities. Significant changes in current riparian forest management policy are recommended in the Report to achieve the objective. The ecological functions to be protected for fish and water quality in riparian areas are large woody debris, shade, streambank stability, sediment control, nutrient and litter fall, fish and some debris passage, water quality, microclimate, and habitat for fish in all life stages and for six stream-associated amphibians. The protection strategy includes statewide requirements, and westside and eastside riparian requirements to reflect the differences in climate, precipitation level, site productivity and threats of fire, disease, and insect infestation.

Water Typing

Water typing triggers riparian protection and some local land use decisions. The definition must reflect current knowledge about fish use. The existing water typing (type 1, 2, 3, 4 & 5), which has been in place for more than 20 years, is based on beneficial uses, one of which is fish. Data from several studies indicated that seventy-two percent of the type 4 streams (waters presumed not to include anadromous and resident fish) were actually type 2 or 3 streams (waters with anadromous and resident fish). In addition several waterbodies with limited water quality (included on the Department of Ecology 303(d) list) are located in forested streams.

Streams will be designated, in a rule to be adopted by the Forest Practices Board, according to availability of fish habitat rather than fish presence. The waters of the state will be delineated into three categories: Type S for shorelines of the state, Type F for fish habitat waters (can include seasonal waters), and Type N for non-fish habitat perennial and seasonal waters. A multi-parameter model that is habitat driven and will use variables such as basin size, gradient, elevation, or other indicators, and statewide maps will be developed to create a predictive map-based system for uniformity in implementation. The modeling and maps will be updated every five years. The water typing will become effective once permanent rules are adopted by the Forest Practices Board, prior to July 1, 2000.

Riparian Habitat

- Fish Habitat Streams- Types S and F Waters

The protection of fish habitat in Type S and F waters will be provided through management restrictions in channel migration zone and limited management in riparian management zones. The riparian area adjacent to fish habitat streams will consist of three different zones extending from the outer edge of the channel migration zone out to a site potential tree height (for 100-year-old tree). The three zones will be managed according to primary functions provided at different distances from the water. As the distance from the stream increases, the level of management allowed will increase.

No Touch Zone - On the west side of the state, this zone is the first 50 feet from the outer edge of the channel migration zone; on the east side, this zone is the first 30 feet from the outer edge of the channel migration zone. There are five types of channel migration zones. Harvest may not occur in any of these, but credit will be given towards trees in the outer zone (see below). The main functions to be provided in the no touch zone are streambank stability, shade, temperature, sediment control, and large woody debris recruitment. No management activities may occur in this zone.

Inner Zone - This zone contributes to the functions of additional large woody debris recruitment, temperature, sediment control, nutrient and litter fall, fish and some debris passage, water quality, and habitat for certain riparian associated wildlife. Management would be permitted only to restore or enhance riparian functions.

On the westside of the state, desired future conditions for stands will be determined by the basal area and tree density at age 140 of reference stands in relatively natural or late seral condition. An average of 20 trees per acre would be required to be left should harvest occur in the area beyond where the basal area and tree density targets have been met. The frequency of achieving the targets in an area narrower than the inner zone will be monitored. Targets by site class and age are under development.

Forested lands on the eastside of the state have been divided into three habitat types: ponderosa pine, mixed conifer, and high elevation. Management in high elevation areas follows the strategy for the inner zone on the westside. In the other two habitat types, specific metrics using zone widths, basal area thresholds and minimums, and leave tree requirements have been agreed to. A 75-foot shade overlay would apply for bull trout.

Outer Zone - This zone extends from the outer edge of the inner zone to a site potential tree height from the water's edge or the channel migration zone, whichever is farther. The functions, which will be provided include windthrow protection and additional large woody debris, as well as special sites such as seeps, springs, and wetlands. On the west side, the outer zone can be managed to a minimum tree count, which could be lowered in exchange for restoration. The minimum tree count will also be lowered to give credit for trees of a certain size or larger left in the channel migration zone.

- Non-Fish Habitat Streams- Type N Waters

The main functions to be protected along non-fish habitat streams are sediment control, streambank integrity, temperature, water quality, large woody debris, and habitat for stream-associated amphibians. These functions will be protected through an equipment limitation zone, buffering of sensitive sites, and buffering along the length of the stream.

- The use of ground-based equipment will be restricted out to 30 feet along both sides of all non-fish streams (perennial and seasonal). Mitigation will be required for activities that disturb more than 10 percent of the soil within the equipment limitation zone.

- Specified sensitive sites along perennial non-fish habitat streams in west side will be protected through 50-foot no-cut buffers along each side of the stream. Specified sites will include the first 500 feet of non-fish habitat streams above a junction with fish habitat streams (streams shorter than 1000 feet will be protected for at least half the stream length or the first 300 feet, whichever is greater), tributary junctions of non-fish streams, initiation point of stream flow, perennial seeps, perennial springs, headwall seeps, and alluvial fans.

- On the west side of the state, when protection of the sensitive sites does not equal 50 percent of the length of a perennial non-fish habitat stream, an additional increment will be provided through a 50-foot no-cut buffer to total 50 percent. Priority sites to be protected as part of this buffer include low gradient areas (channel disturbance zone deposition), tailed frog habitat (non-sedimentary rock streams at greater than 20 percent gradient), and hyporheic and groundwater influence zones (provided a practical field identification model can be developed).

- On the eastside of the state, a 50-foot-wide continuous buffer along the length of the stream will be managed according to the inner zone basal area target for the appropriate habitat type and a leave tree requirement. A non-continuous option is also available where even-age management is practiced.

2. Unstable Slopes

The objective of the management on unstable slopes will be to prevent or avoid an increase or acceleration of the naturally occurring rate of landslides due to forest practices.

The Department of Natural Resources (DNR) will screen each forest practices application for risks of unstable slopes according to a list of specified landforms. Tribes may also screen when evaluating and commenting on applications. If any of these high hazard landforms occur, the landowner may choose to submit a geotechnical report regarding potential for failure and threat to public safety or a public resource, as well as proposed mitigation for reducing threats and potential for failure. Following field verification, if DNR determines there is a potentially unstable slope that could impact a public resource or that could pose a threat to public safety, the application will be processed as a Class IV Special that will trigger a SEPA process. A Salmonid Emergency Rule adopted by the Forest Practices Board on March 31, 1999, provides protection to several salmonid species by setting State Environmental Policy Act (SEPA) triggers that would classify certain forest practices activities within the Endangered Species Act (ESA) listed areas as Class IV–Special and by providing guidance to landowners and DNR.

On more moderate slopes, a trained DNR field forester will use field indicators and features to determine whether the hazardous landforms are present, the slope is unstable, and a threat of delivery exists. In addition, using best available data and science, regional Timber, Fish, and Wildlife (TFW) groups will work with DNR to identify region specific high hazard slopes not covered on the statewide list and regional features that would lead to field verification by DNR on moderate hazard slopes. Regional inventory identifying unstable slopes will be conducted, slope stability predictive models will be developed, and maps created.

3. Roads

The objectives for the management of roads will be to maintain or provide passage for fish in all life stages; to provide for the passage of some woody debris, to meet water quality standards; to control sediment delivery; to protect streambank stability; and to divert excess road run-off from the stream channel.

To achieve these objectives, the forest practices rules and manual will be amended to provide for the following elements: inventorying and assessing the condition of existing roads and orphan roads (constructed before 1974 and not used since then); planning and implementing the proper maintenance or abandonment of existing roads; repairing existing roads; minimizing construction of new roads; building new roads to higher standards; and removing artificial barriers to passage of fish at all life stages.

The number of new roads built in riparian areas will be minimized, construction and maintenance standards will be improved for all new and existing roads, and artificial barriers to fish passage will be removed.

For existing roads, enhanced best management practices will be adopted immediately and road maintenance and abandonment plans will become mandatory for all private and state forest road systems. Plans will be prioritized to address fish and stream listings (under the Endangered Species Act and Clean Water Act, respectively) and riparian functions. These plans will be completed within five years of reaching agreement and will be reviewed by Forestry Module participants and approved by DNR; where hydraulics permits are required, the Department of Fish and Wildlife will need to provide approval. Implementation efforts will proceed evenly over 15 year-period from of reaching agreement. Priorities for maintenance and repair will be based on fish passage blockages and sediment delivery, addressing worst problems first.

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.

Orphan roads will be inventoried and assessed in five years to determine whether cost share funds are needed.

4. Wetlands Protection

The objective is to achieve a "no-net loss" of forested wetlands functions by avoiding forest practices impacts; minimizing such impacts; or restoring affected wetlands.

Timber harvest in bogs is not allowed. Mapping of wetlands and assessment of the functions of associated wetlands and the potential impacts of harvest activities in forested wetlands may determine what changes in forest practices are required. The required wetlands mitigation sequence will be determined based on loss of wetland function using adequate wetlands expertise, site management plan and map of all forested wetlands (regardless of the 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. Several research items are recommended subject to funding and priorities.

Landowners will map all forested wetlands associated with riparian areas and other forested wetlands 3 acres or larger. In addition, DNR will incorporate wetlands into a GIS layer (depending on availability of funding).

5. Pesticides

The objective is to manage the use of pesticides 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. To keep pesticides out of water and wetlands, a variable buffer width, depending on wind, spray nozzle type and spray release height, will be used. In unfavorable wind conditions, no aerial spraying will be allowed in a wider specified buffer width. No spray will be allowed in the no-touch zone or inner zone of any Type S and F water or to wetland management zones unless prescribed for hardwood conversion or required by other laws such as for noxious weeds control, and then only through ground application. 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 (Bacillus Thurengensis) is subject to label requirements only.

6. Watershed Analysis

The objective of watershed analysis is to provide a tool to address cumulative effects, provide guidance for adaptive management and monitoring programs, test effectiveness of new baseline rules, set restoration priorities, refine mapping, and provide long term assurances for landowners under the Clean Water Act.

Watershed analysis is a voluntary process. Because protection of riparian areas and construction and management of roads will be enhanced under the Forestry Module proposal, those modules will be limited to the assessment phase. The new protection strategy prescriptions for riparian areas will supersede existing watershed analysis prescriptions; existing road plans will be incorporated into mandatory road maintenance and abandonment plans. Monitoring module is required; cultural resources and restoration modules will be added; hydrology and fish modules will be revised and added for the eastside; and the mass wasting module can be eliminated if the state mapping of geologic hazards has been completed (depends on adequacy of funding).

Watershed analysis and the water quality module will also be revised to address process improvements and technical upgrades necessary to provide compliance with the Clean Water Act. Watershed analysis may also be used to refine requirements for protection of bull trout habitat. DNR may issue 5 year permit for landowners, within a completed watershed analysis unit, that provide harvest and road detail for the five year period.

7. Enforcement

The Department of Natural Resources (DNR) will retain its enforcement authority. DNR exercises authority to condition forest practices applications to prevent damage to public resources which include water, fish and wildlife, and capital improvements of the state or its political subdivision. Appeals of DNR decisions go to the Forest Practices Appeals Board. The Department has the authority to issue a stop work order for violations of forest practices rules, or to immediately prevent continuation or to avoid damage to public resources, or if there is a deviation from approved application.

DNR may deny forest practices permits to repeat violators until civil penalties are paid or until work required under Stop Work Order or Notices to Comply are completed. The civil penalty process will be streamlined to allow appeals to the Supervisor of DNR and to the Forest Practices Appeals Board.

ESHB 2091 authorized DNR to require financial assurances, prior to the conduct of further forest practices, from an operator who has demonstrated an inability to meet the financial obligations under the forest practices act. DNR may deny an application for failure to provide financial assurances. Inability to meet financial obligations is determined if in the preceding three-year period, the operator operated without an approved application; continued to operate in breach of, or fail to comply with a stop work order; or failed to pay any penalty.

The 1999 Legislature also allowed the Department of Natural Resources or Department of Ecology to apply for an administrative inspection warrant. In addition, DNR is allowed to recover interests, costs, and attorney's fees when seeking recovery of a penalty for a violation of the Forest Practices Act.

8. Revisions to Permit Process

Multi-year permits for up to five years may be available to landowners for forest practices conducted in accordance with approved road maintenance and abandonment plans or approved watershed analysis where applications identifies the specific prescriptions to be used. In addition, a proposal will be developed on integrating the forest practices and hydraulics permitting processes. Corresponding five year HPA's may be issued coincident with DNR's five-year permit.

The 1999 legislature, concerned about problems associated with the dual regulatory and permitting processes under the Forest Practices Permits and Hydraulic Project Approval, required the Department of Fish and Wildlife to make recommendations to the Legislature within two years on integrating the laws, rules, and programs governing forest practices and hydraulic projects and exploring the potential for a consolidated permit process.

9. Alternative Plans

Federally approved habitat conservation plans, or other cooperative or conservation agreements providing protection for fish species, will be exempt from riparian-related forest practices rules. The protection will be implemented by a rule adopted by the Forest Practices Board. Landowners with an existing individual HCP can request Clean Water Act assurances from EPA and Ecology. Several conditions must be met in order for the landowners to receive assurances under CWA. (See Forest and Fish report for more details.)

A landowner may also propose, through an alternate plan, a management strategy different from the basic rules that implement the Forest and Fish report. The alternate plan must provide protection for public resources at least equal in overall effectiveness to the protection provided in the basic rules. A process for developing the alternate plan is provided-steps for the process, review team, contents of the plan, approval process, audits, and relationship to other plans.

10. Small Landowner Incentives

A program for small forest landowners has been created to achieve both 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, but it is intended to help the viability of non-industrial forest landowners and keep forest land base in forestry. Small landowners are expected to meet the riparian and road requirements of the Forest and Fish module. It is expected that small landowners will provide the no-touch zone along fish habitat streams and the equipment limitation zone along non-fish streams without compensation. Beyond those zones, some financial incentives will be provided subject to availability of funding. The incentives can be through compensation for trees not cut, conservation easements, or other mechanisms. Small landowners will be offered one-half of the value of qualified timber as compensation for 50-year riparian easements. Small landowners are defined consistent with Chapter 84.33 RCW as landowners averaging less than 2 million board feet per year of harvest.

A small Forest Landowner Office was created by the 1999 legislation to administer the forest riparian easement program, and assist small landowners with development of options such as alternate plans discussed above. The Office is required to evaluate the cumulative impacts of alternate plans on essential functions within the watershed and make adjustment if necessary. An advisory committee is established to assist the office.

Exemptions are provided to landowners with less than 20 acres in a parcel and with less than 80 acres statewide, from the rules adopted in the Forest and Fish report. Landowners are to operate consistent with rules in place as of January 1, 1999, with few exceptions.

11. GIS, Mapping, Data, and Data Maintenance
The implementation of the Forest and Fish recommendations relies heavily on geographic information system (GIS) mapping and data processes to better protect and monitor public resources. Included here are:

- Transportation Layer Upgrade to support the new requirements for tracking information on forest road maintenance plans and the needs for state HCP implementation and reporting.
- Hydrography and Water Type, a multi-organizational effort to provide a more accurate statewide hydrography (mapping water bodies) in the DNR GIS system, provide modeling capability and put in place a map-based water type system that more accurately represents the water resources needing protection (i.e., fish).
- Wetland Update System to augment the hydrography data, focusing on capturing more complete information on wetlands, fully integrating the data with the hydrography, and putting in place a mechanism for wetland assessment.
- Hazard Zonation to map unstable slopes.

12. Cultural Resources
The Forestry Module makes a commitment to provide more effective protection of cultural and archaeological resources.

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

Forest practices are regulated to meet resource objectives and sustain the economic viability of the timber industry. Adaptive management is necessary to monitor and assess the implementation of the rules and to achieve desired objectives. A science-based program will be established to monitor the relationship between forest practices and forest conditions, and evaluate effectiveness toward achieving the target forest conditions and processes. Also, an infrastructure will be established to ensure that compliance/enforcement, training, and education efforts are being implemented effectively.

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 and on-the-ground implementation of forest practices. See Forest and Fish Report Appendices - Appendix L. Adaptive Management and Schedule L-1 Key Questions, Resource Objectives, and Performance Targets for Adaptive Management - for details on monitoring and adaptive management.

Default Actions

National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) are anticipated to promulgate one or more 4(d) rules within the next two years. The 4(d) rules would exempt forest practices carried out by state and private landowners, if conducted in accordance with the prescriptions recommended in the Forest and Fish Report, from "take" prohibitions. No additional regulations or restrictions for aquatic resources will be imposed, except as provided in the Report.

ESA Compliance Strategy

The Governor's Office is authorized to negotiate terms and conditions for a "programmatic" Habitat Conservation Plan that will form the basis of an incidental take permit under section 10 of ESA. It is anticipated that NMFS and USFWS will issue a "programmatic" incidental take permit by June 30, 2003. Also it is expected that NMFS and USFWS will provide the "no surprises" protection in connection with the programmatic incidental take permit.

In addition to assurances related to ESA, EPA and the Department of Ecology will be providing assurances relating to the Clean Water Act (CWA). Attainment of water quality standards remains the goal for the Report. The assurances spell out the terms and conditions of how section 303(d) of the CWA will be applied to lands subject to the Report and its recommendations. The urgency of developing Total Maximum Daily Load (TMDL) for water bodies impaired by current forest practices will be reduced significantly. The TMDL will be done in ten years, a reasonable time to determine water quality trends from the changes in forest practices.

ESHB 2091 sets out a state process if the federal agencies fail to provide assurances negotiated in the Forest and Fish Report.

IV. Core Elements

➢ HABITAT
Habitat is Key

LINKING LAND USE DECISIONS AND SALMON RECOVERY

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

Background
The tremendous population growth experienced in the past 30 years has taken a toll on the state's natural resources. The State Office of Financial Management, Forecasting Division estimates show the state's population has grown by 20% every 10 years since the 1960s. It now stands at 5.6 million, forecasted to reach 5.9 million in the year 2000 and 7.7 million by 2020. This growth must be handled in ways that are friendly to salmon. Otherwise our efforts to repair past mistakes will be swept away by new development.

While growth was experienced in many counties in the state, urban counties along interstate I-5 have grown the most, with some counties such as Clark County experiencing a 33% increase in population between 1990 and 1997. The population increase and associated development have drastically altered many natural habitats critical for salmon survival. Growth management will continue to be a major challenge facing the state for many years to come. (See discussion on urbanization in Chapter II. Background: Setting the Context.)

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 greatest 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.

Current Applicable Policies
Washington has a rich and at times confusing and poorly integrated array of land use and environmental laws. Over the last thirty years, state and federal governments have enacted legislation designed to protect or address specific environmental concerns. In many cases these laws did not adequately address environmental impacts of land use decisions. The Shoreline

Management Act (SMA) adopted in 1971, and the State Environmental Policy Act (SEPA) adopted in 1971, have recognized some of the gaps and the need to focus on avoiding or mitigating impacts at the planning stage rather than making decisions permit by permit to mitigate impacts.

It was not, however, until the passage of the Growth Management Act (GMA) by the Legislature in 1990 that the relationship between land use decisions and environmental impacts was given more significance. While the primary tools for regulating development activities is through SMA, SEPA, and GMA, there are other state, federal, and local laws and regulations that apply to various land use activities.

In addition to the legislation there is a wide range of governmental entities and authority with a role in land use and environmental decisions. Several of these laws establish a shared responsibility between various local governments, between the state and local governments, and with tribal governments. To clearly understand the solutions outlined in this chapter it is important to present a brief overview of key land use regulatory policies and programs and state and local governments that have a role in land use decisions that relate to salmon protection and restoration.

State Environmental Policy Act

Together, with the Shoreline Management Act, the State Environmental Policy Act (SEPA, Ch. 43.21C RCW) forms the basis of Washington's modern environmental framework. SEPA requires a state agency or local government to prepare an environmental impact statement before making a decision that will have "a probable significant, adverse environmental impact."

SEPA's primary function is to inform decision-makers about the consequences of their actions and to assess and mitigate the environmental impacts of state and local legislation and specific development proposals. For example:

An agency may deny permits or other approvals under SEPA if the proposal would likely result in significant adverse environmental impacts and if mitigation measures would be insufficient to avoid or reduce those impacts. Although SEPA has not been fully utilized by local and state agencies, it is a very critical tool to use to address the inadequacy of existing regulations to protect and enhance salmon habitat.

Shoreline Management Act

The Shoreline Management Act (SMA, Ch. 90.58 RCW), adopted in 1971, was Washington's first comprehensive land use planning statute. The SMA applies statewide to all water bodies, except for smaller streams and lakes. In addition, the SMA defines "shorelines of statewide significance" which include the Pacific coast, portions of Puget Sound, lakes over 1000 acres, and rivers with a specified flow.

The SMA established a cooperative regulatory partnership between state and local government. Local government develops and administers the program and the state provides guidance, technical assistance and oversight. Every local government with shorelines is required to adopt a local Shoreline Master Program (SMP). The Department of Ecology must review and approve the program based on consistency with the SMA and other specific rules that establish minimum requirements for local programs (the SMP Guidelines). Local SMPs or amendments are not effective until approved by the Department of Ecology.

The locally developed Shoreline Master Program provides the specific requirements for implementation of the policy of the Shoreline Management Act and is tailored to address local shoreline conditions and needs. The required elements of the SMP, defined by statute, include economic development, public access, recreation, circulation, land use, conservation, historic and cultural preservation, science and education, and flood prevention and management. The SMP must also include provision for the issuance of a substantial development permit for certain types of shoreline development. Certain other shoreline uses and activities identified in the local master programs require Conditional Use permits or Variances that require state approval.

Legislation passed in 1995 integrated the Shoreline Management Act and the Growth Management Act. In addition, the local shoreline master program is considered to be an element of county or city's GMA comprehensive plans and development regulations. The changes were mostly procedural and did not alter the basic substantive authorities.

Most of the local shoreline master programs in effect today were originally adopted in the mid to late-1970s and were based on guidelines developed by the Department of Ecology. The guidelines have not been comprehensively updated since adoption. As such, they do not reflect current scientific understanding or common shoreline management practices gained over the last twenty-five years.

In summary, the SMA provides a strong policy basis and represents a powerful tool for protecting and restoring salmon and trout habitat as a part of an established local planning and permitting system for shoreline development[1].

Growth Management Act

The Growth Management Act (GMA, Ch. 36.70A RCW) was initially enacted in 1990. In 1991 the Legislature adopted additional provisions. The GMA applies to certain counties and cities based on population level and voluntary option to opt in. There are 18 counties that are required to plan because of their population and /or rate of growth. In addition, 11 counties have voluntarily chosen to plan under the Act. These 29 counties contain more than 80% of the state's population.

[1] RCW 90.58.020. "The Legislature declares…..(1)Recognize and protect the state-wide interest over local interest; (2) Preserve the natural character of the shoreline; (3) Result in long term over short term benefit; (4) Protect the resources and ecology of the shoreline; …"

The GMA gives local governments broad discretion to make choices on how they will comply with the requirements of the statute. No state agency has authority to adopt mandatory rules that a local government must follow in its planning process. The state role is limited to providing technical assistance and commenting on proposed plans and development regulations.

The Department Community of Trade and Economic Development, the state agency with growth management responsibilities, does have authority to adopt minimum guidelines for designating natural resource lands and procedural criteria to guide the development of the comprehensive plan.[2] Decisions of the Growth Management Hearings Boards have determined that the guidelines are voluntary.[3] The Boards and the Courts do, however, look to the guidelines as a basis for determining whether local government decisions comply with the GMA.[4]

The GMA establishes thirteen goals that apply to cities and counties jurisdictions and they are required to take these goals into consideration when adopting the required comprehensive plan and development regulations. In 1995, in an effort to bring some coordination between the GMA and the SMA, the goals of the Shoreline Management Act were incorporated by reference into the Growth Management Act.

A GMA comprehensive plan must have a minimum of five elements: land use, housing, capital facilities, utilities, and transportation. A county is also required to include a rural element in its plan. A 1997 amendment to the GMA requires all GMA cities and counties to review and revise, if needed, their comprehensive plans and development regulations not later than September 1, 2002 and on a five-year cycle, thereafter[5].

Two provisions of the Growth Management Act apply to all counties and cities in the state, whether or not they are planning under GMA: 1) the requirement to designate natural resource lands (agriculture, forest, and mineral resources lands) and 2) the requirement to designate and protect critical areas. This requirement to designate and protect critical areas -- wetlands, fish

[2] RCW 36.70A.190. "(4) The department shall establish a program of technical assistance [by]: … (b) Adopting by rule procedural criteria to assist counties and cities in adopting comprehensive plans and development regulations that meet the goals and requirements of this chapter. These criteria shall reflect regional and local variations and the diversity that exists among different counties and cities that plan under this chapter."

[3] See, e.g., *Twin Falls, ...*

[4] See, e.g., See, e.g., *Benaroya v. Redmond*, __ Wn. 2nd. ___ (1998) where the Supreme Court referred to the minimum guidelines for designating natural resource lands in establishing the meaning of "agricultural lands" under the GMA.

[5] RCW 36.70A.130(1). "Each comprehensive land use plan and development regulations shall be subject to continuing review and evaluation by the county or city that adopted them. Not later than September 1, 2002, and at least every five years thereafter, a county or city shall take action to review and, if needed, revise its comprehensive land use plan and development regulations to ensure that the plan and regulations are complying with the requirements of this chapter [GMA]."

and wildlife habitat conservation areas, frequently flooded areas, geologically hazardous areas, and aquifer recharge areas, is key to the state salmon strategy. Designation and protection of all five critical areas has a direct relationship with how well we can protect and restore salmon in urban and urbanizing areas. In 1995, the Legislature directed the counties and cities to use "best available science" and give "special consideration to conservation or protection measures necessary to preserve or enhance anadromous fisheries"[6] when designating and protecting critical areas. (See discussion on science as a guide in Chapter III. A Road Map to Recovery.)

Consistent with the Growth Management Act's goals for environmental protection, resource lands, critical areas and sprawl reduction, most local governments have undertaken extensive efforts to develop and adopt plans and regulations to protect streams, habitat, and wetlands; conserve resource lands; and direct most new growth to urban areas. The requirement to use best available science and address salmon were added after many local governments had adopted their critical area designations and development regulations. The 1995 requirement applies only to development regulations adopted after the effective date of the legislation or if the regulations are amended. As a result, the majority of city and county critical area ordinances have not been tested against the new requirement.

The Governor has the authority to appeal local GMA action to the Growth Management Hearing boards and to impose sanctions, by withholding certain funds, against a county or city that fails to comply with the act. In addition, the Governor may impose sanctions on a city or county that has failed to meet the timelines for compliance. A city or county not in compliance with the GMA is ineligible for certain state grant programs, including grants to construct, repair, or replace sewer and water facilities.

The state provides local governments with grants to assist them with environmental review and planning, based on the premise that better environmental review of plans would result in a more efficient project review process and better environmental results.

In summary, the basic architecture of the GMA defines a strategy for land use management that will aid in watershed protection and salmon recovery. That strategy is to:

- Protect healthy streams and wetlands and minimize impervious surfaces;
- Conserve rural and resource lands;
- Direct new urban growth to urban areas; and
- Provide for open space corridors within and between urban growth areas.

Forest Practices Act

Under a 1997 amendment to the Forest Practices Act (Ch. 76.09 RCW), by December 31, 2001 cities and counties are required to adopt and begin administering regulations for forest practices which convert parcels from forest management to development. The regulations must

[6] RCW 36.70A.172(1).

meet or exceed the standards in the Forest Practices Board regulations existing at the time the city or county takes action. (See Chapter IV.A.2. Forests and Fish.)

Floodplain Management Planning
Both state and federal laws provide a variety of programs to encourage floodplain management and planning. Floodplain management is important to salmon survival because it directly impacts fish habitat. The response to flooding in most areas has been to build levees, harden banks, dredge the rivers, and construct flood control dams. These corrections to flooding problems have resulted in major habitat degradation and loss. (Some counties, such as King County, place an emphasis on non-structural solutions and environmentally sensitive approach to maintaining flood control river facilities.)

Hydraulics Code
The Hydraulics Code is the Washington Department of Fish and Wildlife's (WDFW) primary authority to meet the goals of protecting habitat. WDFW issues authorizations (Hydraulic Project Approvals) for activities that occur below the ordinary high-water line. This is one of the main regulatory mechanisms the state has to address uses (bulkheads, fills, gravel removal, dredging, placement of structures, etc.) impacting instream habitat. (See Chapter V.C. Permit Streamlining.)

Clean Water Act
The Clean Water Act (CWA) is the principal federal statute for protecting water quality. (See discussion in Chapter IV.A.6. Clean Water for Fish: Integrating Key Tools.) In addition, section 404 of the CWA, administered by the U.S. Army Corps of Engineers, regulates certain activities such as dredging, filling, and locating structures. The Corps cannot, however, grant a 404 permit unless the state Department of Ecology certifies under section 401 of the CWA that the project does not violate state water quality standards.

The requirement to establish total maximum daily loads (TMDLs) and to control point and nonpoint loading will increasingly affect land uses and growth.

Special Purpose Districts
Washington law authorizes the creation of numerous special purpose districts to address issues ranging from irrigation to agricultural pests to the provision of sewer and water services. A number of these special purpose districts have responsibility over matters that have either a direct or indirect impact on land use and the environment. Very few of them require county approval.

Sewer and Water Districts: Sewer and water districts have the authority to establish water and sewer systems. Many actions taken by a water or sewer district must be approved by the county legislative authority and by any city in whose jurisdiction the district operates. A sewer or water district must have a general comprehensive plan. The plan in unincorporated areas must be approved by the local health department and by the county legislative authority. The plan cannot provide for the extension or provision of facilities in conflict with Growth Management Act requirements limiting growth to urban growth areas.

Public Utility Districts: Public utility districts (PUDs) may operate a wide range of facilities, including electrical generation and distribution systems, water supply systems and sewers. No specific statutory provisions require PUD actions to be consistent with county comprehensive plans.

Flood Control Districts: The purpose of a flood control district is "to control floods and lessen their danger and damages.[7]" Some flood control actions are required to be consistent with the district's comprehensive plan. The district is not specifically required to have its plan consistent with the requirements of comprehensive plans.

Port Districts: The operations of port districts could have a significant impact on the near shore marine environment.

Irrigation Districts: An irrigation district may provide water for irrigation purposes and, with some limitations, for domestic purposes. An irrigation district may also decide to establish a sewer system. Irrigation district actions are not required to conform to a county's comprehensive plan.

Open Space Taxation Act (RCW 84.34)

In 1970, the legislature created the Open Space Taxation Act (Chapter RCW 84.34) to implement current use assessment programs that protect 'open-space'. The Act is referred to as Current Use Taxation or CUT. The 'open space,' CUT, offers a reduction in property taxes on private lands when the current open space amenities on these lands, such as wetlands and riparian corridors, are deemed of community benefit and are worth the tax incentive to retain them in their natural undeveloped state. CUT is a unique law in the nation. It provides the option of tailoring implementation of tax relief benefits to local needs. It combines the strong incentive arm of "open space" property tax valuation with the powerful fund-raising option of the "conservation futures" levy. CUT can contribute to smarter growth strategies that enhance livability of a community.

Mitigation Banking

In 1997, the legislature passed the Wetland Mitigation Banking Act, recognizing that mitigation banks are important tools for providing compensatory mitigation for unavoidable impacts to wetlands. The Department of Ecology is in the process of developing and adopting rules for the certification of wetland mitigation banks.

[7] RCW 86.09.010.

In addition, the 1998 Salmon Recovery Planning Act (ESHB 2496) directed the Departments of Ecology, Fish and Wildlife, and Transportation to develop alternative mitigation policy guidance. The guidance is to improve the ecological benefits from compensatory mitigation for wetlands, water quality, flooding, and fish and wildlife habitats impacted by human activities. A proposed policy guidance has been developed. It proposes to adopt the watershed approach to aquatic resource mitigation and provide flexibility needed to address salmon recovery efforts while operating within the existing regulatory framework.

In summary, it is going to take the collective use of federal, state, and local regulatory and non-regulatory authorities to restore and protect healthy watersheds and to resolve the public policy issue of protecting environmental and natural resources in the face of continuing growth and development.

Current Efforts

Counties, cities, and tribal government are undertaking approaches, programs and projects to protect and restore salmon and habitat; this includes assessing/analyzing factors limiting salmon, and adopting protection and restoration programs to protect and restore riparian habitat, managing stormwater run-off, removing fish barriers, acquiring key salmon habitat, etc. Much of the efforts put forth by local governments are very helpful and are needed to help respond to salmon recovery, but they are not enough. The Endangered Species Act is challenging both local and state approaches to land use.

The current condition of many salmon populations would suggest that many plans, programs and regulations are not 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 and that more restrictive regulations and/or economic incentives be enacted to protect, preserve and restore salmon habitat.

The following is a summary of local governments' current land use actions:

Shoreline Master Programs

Since it was adopted in 1971, nearly every city and county in the state with shorelines has adopted a shoreline master program (SMP) as required by the Shoreline Management Act. There are currently over 246 adopted SMPs statewide. However, many cities and counties have not made any significant changes to their SMPs since original adoption. Adoption of new SMP Guidelines by the Department of Ecology will trigger a requirement for updates of local SMPs

Growth Management Plans and Regulations

As of September 1998, 29 counties and 216 cities were planning under the Growth Management Act (GMA, RCW 36.70A). To be in compliance with the provisions of the GMA, local governments must have adopted comprehensive plans and development regulations to implement the goals and policies of their plans. Development regulations include such things as a zoning code, subdivision ordinance, clearing and grading ordinance, critical areas ordinance and other regulations as necessary.

All 39 counties and 278 cities in Washington State were required to designate and protect critical areas. The Department of Community Trade and Economic Development (CTED) has conducted a review of county and city critical areas ordinances in an effort to determine the degree to which they meet the best available science standard and give special consideration to salmon protection and conservation. (The Critical Areas Ordinance Review Project, Final report was issued by CTED, December 1998 summarizing the findings of the review.)

The study examined the degree to which county and city critical areas ordinances conform to the Department of Ecology's Model Wetlands Ordinance, the Department of Fish and Wildlife's Priority Habitat and Species Program and the types of exemptions provided, specifically including exemptions for agricultural activities. In the Puget Sound region, there was a review of the degree to which the ordinances comply with the Puget Sound Stormwater Manual published by the Department of Ecology. The study also examined whether the county or city had implemented an enforcement program, including civil or criminal penalties. The review found wide variation among jurisdictions.

The following is a summary of Washington's 39 counties and 278 cities that have adopted or failed to adopt critical area ordinances as of December 1998:

1). Adoption of Critical Areas Ordinances
- 10 % or 4 out of 39 counties in Washington are without Critical Area Ordinances (CAOs).
- 9 % or 26 of the 278 cities in Washington State do not have CAO ordinances.

2). Critical Areas Designations
- 31 of 39 counties have addressed all 5 critical area types, including wetlands, fish and wildlife conservation areas, frequently flooded areas, critical aquifer recharge areas and geologically hazardous areas.
- 19% of 278 cities have addressed all 5 critical areas in their ordinances.

3). Wetland Classification and Buffer Sizes
- 70 % or 27 counties do not use the state's recommended model guidelines for wetland classification and buffer sizes. There are 5 % or only 2 counties that apply the recommended Ecology Model Guidelines and 10 counties, or 25 % use the low intensity standards of the model guidelines.
- 83% of the 278 cities do not use the state's recommended model guidelines for wetland classification and buffer sizes. Of those cities that use the state's model guidelines, 16

cities have adopted the high and low development intensity buffer sizes and 38 cities or 14 % use the low intensity buffer sizes for all development types.

4). Fish and Wildlife Habitat in WDFW's Priority Habitat and Species (PHS) Program

- 95 % of the counties (33 counties) use the WDFW's Priority Habitat and Species (PHS) program in varying degrees of application with 10 counties, or 25% of those using the PHS program in its entirety through the adoption of the PHS list of priority species, the habitats as a data source and the management recommendations.
- 52% or 145 out of 278 cities use the WDFW's PHS program in varying degrees of application with 12 % or only 32 cities adopting the PHS program in its entirety.

5). Stream Types and Buffer Sizes

- 15% of Washington's counties (6) provide adequate stream typing and buffer sizes of 150 feet or greater for fish bearing streams.
- 7 % of Washington's cities (21) provide adequate stream typing and buffer sizes of 150 feet or greater for fish bearing streams.

6). Enforcement

- 15% of the counties (6 counties) do not apply either civil or criminal penalties to enforce their CAOs. 46 % (18) of Washington's 39 counties apply both civil and criminal provisions, 3 counties have civil provisions only, and 2 have criminal provisions only to enforce their CAOs.
- 87 of 278 cities provide for both civil and criminal provisions, 44 cities have civil provisions only, 1 city has criminal provisions only, and 68 cities have no enforcement provisions to enforce their CAOs. Information is not available on the remaining 78 cities.

7). Stormwater Ordinances

- Information is not available for 19 counties, but of the remaining 20 counties, 10 have adopted stormwater ordinances and 10 do not have adopted stormwater ordinances.
- Information is not available for 128 cities, but of the remaining 139 cities, 72 have adopted stormwater ordinances and 67 cities do not have stormwater ordinances.
- As of July 1999, only 38% of the more than 120 affected Puget Sound region jurisdictions have adopted stormwater provisions fully consistent with the Puget Sound Water Quality Management Plan. There is no current documentation of how well those programs are actually implemented.

Overview of Chapter

Land use impacts on natural resources and the environment are a result of decisions made by state, tribal, local and federal governments, and private interests. 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.

This chapter focuses on land use development in rural and urban areas - also referred to as urbanization. Forest practices, including timber harvest and its associated activities (e.g. road construction) and agricultural practices, although they are significant land uses, are discussed in separate chapters. Also, the effects of urbanization on stream hydrology and water quality, and the need to control surface run-off and manage stormwater are highlighted in Chapter IV. A. 4. Managing Urban Stormwater to Protect Streams.

The statewide strategy for addressing land use decisions has three key elements. First, it seeks to emphasize collaborative decision-making. No single governmental agency or private party will be able to solve this problem on its own. State, local, and tribal governments and their citizens must work together in a coordinated manner for the common good. Second, it seeks to emphasize citizen participation and voluntary and incentive based efforts. Finally, it recognizes that there must be changes in state, local and tribal governments, and citizen land use practices that have an undue detrimental impact on salmon. In summary:

- The land use strategy relies on existing state and federally laws. There are myriad and ample laws that created mandates or incentives that directly or indirectly provide for protection and restoration of salmon habitat. What is needed is better implementation of the existing laws. A few statutory improvements are needed to better integrate environmental and natural resources protection into decisions (e.g. floodplain management).

- In developing strategies for salmon habitat the highest priority is to protect the best remaining habitat by preserving it from future development through acquisition of land, implementation of conservation regulations, and through incentives and education. Improvement of habitat condition where it has been lost or degraded through protection and restoration is also critical to salmon survival.

- The state will seek to improve the quality and implementation of local land use plans and regulations and shorelines master programs, by adopting guidelines, and implementing a coordinated program of technical and financial assistance.

- Through its authority to allocate and provide funding, the state will emphasize the need to have development regulations and shoreline programs that incorporate the best available science for the designation and protection of salmon habitat. The priority will be placed on those jurisdictions where science indicates there is a need to act.

- The appropriate state agencies will also use state and federal permitting requirements and enforcement tools available to protect habitat through immediate actions, where applicable, and to increase compliance with the state's land use and environmental laws.

- To be eligible for protection from potential liabilities under the Endangered Species Act (ESA) local governments must incorporate best available science in their development regulations by 2002, implement salmon conservation measures to prevent any further harm, conserve and restore salmon habitat. In addition, the state will certify municipalities within a habitat conservation plan or section 4(d) of ESA only if the municipality has come into compliance. (See ESA Compliance Strategy section IV for further details.)

- Without an understanding of the effectiveness of its actions, no recovery program will be truly successful. The state will develop a benchmarking program and will monitor and publish progress on outcomes. This information will be used to inform future decisions and to allow for changes necessary to continue making progress.

- Local salmon recovery responses will be integrated with other state and regional efforts and will be a key part of the foundation of regional salmon recovery responses. (For further discussion, see Chapter III: A Road Map to Recovery.)

II. Goal 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?*

The requirements that: 1) all GMA jurisdictions review and revise their comprehensive plans and regulations; 2) all CAOs be developed using the best available science; and 3) local governments with shoreline jurisdiction update their local SMPs for consistency with new Guidelines provide an excellent opportunity for local governments to upgrade the quality of GMA and SMA plans, programs and regulations, provide higher level of protection and conservation of natural resources and the environment and remove or address any uncertainties local governments and or private landowners face under ESA and CWA.

To meet the 2002 deadline, cities and counties will need to begin the review process now. In order to assist local governments in meeting their statutory obligation, and to achieve the maximum benefit for protection and restoration of salmon, several strategies will be implemented.

Policy Guidance for Protection and Restoration Efforts
Development changes the ecosystem through loss of vegetation cover, removing or destroying soil structure, modifying surface drainage patterns, and adding impervious surfaces. The vast majority of existing development has occurred with no or inadequate environmental protection. Often resulting in degradation of streams and wetlands.

While some development activities and the hydrologic disturbances they cause may be reversible, such as replanting trees after a timber harvest, it may not be feasible to reverse the loss of soil structure, or the creation of impervious surfaces, e.g., roads, residences, commercial buildings.

At present, the management tools we have to mitigate the impacts of growth and development are not completely effective. There is strong evidence that high quality stream ecosystems cannot be adequately protected from the impacts of development through "engineered" solutions.

Therefore, it is critical that remaining high quality habitat be preserved, protection measures be implemented, and restoration and enhancement efforts undertaken. For example, higher densities within urban growth areas should be achieved concurrently with minimizing impervious surfaces and vegetation removal. For areas not yet developed, both inside and outside urban growth areas, developments should achieve no net impact by either avoiding impacts, or fully mitigating them.

The following policy guidance is for state and local governments to consider when making land use decisions during review and approval of plans, adoption of regulations and permitting of developments:

Preserve high quality habitat and salmon populations through land conservation pursued through:

- Use of SEPA to analyze how the proposal's objective could be accomplished while providing maximum salmon protection and recovery.
- Adoption of conservative land use restrictions (e.g. restrict total impervious surface areas).

- Secure and expand state, federal, local and private funding for acquisition of conservation easements, land purchase, purchase transfer of development rights, land exchanges, etc. Coordination with private land trusts may be necessary to maximize preservation efforts.
- Use incentives such as the Public Benefit Rating System-tax incentives programs to encourage landowners to preserve their lands.
- Support local community groups' restoration and enhancement efforts.

Protect aquatic ecosystem integrity by using and improving current laws, rules, guidance and incentives for planning, designing, constructing and maintaining new development and redevelopment.

In consideration of this protection priority the following could be included in local land use programs:
- Adoption of adequate riparian buffers using best available science,
- Retention of the natural vegetation cover,
- Control of stream peak flows and flow duration through stormwater management,
- Improved development standards,
- Adoption of mitigation policies that enhance watershed approach, and
- Use of incentive programs.

Restore or enhance degraded and impacted habitat (e.g. streams, wetlands, and estuaries).
- Define the extent of degraded habitats, (For example, use local government-led Watershed Planning under ESHB 2514, watershed assessment and characterization, information collected under the limiting factors analysis under ESHB 2496, and local and regional recovery assessments.)
- Use incentives and non-regulatory mechanisms (lower tax assessment) to restore and enhance riparian habitat,
- Define restoration objectives, priorities, and cost effectiveness, and
- Secure local, state, federal and private funding to adequately meet the challenge of salmon restoration.

Immediate Actions in ESA Areas

While local, state, federal and tribal governments are combining their efforts and resources to address the critical needs of salmon, interim measures must be implemented immediately to avoid, minimize and/or mitigate habitat impacts and losses caused by future developments. Endangered Species Act demands that more stringent conditions and standards be used to prevent further harm to the species. The Tri-County (King, Pierce, Snohomish and several cities) ESA Response has identified several "early actions" to be undertaken by the counties and cities to ensure that no further harm is caused to salmon habitat from land use development and to seek ESA protection by receiving exceptions under the chinook 4(d) rule, once it is proposed.

1. Use the State Environmental Policy Act (SEPA) to specifically address salmon issues
SEPA is an avenue to better define specific actions and conditions around permits by giving special attention to identifying probable environmental impacts, evaluating alternatives and reasonable means to avoid impacts where possible, and preventing further environmental degradation. The following are immediate actions to be taken by state agencies under SEPA:

- Whenever a state agency is lead for an Environmental Impact Statement that has potential impact on salmon one alternative that will be analyzed will be a "salmon recovery alternative." This will address how the proposal's objective(s) could be accomplished while providing maximum salmon protection and recovery.
- Agencies shall increase their efforts in reviewing SEPA actions for plans, regulations, and projects in areas with ESA listings or proposed listings.
- Agencies should use SEPA's substantive authority to require special actions and conditions to mitigate project development impacts on salmon.

The above actions are also recommended for local governments to use during SEPA review to avoid further harm to salmon species)

2. Use existing permitting requirements, such as shoreline conditional permits.

- The various regulatory state agencies will use existing permitting authorities to protect habitat and mitigate project impacts. For example, Washington Department of Fish and Wildlife may use stricter conditions in Hydraulic Project Approvals (HPA) in areas with ESA listings to prevent any further degradation of habitat and harm to the fish. Ecology may deny or condition 401 certification required under the Clean Water Act (CWA) for 404 permits impacting wetlands and riparian habitat. DNR may restrict or condition forest practices permits for conversion to non-forest use. (See Chapter V.2. Permit Streamlining.)

State agencies will work with local governments to identify and help implement interim action items to immediately address the critical needs of salmon, and to prevent or mitigate any potential rush to development and further loss of resources while local plans, regulations and Shoreline Master Programs are being updated.

State Technical and Financial Actions to Improve Plans and Regulations

1. Adopt Shoreline Guidelines

Ecology will update the Shoreline Master Program Guidelines adopted under the Shoreline Management Act as directed by the 1995 legislature (ESHB 1724) integrating shoreline and growth management plans and regulation requirements and reflecting improvements in scientific knowledge and best shoreline management practices. Proposed guidelines were developed based on recommendations made by the Shorelines Guidelines Commission established in May of 1998. Public review and comment of the Guidelines has been extensive. Adoption is planned for the spring of 2000. Upon adoption of these Guidelines, local governments will be required to update their local SMPs for consistency with the new Guidelines and submit them to Ecology for approval before they become effective.

For GMA jurisdictions, shoreline master program updates are proposed to be coordinated and integrated with the requirement for revisions due September 1, 2002. For non-GMA planning jurisdictions within ESA listed or proposed listing areas, the completion for update of SMPs will be between two and five years from Ecology is adoption of the new updated Guidelines.

The SMP Guidelines represent minimum statewide policies and standards for local government. The Shoreline Master Program Guidelines address salmon recovery through:

- Specific policies and standards that address discrete habitat protection issues,
- Performance-based standards that achieve more general but equally important ecological management objectives, and
- Procedures to implement a more comprehensive, ecologically-based and integrated management approach that will ultimately be necessary for species recovery and long-term survival.

Although not yet adopted, the Guidelines incorporate a number of new directions in shoreline management. Some examples of key proposals for salmon included in the draft:

- *Inventory*: Local governments will be required to use all available inventory information (i.e. Critical Area Ordinance inventories, watershed characterizations, existing GIS databases, estuary management plan studies, and State resource agency information) as a basis for updating SMP provisions.

The inventory will address:

a. *Shoreline and adjacent upland land use and activity patterns.*
b. *Critical areas and opportunities for ecological rehabilitation.*
c. *Areas of special interest, such as priority habitats.*
d. *Conditions and regulations in shoreland and upland areas that affect shorelines, such as surface water management and land use regulations.*
e. *General location of bank full-width limits, channel migration zones, and flood plains.*
f. *Identification of cumulative impacts such as bulkhead construction, intrusive development on priority habitats.*

- Shoreline Environment Designations: In light of inventory information, local governments are required to reevaluate and revise accordingly existing SMP shoreline environment designations to reflect current shoreline conditions and development patterns, to make them consistent with the new guidelines. A check for consistency with the land use designations in the comprehensive plan would also be necessary. Where natural shoreline functions remain intact, provisions for prohibiting or limiting future development that would create adverse impacts may be required. Identification stretches of shoreline with restoration potential may also be identified so that natural conditions and physical processes that are presently impaired or degraded can be improved as development or redevelopment occurs.

- *SMA/GMA Integration:* The Guidelines propose to give local governments credit for their good work by allowing a variety of ways to incorporate SMA requirements within their comprehensive plan policies and development regulations. For example, various methods for including SMP policies within the local comprehensive plan and methods to avoid duplication between the SMP and local critical area ordinances would be provided. The intent of these provisions is to ensure better integration of uplands and shorelines land use measures and decisions.

- Use of Scientific Information: The proposed Guidelines represent a significant upgrade from the old rules by basing shoreline regulatory practices on scientific information. The proposed Guidelines base provisions on the need to protect and enhance existing shoreline natural "ecological functions and values." This is also consistent with GMA requirements to include BAS in the designation and protection of critical areas, which are found primarily within SMA jurisdiction. Ultimately this calls for closer coordination with state and regional resource management expertise and a more comprehensive approach to ecosystem management.

- Shoreline stabilization: The proposed Guidelines require that there be a demonstrated need for new bulkheads and other "hard" shoreline armoring prior to their approval. They also require that the "softest" feasible method of stabilization be used as the first priority. The intended result is that new shoreline armoring be restricted and that unnecessary existing armoring be removed over time to restore dynamic shoreline processes and nearshore habitat.

- ***Vegetation management:*** The proposed guidelines require the protection of existing natural plant communities critical to shoreline habitat corridors and the restoration of degraded shorelines as a condition for most shoreline development. The proposed guidelines include provisions to protect and enhance vegetation corridors by:

  a. Preventing vegetation removal that would likely result in significant soil erosion or the need for structural shoreline stabilization.
  b. Preventing vegetation removal within the vegetation management corridor for undeveloped properties outside urban growth areas and for shorelines designated for forestry purposes, if the land is subdivided or converted from forest practices.

The Guidelines establish a "vegetation management corridor" along all shorelines of the state equal to or greater than "one site potential tree height" as measured landward from the top of the bank closest to the shoreline. Development standards for managing vegetation within the corridor will vary depending on local conditions. The vegetation management corridor as defined in the Guidelines is not necessarily a setback, buffer or no-touch zone. It is, however, a designated management area that will receive greater scrutiny with regard to protecting and enhancing shoreline vegetation. In the vegetation management corridor, local governments will be required to demonstrate how their updated shoreline programs both protect existing ecological functions provided by vegetation and enhance those functions on a system-wide basis over time.

2. Update Minimum Guidelines for Designation and Protection of Critical Areas
Local governments, as stated above, are required to use best available science when adopting policies and regulations to designate and protect the functions and values of critical areas. In addition, they must demonstrate that they have given special consideration to protection measures necessary to preserve or enhance anadromous fisheries.

There have been eleven Growth Management Hearings Board cases since 1996 that address both substantive and procedural issues about local government's inclusion of best available science and special consideration for the conservation and protection necessary to preserve or enhance anadromous fisheries.

The Western Board found the following factors should be analyzed to determine compliance with the Act:

1. The scientific evidence contained in the record,

2. Whether the analysis by the local decision-maker of the scientific evidence and other factors involved a reasoned process, and

3. Whether the decision made by the local government was within the parameters of the Act.

The Western Board also ruled that:

> "With regard to anadromous fisheries, local governments must include conservation or protection measures "necessary to preserve or enhance" such fisheries. This part of the statute directs measures for both preservation and enhancement. It therefore limits the discretion available to local governments when dealing with anadromous fish. In balancing the scientific evidence against issues of practicality and economics, the result must be more heavily weighted towards science when dealing with anadromous fish. The "special consideration" language directs that local governments must go beyond what might otherwise be done in designating and protecting other kinds of critical areas."

The Department of Community, Trade and Economic Development (CTED) is developing rule guidelines to assist counties and cities in meeting the requirements of the law and reduce appeals to the growth hearings Boards and courts. Defining and including best available science is also a requirement of the Endangered Species Act. CTED has been working with a technical team, including scientists from state agencies and local governments, to develop draft recommendations for broad review.

The intent is for CTED to adopt the guidelines on what best available science is and how it will be included in the designation and protection of critical areas, and what is required to give "special consideration" to conservation or protection measures necessary to preserve or enhance anadromous fisheries. The Guidelines will encourage enhanced environmental review of proposed development at the earliest feasible stage.

The Departments of Community Trade and Economic Development, Ecology, Fish and Wildlife, and Natural Resources will provide guidance documents and management recommendations for local governments to assist them with identifying sources and reference materials on best available science for fish and wildlife conservation areas, wetland designation and protection, and other critical areas. These documents will be updated periodically with new sources of best available science, as information becomes available.

3. Use WDFW's Priority Habitats and Species Program

The Priority Habitats and Species (PHS) program fulfills one of the most fundamental responsibilities of Washington Department of Fish and Wildlife to provide comprehensive information on fish, wildlife and habitat resources in Washington to landowners, land use planners, elected officials and other decision-makers. The program serves as the backbone of WDFW's approach to fish and wildlife conservation. It is used to screen forest practices applications, hydraulic project applications, development of habitat conservation plans, and watershed level planning.

In 1997, WDFW published its riparian management recommendations for multiple species entitled "Management Recommendations for Washington's Priority Habitats." See Reference. The publication represents the best available science habitat needs for (multiple species) fish and wildlife's riparian corridor. More than 1,500 scientific sources were used in the development of the recommendations. The guidelines are designed to protect and enhance healthy and declining populations of fish, including anadromous salmon and steelhead, through protecting and enhancing riparian habitat. WDFW provides assistance in management decisions. Also, nearly 2,000 state-of-the-art Geographic Information System (GIS) maps are available, which display locations and extent of priority species and habitats on 29 millions acres in Washington.

The Department of Fish and Wildlife will help as local governments amend their plans and regulations identify land use activities that are likely to affect critical habitat for anadromous fisheries. They will also make recommendations on measures necessary to preserve or enhance anadromous fisheries.

4. Provide Model Ordinances and Guidelines

- CTED will provide model Land Disturbance and Re-vegetation Regulations for site development and to guide clearing, grading and vegetation management for local governments' consideration.

- CTED in cooperation with other agencies will review and amend as necessary various state land use guidance documents to reflect best available science.

- Departments of Ecology, Natural Resources, and Fish and Wildlife will update existing model ordinances and technical guidance documents, and will develop additional guidance documents and land use management recommendations consistent with best available science. These documents are intended to help local governments in the designation and protection of critical areas and in the conservation and protection necessary to preserve or enhance salmon fisheries.

- Other model ordinances or technical manuals on salmon recovery solutions/effectiveness options will be updated or developed to assist local governments address best development practices, conserving rural lands, urban infill that takes into account fish habitat and enhancement, stormwater management and reducing natural hazards.

- Regulations that will outline a statewide process for wetland mitigation banking are currently being developed and will be adopted in the very near future. In addition several technical documents on wetland buffers, mitigation ratios, identification and delineation are in existence or in development, agencies will make them available to local governments, when needed.

- WDFW, in cooperation with other state, local and federal agencies, will develop Integrated Stream Corridor Management guidelines, a series of technical guidance documents that detail restoration and protection standards. WDFW will also publish and disseminate the Integrated Streambank Protection Guidelines, a document that describes a process for bank erosion assessment and bank stabilization design. (See Chapter V. Permit Streamlining)

- Policy guidance that will outline the selection of mitigation alternatives based on watershed approach is currently being finalized by the Departments of Fish and Wildlife, Ecology, Transportation, and Community Trade and Economic Development. The development of the policy guidance was mandated by the legislature in 1998 with the passage of the Salmon Recovery Planning Act (ESHB 2496).

- The Department of Ecology, following adoption of new SMP guidelines, will update its technical assistance materials available to local governments, such as the *Shoreline Management Guidebook*. The guidebook includes model language for local SMP policies and regulations.

5. Design and promote incentives programs

The State will provide technical guidance on use and application of non-regulatory programs. A technical document on Open Space Taxation, "Applying the Public Benefit Rating System as a Watershed Problem-Solving Tool," is available to local governments. It contains incentive program options for private landowners to preserve important natural resources, such as direct property tax relief for retaining natural features in their undeveloped condition.

Guidance on how to establish wetland mitigation banks will be available in the fall of 1999. Funding for land acquisition and other conservation protection mechanisms will be made available to local governments and private organizations.

6. Adopt Stormwater Management

See Chapter IV. A. 4. on Managing Stormwater to Protect Streams.

7. Revise Floodplain Management Planning

Restoration of natural floodplain functions has multiple benefits: reduction of flood damage to life and property by relocating people to areas out of the 100 year floodplain where possible; long-term savings of public monies as flood hazards are reduced by re-acquiring previously developed floodplain land and preserving existing flood storage areas; water quality improvement as re-established vegetation buffers reduce erosion rates and help to lower stream temperature; habitat restoration for aquatic and riparian species as these floodplains resume their natural character; and aesthetic and recreational value, as these areas function as open space when they are not inundated by periodic floods.

Primary responsibilities for floodplain management rests with Ecology, WDFW, counties, and cities. Others sharing an interest are CTED, WSDOT, Emergency Management Division, DNR, and federal agencies (Federal Emergency Management Agency, Natural Resources Conservation Service, Federal Highway Administration, and U.S. Army Corps of Engineers).

To further this multi-objective of flood plain management, a unified approach to address flood risk and salmon recovery is proposed by state and local and federal governments. It includes changes to:

- Fund pilot floodplain restoration projects and monitor existing and pilot projects.

- Integrate engineering concepts of flood hazard management and biological concepts of salmon recovery into a unified management strategy.

- Identify flood management strategies that reduce losses to salmon habitat from future floods in specific basins:
  - update flood assistance planning standards with relevant parameters--floodplain development management, sediment management, risk identification (channel types, channel pattern thresholds, meander belts, channel confinements, etc),
  - identify and modify existing flood hazard management practices that limit salmon restoration,
  - Identify and modify flood management projects that could result in a taking under the ESA, and
  - Update and reinforce local comprehensive flood hazard management plans.

- Provide better information through improved floodplain maps (Federal Emergency Management Agency maps, Flood Insurance Rate maps, and local community's adopted maps) and a watershed based GIS model that integrates floodplain management with fish management.

- Develop interagency guidance to promote more environmentally appropriate streambank stabilization projects, including monitoring programs to measure social and environmental impacts.

- Coordinate flood management requirements with GMA critical areas requirements for frequently flooded areas.

- Coordinate and where possible integrate floodplain management with other planning and regulatory programs, especially shoreline, stormwater, and watershed management programs.

- Promote changes to U.S. Army Corps of Engineers standards for levee vegetation to allow more vegetation to provide additional habitat.

Legislative changes are needed to modify floodplain management laws. We need to emphasize limitations on floodplain development to minimize future damage, promote and provide funding for fee or less-than-fee acquisition of frequently flooded areas, and provide incentives to local governments to adopt floodplain management plans consistent with standards.

8. Link Transportation Planning and Decision Making with Land Use and Salmon Recovery

The Washington State Department of Transportation (WSDOT), in cooperation with the Federal Highway Administration (FHWA), the Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), the U.S. Fish and Wildlife Service (USFWS), the U.S. Army Corps of Engineers (COE), the Puget Sound Regional Council

(PSRC) and tribal governments, has been working to incorporate early planning and transportation decision making.

WSDOT and FHWA have recognized that there must be changes in the way transportation decisions are made; there must be a land use and planning link in the solution of transportation deficiencies in Washington State (RCW 47.06).

The early transportation decision making model combines existing state and federal environmental laws and is based on the National Environmental Policy Act (NEPA), and the State Environmental Policy Act (SEPA). Through the use of interdisciplinary teams a collaborative decision making process is used. While the transportation decision making focuses on all aspects of transportation and how it relates to social, economic and environmental themes, salmon and watershed management issues are an integral part of the process. Citizen participation is a major component of the proposed transportation decision making process.

The "new" transportation decision making process is an integral part of a successful salmon recovery effort. Decisions concerning communities, the environment and transportation will now be made early on in the process where agency, tribal, and community input can effectively change the direction of transportation decisions.

Environmental issues are also considered in a watershed context when transportation planning decisions are evaluated. New methods for providing an environmental assessment of the 20-year state highway plan are being developed. Geographic Information System - GIS program - support is essential for the continued integration of transportation planning data, land use data and environmental and natural resources data to support process improvements to transportation decision making and early evaluation of environmental impacts to long-range transportation plans.

The Washington State Department of Transportation, Environmental Affairs Office has the lead on the Reinventing NEPA Pilot Projects, Washington Transportation Plan and Watershed Management, and on other transportation decision making and land use and salmon recovery linkages.

9. Support additional funding of local and state activities

The 1999 legislature approved, for the 1999-2001 biennium, $119 million in federal and state funds for salmon recovery. The Salmon Recovery Funding Board funds will be responsible for the allocation of the funds for protection and restoration activities and projects. Local government updates of critical areas ordinances (CAO) and other development regulations, updates of stormwater management programs (SMP), updates of floodplain management programs, updates of SMPs, and implementation of incentive based programs may be appropriate activities to consider for funding. The Board will be issuing criteria for selection based on statutory requirements. Funding for related activities such as updates of CAO and SMP should be consolidated both at the state and local levels.

10. Provide other technical and financial assistance

- CTED and other state agencies, especially WDFW and the Conservation Commission will provide information to assist local governments with inventory and compilation of existing information, assessment of habitat conditions, identification of alternative methods for protecting and restoring habitat, methods for prioritizing habitat restoration, and identification of data gaps.

- State agencies will provide direct technical assistance and financial incentives, as resources allow, and otherwise engage cites and counties in a constructive dialogue on the benefits of beginning the process for updating their comprehensive plans and development regulations sooner than the mandatory September 1, 2002 date.

- The Governor's Salmon Recovery Office in conjunction with state and tribal and local agencies will conduct a review and evaluation of available incentives and tools that can be used by state agencies, local and tribal governments to improve habitat protection.

11. Coordinate with related locally implemented programs

Chapter III. A Road Map to Recovery outlines the importance of locally implemented programs at the watershed and regional levels. In order to achieve recovery there is a critical need to coordinate and integrate, local, state, federal, tribal, and private salmon recovery activities.

It is important to link water and land use planning and implementation. The linkage can and should be done as part of other planning efforts addressing water and land uses. The 1998 Watershed Management Act provides the opportunity to link water and land use. It requires local planning units to consider all existing plans and related planning activities. It also stipulates that planning units must complete assessment of water supply and use in the area prior to initiation of actions. For example the lack of stream-side vegetation, or land uses that impact aquifer recharge areas (e.g. impervious surfaces) are greater contributors to low flow conditions and lowering of instream flows levels set by rules than direct withdrawals of water in certain tributaries (e.g. Soos Creek). As state and locals involved in watershed planning develop actions to protect and restore instream flows, they must consider and address the impacts of land use developments. (See Chapter IV. A. 5. Ensuring Adequate Water in Streams for Fish.)

- Functional plans for sewer, water, stormwater, flood prevention should be integrated into GMA planning framework. The state will support regulatory and statutory changes necessary to ensure that functional plans prepared by state and local government agencies are consistent with each other and with land use comprehensive plans.

- It is also necessary to ensure that plans developed and implemented by special purpose districts are consistent with GMA plans. The State will support statutory changes if necessary to ensure that special purpose district actions affecting fish and fish habitat are done in a manner that is consistent with GMA comprehensive plans and development regulations, including critical areas ordinances. The State will use incentives (e.g. funding preferences and penalties) to encourage PUDs, flood control districts, port authorities, and irrigation districts operating outside the GMA to coordinate salmon protection and conservation actions, especially acquisition of conservation easements.

Incentives and State Regulatory Actions to Improve Performance/Implementation

In addition to improving the quality of comprehensive plans, development regulations, shoreline master programs, floodplain management programs and other related programs (e.g. stormwater management), the Strategy also seeks to improve the implementation of those plans, programs and regulations by local governments. The state agencies will encourage:

1. *Local governments to focus priority updates/revisions on areas affected by ESA and high population growth.*

2. *The Salmon Recovery Funding Board to link state funds to local regulations that protect and restore habitat by*:
   - Giving a preference to cities and counties that have taken actions that benefit salmon recovery efforts consistent with the statewide salmon recovery strategy.
   - Providing funds for local and state enforcement programs with clear expectations of results and consequences if local government does not meet the expectations.
   - Withholding funds from jurisdictions that have not adopted critical areas ordinances that include best available science.
   - Increasing funding for salmon related priority programs and linking where appropriate state grants/loans to compliance and performance measures.
   - Directing additional funds toward local governments that have adopted protective plans, programs and regulations/ordinances and used best available science in their actions.

State Actions to Increase Compliance

The strategy also seeks to increase the compliance of local governments with the requirements of the GMA and other environmental and land use laws. Local land use laws need to be better enforced at the local level.

1. Ensure compliance and enforcement

- State will provide technical assistance in developing plan provisions and development regulations and in establishing enforcement programs to assure that local development regulations are followed.

- The State will seek funds for local and state enforcement programs which provide clear expectations of results.

- Enforcement and compliance programs and efforts at the local, state, federal, and tribal levels will be coordinated in ESA areas.

- The state will use its existing authority (e.g. under SMA, various permits) to take enforcement action if local government does not meet standards for enforcement program.

2. Respond to critical areas ordinances not in compliance

- Under the Strategy, CTED in cooperation with other agencies will strive to bring all counties and cities into compliance with the requirements of GMA and SMA. Special emphasis will be placed on bringing cities with significant salmon habitat and all counties into compliance.

- Cities and counties that have not updated their comprehensive plans, programs and development regulations, particularly their CAOs and SMPs to include best available science, will not be authorized to rely on any "safe harbor" protection or incidental take permit within salmon recovery plans. The state will certify a municipality within a habitat conservation plan or an ESA section 4(d) program only if the municipality has come into compliance.

- The Governor through CTED and other agencies (e.g. Ecology, WDFW) will appeal to the Growth Management Hearing Boards if local governments fail to comply with the requirement that best available science be used, and will withhold appropriate grants and loans if necessary.

- CTED will notify local governments that have not taken <u>any</u> action in adopting CAO that they have to come into compliance by a specific date. The state agencies with interests in CAOs, such as Ecology, CTED, WDFW, and DNR, will offer technical assistance and guidance on best available science to comply with the GMA. If the local government is not in compliance by the specified date, the state will take one or more actions:

  - Agencies will use any existing discretion to withhold state and federal related grants and loans;

  - CTED in cooperation with other state agencies will aggressively pursue appeals of non-compliance with GMA to the Growth Management Hearings Boards;

  - The Governor will impose sanctions as provided in the GMA;

  - The local government will be excluded from any safe harbor protection within the salmon recovery plans; and

  - The State will implement immediate and default actions identified in this strategy.

Other Actions to Improve Performance and Implementation

1. Governance- Organizational Improvements
- Local and state governments should use GMA framework, the Countywide Planning Policies (CWPP) or any multi-county planning process, to strengthen treatment of ESA issues.

- State, local and tribal governments will explore governance models to develop regional salmon recovery responses.

2. Coordination of Salmon Recovery and Economic Vitality Initiatives

Just as the Governor is committed to recovery of healthy, harvestable salmon stocks, so is he committed to enhancing economic vitality in rural areas. To encourage that rural economic development is consistent with the recovery of salmon, the Governor has proposed an Economic Vitality Initiative and the legislature has acting on his proposal by adopting the Economic Vitality Act. The Initiative directs state resources to retain, build and recruit businesses in the less prosperous communities of the state, all within the capacities of the state's natural resources. Washington's rural communities have largely been built on forestry and farming. The Initiative acknowledges the historic and future economic role played by natural resource based industries.

The key element of the Economic Vitality Initiative is:

Coordinating resources across agencies to provide strategic investments in infrastructure, work force training and technical assistance that promote economic development opportunities including:

- Expanding the scope and funding of the Community Economic Revitalization Board to allow investments in new types of infrastructure such as telecommunications as well as traditional road, water and sewer projects.

- Providing grants to communities to carry out development planning, including examining impacts on natural resource, permitting assistance and general economic development planning.

- Enhancing work force training opportunities to insure that employers can access a well-trained work force throughout the state.

These will enable existing communities to better leverage existing public facilities and services, provide affordable housing near newly created jobs, invest in new infrastructure where it can be efficiently permitted and built, and avoid the conversion of undeveloped rural or resource lands into low-density developments. Rural economic development does not require sprawl development or further loss of "greenfields."

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

Implement State Monitoring and Evaluation Program

- The state will incorporate monitoring/reporting programs into contracts for salmon related federal and state grants.

- The state will continue to support and will enhance GIS programs, with the goal of coordinating data acquisition, statewide fish and wildlife habitat inventory information available to local government planners and decision makers.

- The state will establish a program to monitor and evaluate the effectiveness of current policies and programs and will publish its findings on a regular basis. This report will be included, as part of the Governor's State of the Salmon Report required by the legislature every biennium. The first report is due in December 2000.

Default Actions

In addition to the consequences to local governments for not complying with GMA and SMA requirements, a range of default options is available to state agencies. They are to be used if local governments fail to act to meet the requirements to review and update plans and regulations by September 1, 2002; use best available science; give special consideration to salmon protection and conservation; and/or if no progress is made toward protection, and restoration objectives. The default actions could include:

- Ecology adopting SMPs for local governments after the 2002 deadline.

- Use the various state planning, permitting, and regulatory requirements to address what local governments fail to do.

- Use of the forest Practices Board regulations to restrict conversion of forest lands to non-forest purposes.

- Withhold funds for infrastructure and economic developments that could potentially harm salmon or impact/delay recovery efforts (there is a nexus between state action and harm to species).

ESA Compliance Strategy

It is the state's intent, in cooperation with local governments, to pursue a programmatic approach response under either section 7, 4(d), or 10 (HCP) for several land use elements - i.e. shoreline management, stormwater and transportation - to address ESA/CWA concern. The purpose is to develop standards, guidelines, model programs and/or regulations for key elements of land use, and implementation requirements which when approved by NMFS and USFWS could serve as a "programmatic approach" to be included in ESU 4(d) rules. Local and state programs conducted in accordance with the "approved guidelines" could be exempted from take liability.

IV. Core Elements

➢ HABITAT

Habitat is Key

MANAGING URBAN STORMWATER TO PROTECT STREAMS

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

Background

Studies show that streams, wetlands and estuaries are being degraded by urbanization. Land development changes the natural hydrologic cycle by stripping vegetation cover, removing and destroying native soil structure, modifying surface drainage patterns, and adding impervious and nearly impervious surfaces (e.g., roads, buildings, lawns and other compacted soils).

Challenges to Protection of Habitat

Development changes the natural hydrologic cycle. While some development activities and the hydrologic disturbances they cause may be reversible, e.g., replanting trees after a timber harvest, it may not be feasible to undo the loss of soil structure, and the creation of impervious surfaces, e.g., roads, residences, commercial buildings.

There is strong evidence that we cannot adequately protect high quality stream ecosystems from the impacts of development through "managed" or "engineered" solutions. Changes to both the form and function of stream systems, including degradation of a stream's function as salmon habitat, appear to be inevitable unless we place limits on the geographic extent of urban development, restrict land use in rural areas, and adopt development methods that cause significantly less disruption of the hydrologic cycle.

A particularly difficult issue is how to reduce the extent of impervious surfaces. It is estimated that 65% of impervious surfaces are created to provide "car habitat." Therefore to make appreciable progress in reducing impervious surfaces in a watershed, we must alter our road construction standards, reduce the density of our road systems, reduce surface parking, and rely more on transportation systems (rail, bicycles, walking) that do not require such extensive impervious surfaces.

Even if new site and road development standards are implemented, wherever runoff from new development and redevelopment occurs, it must be properly controlled and treated. Current technology-based and water quality based guidance developed by Ecology for new development and redevelopment in the Puget Sound Basin (as identified in The

Stormwater Management Manual for the Puget Sound Basin, The Technical Manual) are insufficient to prevent significant degradation of the resource. Revisions of most aspects of the manual - treatment requirements, Best Management Practice (BMP) selection, erosion control, source control, and most notably, flow control – are sorely needed. Technology and water quality based guidance for areas outside of the Puget Sound Basin have not been established. Minor adjustments in the Puget Sound guidance may be necessary for areas of western Washington outside of the Puget Sound Basin. Significant adjustments may be necessary for eastern Washington areas because of differences in precipitation patterns, vegetation, soils/geological conditions, and other critical factors affecting stream morphology and biology.

The process of converting land from being undeveloped to a developed condition involves exposing considerable amounts of soil to the weather. Tremendous loss of soil from construction sites to downstream waterways has historically caused smothering of many salmonid spawning beds and other receiving water impacts. Though standard, technology-based procedures intended to minimize loss of sediment have been applied in some areas, most notably Puget Sound, they have clearly not been consistently applied nor have they been adequately successful when applied.

At present, the management tools we have to mitigate the hydrologic changes induced by creation of impervious surfaces are not completely effective. In addition, we are not confident that we know what limited amount of development can occur without causing more subtle, but nonetheless stressful, changes that reduce the ability of the ecosystem to support the same level of salmon populations. We also do not have evidence that we can rehabilitate severely degraded habitats to levels that will support viable, self-sustaining salmon populations, nor can we guarantee full restoration of even mildly degraded habitats. Therefore it is vital that we aggressively pursue maintenance of the high quality salmon habitat that remains.

In consideration of all of the ecosystem impacts mentioned above, a strategy to protect streams and wetlands must include:

- Adoption of adequate riparian buffers using best available science,
- Retention of the natural soils and vegetation cover, primarily forest, in the tributary watershed,
- Control of peak flows and flow duration of streams through stormwater management,
- Improved construction-site erosion control measures, and
- Application of water quality treatment BMPs.

Challenges to Restoration and Rehabilitation of Habitat

The vast majority of existing development has occurred without or with grossly inadequate stormwater controls. Our ability to restore the habitat that existed prior to any urbanization decreases dramatically with increasing urbanization. Restoring a stream or wetland system to its pristine condition is probably not feasible for most urban watersheds. However, rehabilitation of highly urbanized streams to provide some valuable functions is feasible. For example, it may be possible to rehabilitate some highly urbanized watersheds to provide adequate cutthroat trout habitat and for small or artificially sustained populations of other salmon species. However, it may not be possible to restore sustainable coho populations to that same highly urbanized watershed. Consequently, our goals for reclaiming salmon habitat and types of salmon species in urbanized areas need to be commensurate with our ability to effect sufficient habitat improvements.

We need to ensure that urban streams maintain sufficient form and function that they fit into an overall watershed strategy. High quality habitat may exist in upstream reaches of a stream, but if refuge or spawning habitat in the downstream reach or estuary is insufficient or widely scattered, the salmon populations may not be sustainable. Maintaining adequate habitat to allow spawning escapement and successful juvenile passage are minimum requirements for systems that provide sufficient habitat for other salmon life stages in other parts of the watershed. In some streams, that may be all we can realistically accomplish. Therefore we need to plan habitat restoration/rehabilitation at multiple scales (steam, reach, sub-basin, basin, watershed, state, region) to achieve consistent, coordinated, and effective efforts.

We also need to acknowledge and accommodate the important role urban streams can have in gaining the support of urban residents in the overall salmon recovery effort. Although the resource value of the salmon populations in these streams may be small, their value in galvanizing the public to support restoration and protection efforts elsewhere is large. (Urban residents have just as much right to healthy streams as do their more rural counterparts.) We need to maintain sufficient aesthetically pleasing and biologically healthy (though maybe not with significant salmon resources) streams and riparian areas in urban areas that those who live there appreciate them, and that they are seen as a desirable neighborhood feature.

The scale of the rehabilitation efforts and the timing of them also must be considered. The literature is rife with examples of poorly planned and expensive habitat restoration projects that had limited life and resource benefits. Fixing one or more aspects of stream structure is not effective, without first controlling the causes of the degradation – typically the altered hydrologic regime and the degraded riparian habitat.

In regard to retrofitting existing stormwater discharges with adequate best management practices, we have not yet developed any guidance concerning treatment and flow control. There is a particular need to identify measures to minimize the potential for sediment contamination in urban areas. Finally, there isn't yet any definitive guidance on other aspects of stormwater management: e.g., operation and maintenance of stormwater facilities, operation and maintenance of roads, public use of landscape chemicals.

Current Applicable Policies and Programs

The principal tools currently used by the 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) are broadly applied but have not been focused on stormwater management as a priority. Therefore, 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 apply only to Puget Sound and are essentially voluntary. As of July 1999, fully four years after the deadline adopted in the PSWQMP, only 38% of more than 120 affected local governments had fully complied with the requirement to adopt a basic stormwater program. Adoption of the basic PSWQMP stormwater program by jurisdictions within Puget Sound was due in 1995. Full and accurate information concerning the level of implementation of basic program requirements is not available. As further described in the PSWQMP, basic stormwater programs are intended to only address how to prevent new development from increasing stormwater problems.

  Comprehensive programs as currently provided for in the PSWQMP are intended to solve some aspects of problems caused by existing development. About half of the municipalities called on to develop comprehensive programs are on schedule to do so as of July 1999.

- The National Pollutant Discharge Elimination System (NPDES) stormwater permit program is a regulatory tool under the Clean Water Act for urbanized areas to achieve both water quality and salmon habitat objectives. The NPDES stormwater permit program requirements currently apply to only six local governments: (Seattle, Tacoma and the unincorporated areas of Snohomish, King, Pierce and Clark counties) and to Washington State Department of Transportation (WSDOT) facilities within the legal boundaries of those jurisdictions. The requirements do not apply to all storm drainage systems within those areas. The permits require development and implementation of stormwater management programs that are very similar to the comprehensive stormwater program requirements in the PSWQMP.

  The US Environmental Protection Agency (EPA) has proposed new NPDES stormwater regulations (i.e. Phase II permits) that would require stormwater management programs for municipalities in urbanized areas (as defined by the U.S. Census Bureau), and in some cities above 10,000 population in rural areas. If the federal rule is adopted as proposed, an additional 92 municipalities may need NPDES permits for their stormwater discharges. Additionally, large industrial operations are required to have NDPES permits for their stormwater discharges and a general NPDES permit applies stormwater controls to construction sites of five acres or more.

- The Hydraulic Project Approval (HPA) permit program reviews and approves development projects that change, alter, or affect the natural bed or flows of waters of the state. However, the program has not been effective in monitoring and preventing cumulative impacts to salmon habitat.

Financial and technical assistance is provided through many state and federal programs as an incentive for watershed management and habitat protection and restoration. Although some technical and financial assistance for development of stormwater management programs has been available from the state, particularly for jurisdictions within Puget Sound, direct state or federal financial assistance has generally not been provided to local governments to actually implement and enforce stormwater management programs.

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?*

Integrating Urban Stormwater Strategies into Watershed Planning
There are a variety of new local watershed management processes that are underway, including processes established by the Watershed Management Act (ESHB 2514) and the Salmon Recovery Planning Act (ESHB 2496). Other equivalent processes are

also resulting in watershed management, salmon recovery planning and related land use planning. All these efforts create an opportunity to assess and monitor watershed conditions, to establish goals and objectives, and to set priorities for salmon habitat protection and restoration.

Setting clear priorities for watersheds is a critical part of dealing with the effects of urban stormwater. Degradation of habitat from urbanization can be prevented or minimized by preserving high quality habitat or restricting where development occurs. Stormwater management programs and practices are able to only partially mitigate the degradation of salmon habitat caused by new development or redevelopment. Retrofitting existing developments to add or upgrade stormwater management facilities will be needed on a priority basis to rehabilitate degraded salmon habitat in urban areas. Such retrofitting can be very expensive, take years to implement, and in most cases will not fully restore the habitat that existed prior to development. Preventing urban stormwater impacts on habitat by preserving habitat or restricting development, or mitigating impacts of new development and redevelopment by implementing stormwater management practices will generally be more effective and less expensive than retrofitting existing development.

Local watershed management processes are in various stages of development across the state. Setting priorities within watersheds for protection and restoration projects and activities is essential to ensure that limited funds are allocated to efforts that will provide maximum progress towards salmon recovery. Few watershed management processes have yet completed the process of setting priorities for the preservation or protection of remaining salmon habitat and the restoration or rehabilitation of degraded habitat.

When setting priorities for urban streams and estuaries it will be necessary to: 1.) identify the stormwater control problems that are most urgent to address in the context of protecting and restoring salmon habitat within the watershed; 2.) develop methods to consistently determine stormwater control priorities to protect and restore salmon habitat across watersheds and multiple jurisdictions; and 3.) provide flexibility for decision-makers within watersheds to allocate resources to the priority salmon recovery problems in their watersheds.

A potential model for setting stormwater management priorities within the context of local watershed management has been developed by the Washington State Department of Transportation (WSDOT). WSDOT has developed and is using this model as part of the Stormwater Control Enhancement Program established by 1996 legislation (2SHB 2031, Chapter 90.78.010 RCW)), which authorized a stormwater management funding and implementation program to address state highway-related problems. This model has been successfully used by WSDOT to coordinate and leverage federal, state and local funding sources to facilitate construction of stormwater mitigation projects that integrated the needs of many partners within a watershed management context.

Assistance and Incentives for Voluntary Action

1. Habitat Assessment

Local watershed management and salmon recovery planning processes, with state financial and technical assistance, will identify high quality habitat for preservation or protection through a variety of means, such as purchase of development rights or conservation easements. Local watershed management and salmon recovery planning processes will also establish goals and priorities for habitat restoration.

2. Local Technical and Financial Assistance

The Department of Community, Trade and Economic Development (CTED), the Department of Ecology (Ecology), and the Puget Sound Action Team (PSAT) 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 and salmon recovery planning priorities, will have funds directed to them from existing grants and loans.

3. Funding

Substantial funding needs related to local stormwater management are not yet addressed or are only partially addressed. These needs include the costs of: local land use and stormwater management planning; assuring implementation and enforcement of local stormwater management programs; researching and demonstrating new designs and methods for land development; and upgrading or retrofitting existing stormwater control facilities that are not adequate for mitigating impacts to salmon habitat. In addition, and most importantly, preventing impacts from urbanization through preservation of high quality habitat will require substantial funds for acquisition of property or development rights.

The state will work with federal and local governments to identify new funding for local governments as an incentive to implement and enforce local stormwater management programs and ordinances that are adopted and consistent with the PSWQMP.

4. Goals and Priority Decisions

The identification of specific funding needs and decisions to allocate funding will be done within the context of overall priorities for salmon recovery and the identification of priorities through local watershed management processes. A statewide science-based framework for setting priorities for salmon recovery across the state and among high priority areas will be developed through the Salmon Recovery Funding Board established by the 1999 Salmon Recovery Funding Act (2E2SSB 5595). The Watershed Management Act (ESHB 2514) and the Salmon Recovery Planning Act (ESHB 2496), or equivalent processes, will be used to make local decisions and set priorities for urban stormwater management within watersheds. These priority and funding allocation determinations must also be coordinated with land use objectives for urban and rural areas formulated by local governments under the Growth Management Act.

5. Mitigation of Transportation Projects
Transportation projects have a significant impact upon salmon habitat by increasing stormwater runoff and by creating barriers to fish passage. The current biennial transportation budget provides $10.2 million from the Motor Vehicle Account for WSDOT to retrofit state projects to address stormwater runoff problems ($5.1 million) and to correct fish passage barriers ($5.1 million). The Transportation Improvement Board has also been provided $5 million to fund upgraded stormwater controls associated with local transportation projects. Projects to correct stormwater or fish passage problems associated with city or county roads will be eligible for funding from the Salmon Recovery Account administered by the new Salmon Recovery Funding Board. Additionally, an estimated 5% of state and federal highway project funds are spent on stormwater conveyance and treatment systems and related items, such as land acquisition.

6. Action Incentives
Depending upon the availability of state or federal funding assistance, the principal incentives for increased local action to address urban stormwater impacts are the degree of local support for salmon recovery, the extent of local concern about potential liability under the ESA for harming listed salmon, and the potential that failure to act will trigger default actions by the state (see discussion of potential default actions).

7. Public Education/Stewardship
Conduct training workshops by agencies responsible for stormwater management (Ecology, PSAT, WSDOT, USEPA, and local governments) and land development (CTED and local governments), and support existing training offered by the University of Washington and others. Workshops can be implemented in the short-term by using existing educational materials, subject to availability of staff support and funding for other expenses. Support new or modified educational materials and programs/courses at state universities and colleges to educate the current and future professional planners, urban designers, and engineers. Develop public/private sponsorship for certification courses. Certification and linkage of certification to approval of project design or to project funding is a longer-term strategy.

8. Local Funding Options
To improve the ability of regional and local governments to fund the actions needed for effective stormwater management, legislation may be needed to expand current local authority and options for funding stormwater utilities and stormwater programs. For example, the statutory authority of regional and local jurisdictions to establish and fund multi-jurisdictional stormwater utilities and stormwater management activities needs to be clarified.

9. State Technical Assistance
Contingent upon additional funding for technical staff, Ecology will enhance technical assistance on stormwater management to local jurisdictions within the Puget Sound Basin and will start providing technical assistance outside Puget Sound.

10. Research and Demonstration
The state and local governments will collaborate to seek and coordinate federal, state and local funding to support research and demonstration of the effectiveness of best management practices for stormwater management and new building and site development practices to prevent impacts from stormwater.

State and Local Actions and Enforcement

1. Growth Management Act
The Department of Community, Trade and Economic Development (CTED) will develop additional guidance under the Growth Management Act on land development practices and growth constraints that are necessary to preserve salmon habitat and prevent stormwater impacts. (See Chapter IV.A.3. Linking Land Use Decisions to Salmon Recovery.) Local governments will be asked to implement this guidance through designation of urban growth areas and land development regulations. The state will consider filing appeals with Growth Management Hearings Boards if local governments do not implement this state guidance and thereby fail to protect critical salmon habitat.

2. Puget Sound Water Quality Management Plan
The PSAT will upgrade the description of local stormwater program characteristics in the PSWQMP. The amendments to the PSWQMP will also acknowledge and help address the need for stormwater standards and programs to encourage more dense development or redevelopment of previously developed areas. After the PSWQMP is amended in the year 2000, local governments in the Puget Sound Basin will have two years to make their stormwater programs consistent with the amended PSWQMP prior to evaluation of progress and consideration of default actions by the state.

3. Stormwater Manual
Ecology will improve and update the stormwater technical manual to include all known available and reasonable technology, particularly in regard to runoff quantity and flow controls. The scope of the manual will be expanded to include guidance for areas of the state outside the Puget Sound Basin. In revising the manual, Ecology will develop its standards and guidelines to provide incentives to redevelop or intensify development in areas that have already been developed, at least to the extent that such incentives are consistent with salmon recovery under the ESA and with Clean Water Act requirements. After the manual is updated in the year 2000, local governments will have two years to make their stormwater programs consistent with the manual prior to evaluation of progress and consideration of default actions by the state.

4. National Pollutant Discharge Elimination System Permits
Ecology will strengthen and enforce NPDES permit requirements for stormwater programs by: incorporating standards for new development consistent with amendments to the PSWQMP; requiring more explicit commitments to retrofitting in priority areas and to operation and maintenance of stormwater facilities; requiring increased attention to erosion and sediment control at construction sites; and implementing new federal

requirements (i.e. Phase II permits) for stormwater management under the Clean Water Act.

5. Hydraulic Project Approvals
The Washington Department of Fish and Wildlife (WDFW) will improve the consistency of HPA reviews by using integrated stream bank protection guidelines and other stream corridor management guidelines that are to be developed. (See Chapter V. C. Permit Streamlining) The program's capability to monitor and prevent cumulative impacts from projects affecting stream flows will be increased.

6. Interim Regulatory Action
Regulatory discretion will be used to apply existing authority where stormwater programs are lacking or inadequate. Where the basic or comprehensive PSWQMP stormwater programs have not been adopted by local jurisdictions as scheduled in the PSWQMP, state agencies will consider which state authorities and regulatory tools should be applied and enforced to protect salmon habitat from urban stormwater impacts. Such tools that may be used include issuance and enforcement of HPA's or other permits involving state review or approval, and substantive review under the State Environmental Policy Act (SEPA).

7. Combined Sewer Overflow
Continue local implementation of the Combined Sewer Overflow (CSO) correction program with reconsideration of the correction schedule at 5-year intervals. Approaches to CSO correction should be consistent with strategies for water reuse. The schedule would not be accelerated unless specific CSOs are identified as high priority limiting factors for salmon recovery.

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

Adoption and implementation of local stormwater programs consistent with or equivalent to the Puget Sound Water Quality Management Plan and compliance with National Pollutant Discharge Elimination System stormwater permits will be monitored. The effectiveness of stormwater management practices, particularly new practices, will also need to be monitored.

Monitoring of salmon populations and monitoring of habitat conditions, particularly monitoring of biological integrity of streams in urbanizing areas, will be used to evaluate progress over time and to make adaptive management decisions.

Potential Default Actions After 2002
The following default actions will be pursued as needed after evaluating progress in achieving urban stormwater objectives as of September 2002. The implementation of default actions will be done within the context of and to complement the watershed-level assessment and planning conducted under the Watershed Management Act (ESHB 2514), the limiting factors analysis done under the Salmon Recovery Planning

Act (ESHB 2496), as well as the statewide framework for identifying priorities for salmon recovery developed through the Salmon Recovery Funding Board.

- Make adoption and implementation of the basic PSWQMP stormwater program elements mandatory for those jurisdictions within Puget Sound that have not voluntarily adopted programs or are not implementing programs consistent with the PSWQMP. Also make the basic PSWQMP stormwater program elements mandatory for jurisdictions outside Puget Sound that have not voluntarily adopted and implemented an equivalent stormwater program and where urban stormwater is identified as a limiting factor for salmon recovery. These requirements will require new legislation.
- Expand NPDES stormwater permit requirements (i.e. Phase I or Phase II permits) to apply to any jurisdictions within Puget Sound that have not adopted or implemented a comprehensive (Phase I permits) or basic (Phase II permits) stormwater program consistent with PSWQMP comprehensive or basic stormwater program elements. Expand Phase I or Phase II NPDES stormwater permit requirements to also apply to jurisdictions outside Puget Sound that would be subject to the PSWQMP comprehensive (Phase I permits) or basic (Phase II permits) stormwater program (i.e. if they were within Puget Sound) that have not adopted or implemented a stormwater program equivalent to the PSWQMP comprehensive or basic stormwater program and impacts from urban stormwater have been identified as a limiting factor for salmon recovery.

The analytical methods and process that would identify where urban stormwater is a limiting factor for salmon recovery outside Puget Sound must be further developed as part of the limiting factor analyses called for under the Salmon Recovery Planning Act. Implementing these default actions will require substantial expenditures by the affected local jurisdictions and by the Department of Ecology.

The following are additional potential default actions that are more broadly related to land use, water quality and other salmon recovery issues. These additional default actions will be considered when progress in achieving urban stormwater and other salmon recovery objectives is evaluated as of September, 2002:

- Legislation amending the Shoreline Management Act (SMA) to extend the definition of shorelines to include upstream salmon habitat for jurisdictions that have not adopted and implemented stormwater management programs to protect salmon habitat.
- Further strengthen state water quality standards, as needed in the absence of progress in salmon recovery, to incorporate additional biological and physical criteria relevant to protection of salmon habitat.
- Amend the Washington Uniform Building Code to incorporate building and site design standards and road and parking lot construction specifications to minimize impervious surfaces and reduce stormwater impacts. These standards and specifications would be required where local governments have not voluntarily

implemented a stormwater program consistent with Growth Management Act guidelines and the Puget Sound Water Quality Management Plan.

ESA Compliance Strategy

Urban stormwater management programs are primarily implemented by county and city governments and the WSDOT. Program guidance is provided by the state through the PSWQMP and Ecology's stormwater technical manual. The NPDES permit program is a regulatory tool, administered by Ecology, that currently applies to the stormwater programs of the largest jurisdictions.

The key to an ESA compliance strategy for urban stormwater is to improve these state guidance and regulatory tools to the point they are accepted by the National Marine Fisheries Service and US 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 to amend the stormwater provisions of the PSWQMP, update and improve the stormwater technical manual, and strengthen NPDES provisions that will be applied as permits are reissued. This work will be done through processes that involve public review and collaboration with the federal agencies. Once this work is completed and the improved tools have been accepted by the federal agencies, a framework to enable stormwater management programs to be formally recognized under the ESA will be in place.

The urban stormwater strategy calls for improved local stormwater programs consistent with the amended PSWQMP and the revised technical manual to be adopted and begin implementation over the following two years (i.e. by September, 2002). Federal recognition under ESA of stormwater management programs that conform to this strategy could be accomplished through ESA Section 4(d) rule procedures. Alternatively, jurisdictions with conforming stormwater programs may seek even greater certainty under ESA by preparing Habitat Conservation Plans and obtaining Section 10, Incidental Take Permits.

Since there may be a potential for liability under ESA for take of listed salmon in many areas of the state prior to September, 2002, there is need for interim actions. The urgent need for action to recover salmon and the potential for legal liability are reasons to adopt and implement stormwater programs that are at least consistent with the current PSWQMP and the existing stormwater technical manual. Stronger implementation of existing programs and upgrading programs consistent with current science are interim steps that can be taken by jurisdictions responsible for managing urban stormwater. Such actions will contribute to salmon recovery and will help jurisdictions respond to any ESA liability issues that may be raised.

IV. Core Elements

➢ HABITAT
Habitat is Key

ENSURING ADEQUATE WATER IN STREAMS FOR FISH

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

Background
Instream flows are defined as the amount of water needed in streams and rivers for aquatic life, water quality and other instream values that occur in them. Instream flows are necessary to ensure that sufficient amounts of water are available for fish to survive and reproduce, for boats to navigate, and people to swim and enjoy. The focus of this strategy is only on the water needs of fish. Sufficient flows for fish generally will also suffice for water quality, and aesthetic purposes. Recreational boating needs may in some cases and in some seasons require more water than is needed by salmonids.

Insuring adequate quantities of cool, clean water during seasonal low flow periods is a key habitat requirement for sustainable fish production in streams. Among the many factors contributing to the poor status of many wild fish stocks is the lack of stream flow to sustain healthy production levels during the low flow periods. Human activities have resulted in some streams being appropriated to dry streambed conditions during the low flow period in the summer. See Chapter II. Background: Setting the Context.

State law made no provision to protect instream flows prior to the middle of the 20th century. Thus, nearly 100 years of water rights development in the state occurred without regard to the effects of dewatering streams on fish and other instream values. It was not until 1949 that first legislative action was taken to recognize the importance of flows to fish.

The Department of Ecology has made a concerted effort to condition certain water rights with flow requirements since 1949, and to establish instream flows from 1976 through 1986 by rule in 19 watersheds. That is only about 30 percent of the state's watersheds. Approximately 350 lakes and streams in our state are currently closed to further withdrawals of water, and low flow provisions have been applied to individual water right permits on approximately 250 other streams.

Most major water development in the state occurred, however, before instream flows were established. Consequently instream flows that have been established by rule since the mid-

1970s are junior to most existing diversionary water rights. Most of them are frequently not met (e.g. on average, instream flows in the Cedar River are not met 81 days/year and the number is increasing). In addition, in only five watersheds where instream flows have been set has there been any effort made to regulate conditioned water uses to the flows. In some cases, too few new rights have been issued after the flows were set to justify the considerable expense of setting up a regulatory program. In other cases, Ecology has lacked the resources to establish a regulatory system.

From 1986 through 1997, the establishment of instream flow protection rules was put on hold due to an ongoing policy debate on how to provide additional water for fish and for growth/development given limited water availability being experienced in many areas of the State. Numerous attempts were made by state executive and legislative leaders to break the policy deadlock for over a decade, but without lasting success. A 1993 state Supreme Court ruling provided some guidance on this issue. In Jefferson County PUD v. Ecology, the State Supreme Court upheld Ecology's use of flows as high as the "optimum" flow for fish to condition a proposed hydropower diversion on the Dosewallips River. This did not resolve the politics concerning the appropriate level of instream flows to protect fish, but it did resolve the legal issue. Subsequent state level court decisions have ruled that ground water development may not be allowed if it impairs existing surface water rights, including instream flows adopted by rule.

Although establishment of instream flow requirements were frozen for over a decade, important information was being collected during that time. Ecology, WDFW, Tribes, local governments and other state and federal agencies have collected and published extensive studies, data and information on instream flow needs; water availability; level and location of population growth and development; condition, status, health and causes for decline of wild salmon stocks; and priority areas where flows are problems for fish.

Regardless, **no new instream flow requirements** have been established in the past 14 years while the state's population has grown by 30%. Based on the Department of Fish and Wildlife's analysis many fish stocks are in rapid decline due in part to the lack of adequate flows for fish. There is urgency to set, protect and restore instream flows. Flow management is one the more well-established state authorities that can be brought to bear on the myriad causes of poor fish stock health.

Assessment of adequacy of instream flows

The State Salmon Recovery Office categorized 32 of the state's 62 water resources inventory areas for health of salmon and steelhead stocks, water availability, and risk to stocks from future population growth. (See report on "Summary of Instream Flow Conditions by WRIAs" contained in Appendix B.) The following map is of these watersheds. The five categories are as follows:

- *Overappropriated basins*. Category I includes sixteen WRIAs in which more water has been allocated through water rights, claims and exempt withdrawals in all or significant parts of the watershed than is naturally available for at least part of the year when instream flow needs are also accounted for, and in which one or more fish stocks are listed under the ESA or are proposed for listing. Some of the basins have instream flows set by rules but they are frequently not met.

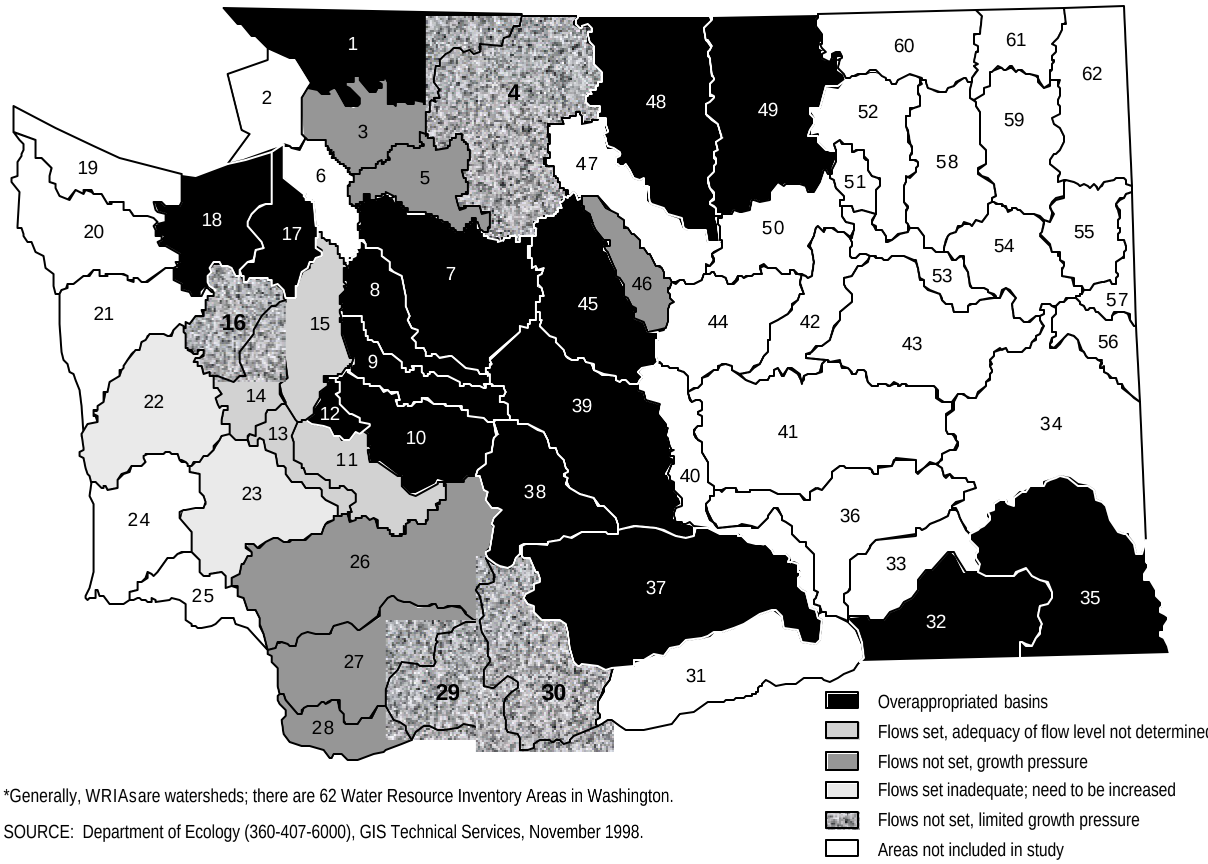
- *Basins with existing flows that are inadequate and need to be increased*. Category II includes two WRIAs in which instream flows have been established but appear to be inadequate according to subsequent studies. They do not have fish stocks either listed or proposed for ESA listing but are believed to have the potential to be listed.

- *Basins where adequacy of existing flows have not been determined*. Category III includes four WRIAs with instream flows established but in which no subsequent review or study has been completed to determine adequacy and in which listings have occurred or have been proposed.

- *Basins with no instream flow requirements set and which are experiencing growth pressure*. Category IV includes six WRIAs where instream flows have not been set and where there is or will likely be significant development pressure. These basins are in relatively good condition, but could deteriorate unless instream flows are established and maintained.

- *Basins with no instream flow requirements set and with limited growth.* Category V includes four WRIAs where instream flows have not been set and where development pressure remains limited now and/or in the foreseeable future. These are generally low priority basins for receiving immediate attention.

Map 3. Summary of Instream Flow Conditions by WRIA



*Generally, WRIAsare watersheds; there are 62 Water Resource Inventory Areas in Washington.

SOURCE: Department of Ecology (360-407-6000), GIS Technical Services, November 1998.

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

Current Applicable Policies and Programs

1. Statutory Foundation of the Instream Flow Program

Much debate has occurred over many years regarding the meaning of key statutory terms (highlighted below). Case law in recent years has determined that Ecology has considerable discretion in determining the level of instream flow to protect upon considering the character and value of the stream and its instream resources. The following four statutes form the basis of Ecology's instream flow program:

- The state Fisheries Code (*RCW 75.20.050*) in 1949 was the first state law recognizing the need to protect a flow instream to **adequately support** fish. This provision has been used to deny or condition water rights since 1949.

- A more systematic approach was set forth in the 1967 Minimum Water Flows and Levels Act (*Chapter 90.22 RCW*). It permits Ecology to establish **minimum flows** or levels on streams and lakes by regulation for the purpose of **protecting** fish, game, birds, and other wildlife, recreational or aesthetic values or water quality.

- The Water Resources Act of 1971 (*Chapter 90.54 RCW*) requires Ecology to establish and protect **base flows** to **protect and preserve** a variety of instream beneficial uses, such as fish, wildlife, navigation, recreation, aesthetics and other environmental values.

- The Water Code (*Chapter 90.03 RCW*) was amended in 1979 to clarify that minimum or base flows adopted by rule are appropriations of water (i.e. water rights) with priority dates as of the effective date of the rule under which they are established. The code also requires that Ecology condition any subsequently issued water rights with the flows adopted by rule. This means that when the flows are not being met, conditioned water rights must cease to divert or withdraw water. Finally, the water code authorizes Ecology to deny a water right application if it would impair any other existing water right or if it would be detrimental to the public interest. This authority provides the basis for Ecology to close streams to further consumptive appropriation.

- Legislation passed in 1997 and 1998 authorizes locally based planning groups to develop watershed management plans that must establish a water budget for the watershed and may, at the option of the group, address instream flows as well as water quality and fish and wildlife habitat (Watershed Planning Act *Chapter 90.82 RCW*). If addressed, instream flows must be set within four years after receiving a Phase 2 watershed assessment grant. When the planning committee reaches agreement on minimum instream flows for streams where they currently do not exist, Ecology adopts a rule to implement the decision. If the planning committee decides instream flows should be established, but cannot reach a decision within four years after beginning its watershed assessment, then Ecology may set the flows in consultation with "affected tribes." Any instream flows and other water allocations proposed by a planning group would generally have to undergo rule-making by

Ecology to be implemented. Under the law a planning group cannot obligate a state agency to implement a portion of the plan for which the agency has responsibility without the consent of the agency. This means that Ecology must first agree with the instream flow levels for them to become a part of the plan.

- The state may acquire "trust water rights" under two statutes passed in 1989 (*Chapter 90.38 RCW*) and 1991 (*Chapter 90.42 RCW*). Trust water rights can be acquired by purchase, lease, gift or conservation of water. They are rights held by the state for various purposes that may include instream flow augmentation.

- Several statutes prohibit the waste of water. The 1993 Grimes v. Ecology decision of the State Supreme Court provided useful guidance regarding beneficial use and waste of water. In essence water users have an obligation to use water in a reasonably efficient, non-wasteful manner and efficiency requirements may become more strict over time as available technology improves, local standards advance, and competition for limited water becomes more intense.

- State law provides that a water right is relinquished (forfeited) back to the state if it goes unused for five consecutive years without good cause (such good causes are listed). Common law abandonment is also recognized in Washington State. Under the abandonment doctrine, a water right is forfeited if the user ceases using it and does not intend to restart the use. The user's behavior, e.g. failure to maintain facilities, is prima facie evidence of intent (see Okanogan Wilderness League v. Twisp). Relinquishment and abandonment do not put water back instream but do remove paper water rights from the records that might otherwise be reactivated.

2. Other Legal Mechanisms for Instream Flows

Several federal laws and common law doctrines under federal and state law may prove to be potent tools to identify, protect and restore instream flows. These are Federal and Indian reserved rights, the Federal Clean Water Act, the Federal Power Act, and the Public Trust Doctrine.

- Court rules have affirmed that Federal and Indian reserved water rights were by implication established when the federal government set aside (reserved) certain public lands for specific purposes. This means that each National Forest, National Park, military reservation, wildlife refuge, Indian reservation, etc. has an associated water right for the reservation's primary purposes. Some of these purposes require offstream use while others require that water be retained instream within streams on the land reservation. These rights have a priority date of the date the reservation was established. Most Indian reserved rights date back to the 1850s when the reservations were established by treaty. For the most part these rights have not been quantified under a general adjudication of water rights. An exception is in the Yakima basin where an ongoing adjudication has preliminarily quantified such rights for various federal reservations and for the Yakama Indian Nation's reservation.

- Indian treaties in the Pacific Northwest also reserved to the Indian tribes the right to fish in common with the other citizens of the territory (now the states). Courts have interpreted this language to mean that tribes are entitled to half the harvestable salmon and steelhead (of both wild and hatchery origin). The tribes share management status over fish runs with the state. Tribes also asked the courts to find that the state is burdened to protect the environment that supports treaty fisheries. Court cases throughout the Northwest have generally supported this claim, specifically with reference to water flows required to sustain the fish runs encompassed by the treaty fishing right. For example, in the Yakima basin, the Court has confirmed that the Yakama Indian Nation has a treaty secured right to adequate flows in the Yakima River and tributaries to sustain fish. This right has a priority date of time-immemorial (obviously predating non-Indian water uses). The U.S. Bureau of Reclamation has a trust obligation to ensure that these flows are provided in the Yakima basin, even if providing them occurs at the expense of other water needs.

- Court rulings have determined that provisions of the Federal Clean Water Act may affect the use of water under a state issued water right. The U.S. Supreme Court ruled in Jefferson County PUD No. 1 v. Department of Ecology that water rights savings provisions in the Clean Water Act do not limit the scope of water pollution controls that may be imposed on users that have obtained a water right. The decision upheld Ecology's conditioning of a section 401 water quality certification for a proposed hydropower project with instream flows necessary to protect fishery uses of the Dosewallips River designated under the state's water quality standards.

- A case that may provide additional guidance is presently under litigation (Pend Oreille PUD No. 1 v. Department of Ecology – accepted for review by the Washington State Supreme Court). Other possible applications of state (or federal) Clean Water Act authority (such as requiring "best management practices" by water users to reduce the dewatering impairment of designated instream water uses) are untested and would be controversial. These include requiring "best management practices" by water users to reduce the dewatering impairment of designated instream water uses and regulating water uses that contribute to listings of streams on the Clean Water Act 303d list due to inadequate streamflows for preserving designated instream water uses.

- The Federal Power Act regulates development and use of waterways for hydroelectric power production. As indicated in the Clean Water Act discussion immediately preceding, states appear to have relatively strong authority under the CWA to condition the operation of such projects with instream flow requirements. Additionally, state and federal fish and wildlife agencies and tribes may make recommendations to the Federal Energy Regulatory Commission regarding license or relicensing conditions needed to protect fish and wildlife (including instream flow requirements). FERC must give deference to the expertise of the agencies and must consider the recommendations, but may reject or modify them. For smaller projects seeking approval under license exemption provisions, the agencies' recommended terms and conditions are mandatory on the project. (See also the section of this report on Hydropower.)

- The public trust doctrine is an English common law doctrine that is traced back to Roman law. The doctrine holds that the government cannot alienate public rights in public resources (such as water). The doctrine is best developed with regard to tidelands and the protection of public navigation rights. The California Supreme Court has advanced the application of the doctrine to upland streams in a manner that affects existing state issued water rights. In the leading case on the doctrine, the city of Los Angeles was required to reduce diversions of streams feeding Mono Lake to reverse the decline in the level of the lake. The court ruled that the state has continuing jurisdiction over the water rights and may review and modify them to accommodate the public trust. Several attempts have been made to assert the public trust doctrine to challenge water rights or impose instream flow requirements on older water rights in the State of Washington. So far these attempts have been unsuccessful.

3. Process for Establishing Instream Flows

Ecology is authorized by law to establish instream flow levels by rule and on a case-by-case basis where appropriate. Setting instream flows is a process involving other state and federal agencies, affected tribes, interested parties, and the general public. Setting minimum instream flows under current state law does not affect existing water rights within a watershed basin, nor does it put water back into a stream.

- The process used by Ecology to set an instream flow usually begins with consultation with other natural resource agencies and affected Indian tribes during a scoping process. The agencies and tribes may elect to be involved at every stage of instream flow development, including prioritizing streams to be addressed, assisting in studies, providing data, making recommendations and reviewing proposed rules and draft reports.

- Ecology conducts technical studies on each stream of interest with the target watershed. The Departments of Ecology and Fish and Wildlife often use the Instream Flow Incremental Methodology (IFIM). IFIM is a series of computer models that predict the amount of available habitat as a function of increases or decreases in stream flow. IFIM is a credible but data intensive method. Another method used in Washington is the simpler "toe width" method. Field measurements are taken of the width of a stream channel from the toe of each bank. The measurements are used to predict the flow that would provide the best conditions for fish spawning and rearing. This method was developed using measurements similar to those used in IFIM. The toe-width method is generally used in lower controversy and low budget situations.

- Ecology may be assisted by other agencies and tribes to establish instream flows. The study results are evaluated and recommendations are solicited from the fishery agencies and tribes. Based on these recommendations and discussions and Ecology's own analysis of supporting data, the agency, after extensive public involvement, adopts the recommended or revised instream flow levels into a rule.

- Where instream flows have not be established by rule, Ecology retains the authority to condition a new water right with flow requirements determined on a case by case basis in consultation with the Department of Fish and Wildlife (under the fisheries code provisions). Such case-by case flows usually rely on existing information and the best professional judgment of Fish and Wildlife and Ecology biologists.

- Once established by rule, an instream flow is an appropriation under the law with a priority date as of the effective date of the rule establishing it and must be protected as an existing water right.

4. Protecting Instream Flows

Establishing instream flows by rule is a wasted effort unless follow-up efforts are made to protect those flows from further diminishment. Instream flows are, as stated above, a water right under Washington law that can be protected from diminishment by junior water users, by unauthorized, excessive, or illegally expanded water uses, and by the inappropriate use of exempt ground water withdrawals. Therefore:

- All subsequently established water rights are junior in priority to the instream flow and water right applications pending at the time an instream flow is adopted will, if issued, be conditioned by those instream flows when the water right is granted. When the flow of the stream falls below a specified level, water rights provisioned to those flows must cease diversion until the instream flow is met or exceeded. In addition, water uses can be required to measure and report on water diversion and withdrawals to assure that users are remaining within their authorized quantities.

- A stream may be closed to further consumptive appropriation if it is determined that no water remains available after existing water rights and instream flows are taken into account. When a stream is closed to further consumptive appropriation, no further rights are issued for diversion during the closure period. New rights to take water during the closure period are denied.

- Ecology seeks to relinquish unused water rights when they come to its attention in the course of other work. When Ecology approves a water right change it limits the proposed water use to the quantity that remains unrelinquished and to the minimum necessary to accomplish the stated purpose using efficient means of conveyance and application of water.

Often this returns some water to the system by reducing the amount that can be diverted or withdrawn. Under current law, this water may or may not benefit the stream depending on whether there are unsatisfied junior water rights that can claim and utilize the saved water.

5. Current Instream Flow Activities

Legislative appropriations were made to Ecology in FY 1999 and to provide grants to local groups. Grants were issued to twenty-seven watershed groups to start work on water allocation and instream flows needs. Ecology also received funds to provide technical assistance to watershed planning efforts. Some of these funds were allocated to rebuilding the state's capacity to carry out instream flow studies and to provide information and recommendations to local planning groups regarding instream flow needs. An additional four to five watersheds will be enrolled this biennium.

The Departments of Ecology and Fish and Wildlife recently completed new instream flow studies for the first time in many years. These studies are for streams in southwest Washington in support of watershed planning and steelhead recovery efforts in Grays-Elochoman (25), Cowlitz (26), Lewis (27), Salmon-Washougal (28), and Wind-White Salmon (29) WRIAs. Ecology is a signatory to a memorandum of understanding to develop and adopt instream flows for the Lower Skagit WRIA (5). In addition, Ecology has existing commitments to adopt rules setting instream flows for the Dungeness (18) and Quilcene (17) WRIAs and to assist in implementing flow restoration efforts in the Methow (48) WRIA.

As of December 1998, watershed planning initiating entities have indicated an interest in addressing instream flows in eight of the twenty-seven watersheds (WRIAs), including Nooksack (1), Nisqually (11), Chambers-Clover (12), Deschutes (13), Quilcene-Snow (17), Elwha-Dungeness (18), Entiat (46) and Methow (48). Several watershed areas continue their scoping process and could decide to opt for or against addressing instream flows. *Note: nine out of the 12 basins have instream flows already set by rules. The efforts of the planning units and Ecology will be to modify them by increasing the level and insuring that instream flows are set in all tributaries critical for fish [see map and table for details].*

Instream flows are also of interest in the central Puget Sound/Tri-county discussions, affecting another four WRIAs: Snohomish (7), Cedar-Sammamish (8), Duwamish-Green (9), and Puyallup-White (10). Although these are not areas engaged in planning under chapter 90.82 RCW, they have an active collaborative process underway. Parts of two of the areas, the Cedar River and the Green River are the subject of Habitat Conservation Plan (HCP) development under the federal Endangered Species Act by the city of Seattle and the city of Tacoma respectively. In both cases, instream flows are a major concern.

See report in Appendix B where instream flows have been established and where technical information is available to support the establishment or update of instream flows.

Overview of the Chapter
The overall strategy for instream flows described in this chapter is based on the following key elements:

1. Collaboration between state and local governments, Indian tribes, and water and fish interests to develop locally tailored, basin specific solutions to the problem of instream flows, water allocation and salmon habitat wherever that opportunity exists. This includes watersheds undertaking watershed management under Chapter 90.82 RCW or other watershed or regional efforts that are addressing instream flows and salmon habitat restoration efforts.

2. Prioritization of watersheds for setting, protecting and restoring instream flows based on the health of fish stocks and the risk of diminishment of those stocks. Watershed priorities will determine where effort and resources will be concentrated at any given time.

3. Requirement to implement "baseline actions" in all basins in the state including those with watershed planning efforts. Implementing baseline actions will be initially for the highest priority watersheds and as soon as practicable in all watersheds with stocks listed or potentially listed under the Endangered Species Act.

4. Requirement to implement "immediate actions", until flows are established and protection and restoration actions are implemented, to prevent further decline in instream flows in watersheds with fish stocks that are listed under the Endangered Species Act or that have the potential to be listed, are spelled out.

5. Requirement to implement "default actions" if local collaboration fails to address the establishment, protection and restoration of instream flows in a timely manner.

6. Implementation of monitoring and evaluation measures to track progress toward meeting instream flow protection and restoration goals and objectives.

The chapter describes in details the actions needed to protect and restore instream flows. These actions will be taken either as "immediate actions", "baseline actions", or longer term actions which require time, extensive resources and will be implemented as part of the collaborative process.

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

Goal:
Retain or provide adequate amounts of water in streams to protect and restore fish habitat required by wild salmonids.

Objectives:

- Establish instream flows for watersheds that support important fish stocks.

- Protect instream flows from being diminished by new or expanded water uses (legal or ongoing illegal uses) and by changing land uses. This must be done in the larger context of ecosystem protection.

- Restore instream flows by putting water back in streams where flows are diminished by existing uses, illegal or wasteful uses, or by poor land use practices. This must be done in the larger context of ecosystem restoration.

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

Instream flows will be established, protected, and restored, initially in priority watersheds, and eventually in all watersheds that support fish stocks that are listed under the Endangered Species Act or that have the potential to be listed.

1. Process - Collaboration Coupled with Action

Ensuring adequate water for fish requires taking a collaborative, incentive-based approach, taking immediate actions where needed, using strategic enforcement, ongoing monitoring, and implementing default actions when collaboration efforts fall short of expectations.

Locally-based collaborative watershed management efforts will be supported if they address establishing, protecting and/or restoring instream flows within a reasonable time. The solutions to the instream flow problems will be tailored specifically for each watershed. Deference will be given to collaborative watershed management efforts on the establishment, protection and restoration of instream flows, but not if delays risk the extinction of wild salmonids. Therefore the state through it natural resources agencies, especially Ecology and WDFW will:

- Participate actively, as resources allow, in all watershed management planning processes in which the outcome is likely to obligate state government, particularly in basins with endangered, threatened, critical or depressed fish stocks. The state will also engage in ongoing efforts to develop effective watershed management tools (e.g. water conservation and reuse opportunities) for selection and implementation by local collaborative groups.

- In accordance with Chapter 90.82 RCW, provide technical assistance to local planning groups per their request and to the extent that available resources allow. This includes technical assistance with studies and advice regarding instream flow needs and means of protecting and restoring instream flows.

- In those local collaborative efforts that intend to address instream flow setting, protection and restoration, assign representatives with authority to speak on behalf of the state. State representatives will seek to maximize the commitment of the groups to quickly develop instream flow recommendations, including where appropriate interim instream flows, and to identify and implement discretionary actions that will assist in establishing, protecting and restoring instream flows relied upon by endangered, threatened, critical and depressed fish stocks. State representatives will urge that instream flow establishment be undertaken as an early action item and that it generally not await development of the complete plan.

- In consultation with other state agencies, local governments, and Indian tribes, develop, adopt and implement instream resource protection plans using existing authorities in watersheds with endangered, threatened, critical or depressed fish stocks but no current or anticipated watershed management process. This will be accomplished according to the priorities identified later in this chapter. In watersheds with endangered, threatened, critical or depressed fish stocks in which planning groups decide to not address instream flows, Ecology will, in accordance with the priority list discussed below initiate and carry out instream flow establishment outside the watershed planning process.

- Seek agreement with local planning groups and/or government entities on potential actions that need to be taken immediately to start addressing salmon problems. Where no agreement is reached the state will act using existing statutory authorities if necessary to prevent the further decline of weak fish stocks.

- Seek agreement with local planning groups and/or government entities on default actions that will be taken in the event that collaborative efforts fall short of expectations or are incapable of providing timely results.

- Withhold action on pending and new water right applications and use of interim instream flows approved by WDFW if necessary to control water development until permanent instream flows can be established.

- When necessary to prevent any further degradation of flows Ecology will adopt emergency rules to set interim instream flows in rules while the permanent rules undergo the administrative rules process.

- Advocate effective instream flow protection, restoration and monitoring measures, including but not limited to those identified in this chapter of the strategy.

2. Priority for Establishing, Protecting and Restoring Instream Flows

The Governor's Salmon Recovery Office will work with the Salmon Recovery Funding Board (SRFB) to determine priorities for salmon habitat protection and restoration and to determine priority watersheds for expenditure of new funds and efforts. The framework advocated will be based on fish stock status, water availability conditions (described previously), and land cover and human population.

The Departments of Ecology and Fish and Wildlife completed several studies including studies in five WRIAs in the Lower Columbia (WRIAs 25, 26, 27, 28, and 29). (See Appendix B, Summary of Instream Flow Conditions.)

In addition, the Department of Ecology has existing commitments to establish instream flows in the Dungeness (18), Quilcene (17), and Lower Skagit (5) WRIAs; to revise existing instream flows in the Cedar-Sammamish (8) and Green-Duwamish (9) WRIAs; and to assist in flow restoration in the Methow (48) WRIA. The Dungeness, Quilcene, and Methow basins were pilot watershed planning projects authorized and funded by the Legislature in the early 1990s and now in the implementation phase. The Lower Skagit has a cooperative instream flow study underway involving Skagit PUD, Anacortes, Lower Skagit Tribes, and the state.

The Cedar-Sammamish and Green Duwamish have proposed Habitat Conservation Plans (HCPs) developed under federal ESA procedures by (respectively) the cities of Seattle and Tacoma. Due to prior commitments, these watersheds are de-facto priorities for the deployment of Ecology instream flow staff.

The Departments of Ecology and Fish and Wildlife anticipate that additional local watershed planning efforts occurring under Chapter 90.82 RCW may request the assistance of the state in instream flow studies. Those requests will also have to be factored into the priorities for instream flow work. The agencies have now hired staff to carry out new instream flow studies and to finish partially completed studies in priority watersheds.

Currently established instream flows and closures will be reviewed by the Departments of Ecology and Fish and Wildlife for adequacy in all watersheds that support fish stocks that are listed under the Endangered Species Act or that have potential to be listed. Where flows and closures are determined to be inadequate and are being addressed in a collaborative local watershed management effort, the currently established instream flow and closure rules will be reviewed by the Departments of Ecology and Fish and Wildlife. If necessary, they will be amended by the Department of Ecology in accordance with the schedule below. Where no collaborative process is occurring or a planning group determines it will not address instream flows, the flows will be reviewed by the Departments of Ecology and Fish and Wildlife and amended by the Department of Ecology as indicated in the schedule below.

Instream flows will therefore be **established** or **revised** in all watersheds with fish stocks listed as endangered or threatened under the federal Endangered Species Act or categorized as critical or depressed by the Department of Fish and Wildlife in the Salmon and Stealhead Stock Inventory (SASSI) report. Instream flow rules will be established or revised in the highest priority watersheds first and then in other high priority watersheds, unless opportunity exist to establish instream flow in those basins sooner.

Subject to future refinements, following is a proposed priority list for establishment or revision of instream flows:

Table 4. Priority for Setting or Revising Instream Flows

	WRIA(s)	Comment
Highest Priority		
Lower Skagit	3	MOU to set flows
Cedar Samm.	8	MOU to revise flows-HCP
Dungeness	18	Set target flows-Pilot area
Quilcene-Snow	17	Set target flows-Pilot area
Stillaguamish	5	Set flows
Green-Duw.	9	Revise flows-HCP
Snohomish	7	Set flows in tributaries
Methow	48	MOA with county
High Priority		
Chehalis	22-23	Revise-Planning area
Entiat	46	Set flows -Planning area
Lower Columbia ES	25–29	Set flows- Planning area
Middle Snake	35	Target flows
Walla Walla	32	Target flows
Skokomish-Dosewallips	16	Set flows- Planning area
Upper Skagit	4	Set flows- Planning area

Instream flow **protection and restoration** actions include a variety of regulatory and non-regulatory means discussed later in this report. Action plans for protection and restoration for the highest priority watersheds will be implemented as a high priority.

Subject to future refinement, following is a proposed priority list for protection and restoration (P&R) of instream flows:

Note: *Restoration efforts are already underway in few basins. The dates represent the start-up of implementation of a comprehensive strategy for putting water instream. In some of the basins immediate actions and enforcement against illegal uses will be taken as soon as the summer of 1999 to protect and restore instream flows.*

Table 5. Priority for Protection and Restoration of Instream flows

	WRIA(s)	Comment

Highest Priority		
Methow	48	Restoration started prior to 1998
Dungeness	18	Restoration started prior to 1998
Quilcene	17	Pilot planning area
Cedar-Sammamish	8	Restoration part of HCP
Green-Duwamish	9	Restoration part of HCP
Wenatchee	45	Strategic enforcement
Snohomish	7	Collaborative planning area
Nooksack	1	Planning area-strategic enforcement
High Priority		
Kitsap	15	
Middle Snake	35	
Walla Walla	32	
Okanogan	49	Has good flow monitoring
Puyallup	10	Collaborative planning area
Nisqually	11	Planning area
Deschutes	13	Planning area
Chambers-Clover	12	Planning area
Lower Yakima	37	*
Naches	38	*
Upper Yakima	39	*

- Considerable effort is already underway in the Yakima basin to restore instream flows under federal legislation passed in 1994. The state of Washington is cost-sharing irrigation system improvements with the U.S. Bureau of Reclamation and irrigation districts. State bond funds for this purpose have been ear-marked. Federal legislation established target instream flows and allocates water conservation savings to instream flows and existing irrigation.

3. "Baseline Actions" Applying Statewide, with ESA Areas First

- Baseline actions are intended to apply in all watersheds. They will first be implemented in the highest priority watersheds with endangered, threatened, critical or depressed fish stocks, identified by the Governor's Salmon Recovery Office (see previous section on priorities). Further details on the actions are contained in the sections of this chapter on “specific actions for protecting instream flows” and “specific actions for restoring instream flows”. *(Note, dates and level of resources dedicated to this baseline activity will be covered in the implementation volume).*

- The Department of Ecology currently has limited ability to monitor flows and regulate water use when rivers and streams are stressed from low water flows. Accurate information on water flows in rivers and streams is necessary to effectively manage instream and out-of-stream uses.

- The Department of Ecology will establish an effective stream flow monitoring and instream flow compliance program. New stream gauges will be established where needed for all highest priority watersheds first and then for all other high priority watersheds with endangered, threatened, critical or depressed fish stocks.

- Measuring and reporting of diversions and withdrawals will eventually be required universally. Ecology currently has authority to require measuring and reporting of new surface and ground water uses. Ecology can require measuring and reporting of existing surface water diversions by all persons diverting water from streams listed in the state Salmon and Steelhead Stock Inventory (SASSI) as critical or depressed and from any other stream where the amount diverted exceeds one cubic foot per second.

  Measuring and reporting in the highest priority watersheds will be implemented in the first phase. All high priority watersheds with endangered, threatened, critical or depressed fish stocks will have measuring and reporting implemented in the second phase. The initial goal is to accomplish measuring and reporting of 80 percent or more of water used in these watersheds with ongoing effort to secure measuring and reporting by all water users. Ecology will develop and implement new metering requirements to monitor water withdrawals and ensure that the amount, time, and place of water use do not exceed existing permits. The Department of Ecology also will install a mix of manual and telemetered river flow gauges in the 16 critical basins to collect information on water flows.

- Water conservation and reuse can provide additional water for both instream uses to support salmon and out-of-stream uses to support municipal, domestic, agriculture and industrial water use. The Departments of Ecology and Health will provide technical assistance to local governments, irrigation districts, and other water users in the 16 critical basins to develop water conservation and reuse programs. Baseline water conservation measures will be required to ensure efficient use of limited resources.

  Water conservation and reuse projects will be identified and implementation first in highest priority watersheds, and the remaining high priority watersheds with endangered, threatened, critical or depressed fish stocks will be implemented as part of the long-term implementation plan.

- Any water right actions for watersheds with endangered, threatened, critical or depressed fish stocks will be taken only if there will not be any negative impacts on the fisheries resources and if future flow restoration options will not be foreclosed.

- Strategic enforcement against illegal water uses will be taken in prioritized and targeted areas that support listed or potentially listed salmonids. (See Chapter V. B. Enforcement of Existing Laws Related to Salmon.)

4. Immediate Action to Prevent Further Decline in Instream Flows

For purposes of developing long term salmonid restoration strategies, the state will rely wherever possible on effective locally-based collaborative watershed management efforts occurring in watershed planning areas under Chapter 90.82 RCW or similar efforts that are scoped to include establishing, protecting and/or restoring instream flows.

As these efforts are initiated, the Departments of Ecology and Fish and Wildlife will engage in discussions with the watershed planning initiating entities regarding efforts that need to be taken immediately to avoid any further decline in fish stocks of concern. If no watershed effort is underway, the discussions will be held with local government representatives and Indian tribes.

Immediate actions will be identified for the highest priority watersheds first and then for all other high priority watersheds with endangered, threatened, critical or depressed fish stocks.

Immediate actions are likely to include:

- Restricting use of exempt wells, where appropriate.
- Mandatory strict water conservation measures and water use standards.
- Aggressive enforcement against excessive waste of water.

Further details on these actions are contained in sections on "specific actions for protecting instream flows" and "specific actions for restoring instream flows".

5. Details of Specific Actions for Protecting Instream Flows

Establishing instream flows by rule is ineffective for salmon recovery unless follow-up efforts are made to protect those flows from further diminishment. As stated in the background section instream flows are a water right under Washington law that are protected from diminishment by junior water users, by unauthorized, excessive, or illegally expanded water uses, and by the inappropriate use of exempt ground water withdrawals.

We must protect, prevent and correct unauthorized diversions, water spreading and waste through compliance monitoring, public education, technical assistance and regulatory action. The Strategy is to:

- **Prevent further decline in flows until instream flow levels are adopted or modified by rule**. Until instream flows are adopted or modified, when necessary, the Department of Ecology will withhold issuance of surface and groundwater water rights (except for public health and safety emergencies). Ecology, as an alternative and only where development pressure is low, will use case by case review of water right applications and condition issued water rights to protect instream flows using Department of Fish and Wildlife (WDFW) recommendations, until instream flows are set by rules. The Departments of Ecology and Fish and Wildlife will assist in the establishment of interim instream flows if called for by a watershed planning group. Ecology may close basins where required as part of the instream flow rule adoption or amendment.

- **Monitor flows and compliance.** After an instream flow is established, the Department of Ecology will condition all subsequently issued water right permits and certificates that could affect the flows with provisions requiring that the use be ceased as long as the specified instream flow is not being satisfied. Permit extensions and water right changes will also be conditioned with instream flow conditions. Existing statutory and case law provides Ecology with discretion to condition permit time extensions. Water right changes are prohibited from impairing any existing water rights (including adopted instream flows).

  The Department of Ecology will establish an instream flow monitoring and compliance program, in priority basins using the model instream flow compliance effort established in the mid-1980s by the Department of Ecology's Central Regional Office for the Wenatchee, Okanogan and Methow basins. The protection program requires that Ecology actively monitor flow conditions including published runoff forecasts in the winter and spring. When it appears that runoff is likely to be insufficient to maintain the instream flow levels, the Department of Ecology requires the holders of conditioned water rights to contact the department daily on a toll free telephone line to find out whether they may divert water that day. Agency personnel make spot checks in the field to assure compliance by conditioned right holders.

  While this kind of monitoring and enforcement is efficient, it requires additional resources and cooperation of conditioned water right holders.

- **Correct and prevent unauthorized water use.** Unauthorized water use is a growing problem in many areas of the state, as it becomes more difficult to acquire a permit to appropriate water and also due to the Department of Ecology's lack of enforcement resources. Unauthorized uses have a direct impact on stream flows because unlike conditioned rights, they do not shut off when instream flows are not being met.

  A compliance assessment will be undertaken in each of the highest priority watersheds and in each of the high priority watersheds to determine the extent to which these illegal activities are established. For those watersheds with an existing collaborative process, the Department of Ecology will consult with the local watershed group to share the results of the assessment and to request assistance in achieving public support for follow-up compliance efforts.

  If the local watershed process is addressing illegal use, the Department of Ecology will actively work with the watershed group to identify alternatives and take appropriate actions needed to protect and restore instream flows and salmon habitat. The Department of Ecology will consult with local governments in watersheds without a collaborative process.

The agency will also initiate legal action to eliminate egregious cases of waste and unauthorized diversions and withdrawal of water (see section on immediate and baseline actions).

New unauthorized use will be prevented through providing better information to the public regarding the water laws of the state, by establishing a credible monitoring and compliance presence in the field, and by issuing orders to cease and desist when illegal use is observed. (See Chapter V. B. Enforcement for a more detailed discussion.)

- **Prevent water spreading.** Water spreading is closely related to unauthorized water use. The water code and related case law generally prohibits a water right from being expanded once it is established. Any expansion beyond the intention stated in the original water right application requires a new water right application for the added use.

  The concern raised by water spreading for agriculture irrigation is that in most cases, the amount of water actually consumed increases when the intensity of use increases. This reduces return flows on which other users and the stream itself may rely. The urban equivalent of agricultural water spreading occurs when a water supplier implements water conservation measures and then allocates the water savings to new development in areas outside the original intended and authorized place of use.

  The Department of Ecology will initiate efforts (see sections on immediate and baseline actions and chapter on enforcement) to eliminate egregious cases of illegal water spreading.

  New instances of water spreading will be prevented through providing better information to the public regarding the water laws of the state, by establishing a credible monitoring and compliance presence in the field and by issuing orders to cease and desist when illegal water spreading is observed. (See Chapter V. B. Enforcement)

- **Prevent the waste of water.** Waste of water involves the diversion or withdrawal of water for a non-beneficial purpose or in an amount that exceeds the amount necessary for beneficial use. Statutory law repeatedly prohibits the waste of water. The state Supreme Court has ruled that there is no right to wasted water. The quantity allowed is based on the concept of "reasonable use" and a "water duty" for each particular use. Local customary practices is a factor to consider, but not necessarily determinative. (Grimes v. Ecology)

  The state has no clearly articulated standards for the amount water that is reasonable for various purposes. The Department of Ecology uses quantity allocation guidelines when issuing new water rights. For irrigation, the agency uses quantities published by the Washington State University Agricultural Extension Service for various locales and local conditions.

In water right adjudications, courts generally arrive at their own conclusions of what is reasonable, often without much evidence in the record. Only one adjudication is presently under way (for the Yakima basin) and Department of Ecology's attempts to have waste and beneficial use evaluated in that process have been of limited success to date.

Like other factors of water use, the agency lacks good information on the amounts actually being diverted and used. Water use in many cases is not measured and is rarely reported. In addition, the lack of compliance resources within the Water Resources Program has made it difficult to do anything about waste.

The Department of Ecology will initiate efforts (see sections on immediate and baseline actions and chapter on enforcement) to eliminate existing egregious cases of waste of water.

New instances of excessive water use can be prevented through providing better information to the public regarding the water laws of the state, by establishing a credible monitoring and compliance presence in the field and by issuing orders to cease and desist when excessive water use is observed.

- **Prevent misuse of the groundwater withdrawal exemption.** Inappropriate reliance on the groundwater permit exemption can take several forms. In basins closed to appropriation, unchecked development of exempt withdrawals can cumulatively further diminish stream flows. It is legally questionable whether these withdrawals are actually establishing a water right when the basin has been closed to appropriation unless a specific exemption in the closure rule has been provided. Another form of inappropriate use of the exemption is when a developer establishes a water system for a subdivision using multiple exempt withdrawals when the total withdrawal will exceed 5,000 gallons per day.

  Despite a recent Attorney General opinion finding this to be illegal, some counties have decided to continue approving developments that rely on multiple small, presumed to be exempt withdrawals. The Department of Ecology believes that both it and local governments have the authority to regulate the inappropriate use of the groundwater withdrawal exemption. This is an issue likely to end up being resolved by the courts and/or the state Legislature.

  Exempt withdrawals are not equally problematic everywhere. Solutions therefore need to be crafted in accordance with each geographic situation. Local governments, water supply utilities and the development community will be encouraged to find more responsible water supply alternatives.

  Exempt ground water withdrawals wells should be restricted where they contribute to streamflow problems. Withdrawals from exempt wells should be brought into consistency with the policies governing the manner in which permitted ground water withdrawals are managed (including being subject to instream flows). They should not be allowed to further diminish stream flow in closed watersheds or tributaries.

In closed basins where no public water supply is available, exempt wells could be allowed if the water withdrawn is conserved water and an adopted watershed plan provides for using "trust water rights", "water banking" or other mechanisms for sharing saved water.

New instances of this problem can best be prevented through providing better information to the public regarding the water laws of the state, by establishing a credible monitoring and compliance presence in the field and by issuing orders to cease and desist when inappropriate reliance on the groundwater withdrawal exemption is observed.

- **Measure and report water use.** Water measurement can be an effective stream flow protection requirement. It allows not only the Department of Ecology, but also the water users themselves to assure that legally allocated diversion quantities are not being exceeded. State law requires that measuring devices be installed on diversion facilities where fish stocks are classified as critical or depressed by the state Department of Fish and Wildlife.

  The amounts diverted are supposed to be recorded and reported to the Department of Ecology. Since passage of this provision in 1993, the agency has been requiring measuring devices on many new diversions, but at a minimum is informing new water users that measurement will be required in the future. In only a few pilot areas has the agency had the resources to require retrofit of measuring devices on existing diversions (e.g. from the Snake River and Salmon Creek in Clark County). The Department of Ecology is cooperating with the U.S. Bureau of Reclamation in seeking court-ordered measurement and reporting requirements in the Yakima Basin through the Yakima County Superior Court.

  Measuring and reporting of diversions and withdrawals will be required of all water users, focusing first on the highest priority watersheds (see section on baseline requirements) and largest water users first.

- **Link land use to instream flow protection.** It is critical to link water and land use planning and implementation. The linkage can and should be done as part of planning efforts addressing water and land uses. The Watershed Management Act passed by the 1998 legislature provides the opportunity to link water and land use. It requires local planning unit to consider all existing plans and related planning activities. It also stipulates that planning units must complete assessment of water supply and use in the area prior to initiation of actions. For example in certain tributaries (e.g. Soos Creek) the lack of stream-side vegetation, or land patterns that impacted aquifer recharge areas (e.g. vegetation removal, increase in impervious surfaces) are greater contributors to low flow conditions and lowering of instream flows levels than the direct withdrawals of water. Therefore, it is critical for the state and locals involved in watershed planning to modify land use patterns and land use development in order to protect and restore instream flows.

6. Details of Specific Actions for Instream Flow Restoration

Setting an instream flow does not put water back into a stream for basins with chronic low flow conditions. For many of the highest priority watersheds, the most important need is to get water back in stream. However several key water law principles affect the ability to restore instream flows. These include the following:

- *Water rights are issued in perpetuity and are a form of property right***.** As long as water continues to be used under a water right, the right remains effective and is relatively immune to being modified without the owner's consent. If a water right is altered or taken back by the state for a public purpose, compensation must be paid to the holder of the right.

- *First in time is first in right.* The earlier a water right was established, the more secure it is in time of shortage. Instream flows have only been established since about the mid-1970s and are therefore junior to most existing water developments.

- *Use it or lose it.* A water right can be relinquished or abandoned by the water user's non-use. Relinquishment is a statutory provision in which five consecutive years of non-use is grounds for relinquishment of the right (though numerous "good causes" for non-use without relinquishment are provided in law). Abandonment is a common law principle recognized by the courts in which a water right may be lost by non-use and the right holder's intention to not resume the use. The intention to abandon may be evidenced by the right holder's behavior.

- *Beneficial use versus waste.* A water right can only be established and continue to exist for a beneficial use. Beneficial use is defined by the type of the use made of water (e.g. domestic use) and by the character of that use. The use must be "reasonable" in quantity to accomplish the purpose intended without waste. No right exists to waste water.

The following initiatives will be pursued and implemented to start putting water back in streams in the highest priority watersheds.

- **Modify Water Rights.** State water rights are a usufructuary right; that is, a right to use the property of someone else (in this case the state of Washington, which in the 1917 Water Code asserted ownership of all unappropriated water in the state). Water rights are issued in perpetuity and remain in effect as long as they are continually used. Water rights are property rights and under state law cannot be taken back or further limited by the state without compensation of the owner. This makes flow restoration especially difficult to achieve.

  The State Supreme Court recently ruled that if a water right filing is still in permit status and the permittee requests an extension of time, the Department of Ecology must consider the public interest in the permit and may modify the conditions affecting the permit. This implies that a permit extension could be denied in the interest of instream flows or approved with new instream flow conditions. Generally, this same logic extends to requests to change or amend a water right. (Theodoratus v. Ecology). The Department of Ecology will, under appropriate circumstances, impose instream flow conditions when reviewing and making decisions on change, amendment, extension, or other change to a water right permit or water right certificate or claim.

- **Remedy stream flow problems for Hydropower projects.** Most hydropower facilities operate under federal licenses that must periodically be renewed by the Federal Energy Regulatory Commission. (See Chapter IV.D Hydropower and Fish: Pursuing Opportunities.)

- **Regulate Illegal and Excessive Use and Water Spreading.** Some areas of the state have a significant amount of water being used (1) without authorization from the Department of 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. The agency has found these forms of illegal activity to some degree in most areas of the state that it has investigated. In some areas the problem is completely out of control and in others it is relatively isolated and minor. This issue will only be summarized here because it is treated in detail in the enforcement section of this report.

  The Department of Ecology has authority to issue a regulatory order to a person violating or about to violate a state water law or regulation (RCW 43.27A.190). Use of water without a water right is clearly a violation of the water code. The law is also clear that the parameters on a water right relating to quantity, place of use, purpose of use, point of diversion of withdrawal, maximum acreage irrigated, and special conditions specified in the water right are all legal limits on the use of water. Failure to comply with such limits is a violation subject to civil or criminal sanctions.

  Much water use in the state occurs under water right claims rather than under state issued rights. One problem is that many claims are clearly spurious on their face in that they may claim an unrealistically large amount of water for the use that is claimed. Many also claim water use that began after passage of the water codes extinguished means of establishing a water right except through the state permit process or which claim a right for future use. A general adjudication of water rights can determine the validity and quantification of all claims in the basin. Until claims are adjudicated, they remain a major uncertainty.

  The Department of 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 the agency from making a similar determination for purposes of regulating among conflicting uses. Only the Superior Court in a general adjudication of water rights can make such a determination. (Rettkowski v. Ecology) This casts some uncertainty over whether the Department of Ecology truly can regulate an illegal or excessive use if the use is based on a claim (whether legitimate or not) until after the claim has been adjudicated. If adjudication is necessary before illegal uses can be regulated, it may be a long time before anything can be done.

Only ten percent of the state surface water has been adjudicated (percent of ground water is insignificant) with another ten percent now underway for the Yakima basin. Washington is the least adjudicated of the western states.

The section on "Details of specific actions to protect instream flows" and the chapter on enforcement describes in detail the actions the state will take to address this problem. It is important however to note that in some basins, regulating illegal and wasteful practices could result in significant amount of water remaining in the stream. (See Chapter V. B. Enforcement)

- **Require Water Conservation.** Water conservation is a primary means of restoring depressed stream flow levels. Water conservation takes many forms, but is effected through four primary means: regulatory, education, incentives, and subsidies.

  - Under a **regulatory** approach, the State can exercise the police power in various ways to cause water use to be or to become more efficient. For example, the state could establish efficiency standards and require all water users to comply with them under threat of penalty. Water users could also be required to evaluate conservation potential and to implement specific conservation elements as part of a water system plan.

  - Educational approaches involve providing technical assistance and information transfer to water users in the hope that improved, more efficient methods will be voluntarily employed. Existing institutions, including universities and conservation districts are already established to provide this kind of information.

  - An **incentives** approach involves giving users economic signals that will hopefully lead to making good choices about water use. Incentives generally involve influencing the costs and benefits of desired and not-so-desired behaviors. Tax and rate incentives are commonly used in this regard. For example a water utility's rate structure can send signals to water users that can influence how much water is used.

  - Subsidies involves providing payments in the form of loans and grants to water users to implement technologies and methods that will improve water use efficiency. Several referendum bond funds passed by the voters have provided funds for the Departments of Health, Ecology, and Community, Trade and Economic Development for purposes of helping to finance water infrastructure development and betterment.

Washington has attempted to some degree to employ all four of these approaches. A Legislatively sponsored Water Use Efficiency Study completed in 1988 recommended that all four approaches be used in concert to foster improved water use efficiency. The study report provided detailed recommendations, some of which have been implemented. Others were not implemented due to budgetary constraints.

- Municipal water conservation. – Detailed report by the state Department of Health (DOH) on the status of water conservation by public water systems and opportunities for further improvements in the state's program, "Municipal Water Conservation Analysis and Recommendations", was issued on December 1998. Generally, Washington has one the most progressive programs in the country. The state's program requires water utilities with more than 15 service connections to develop a conservation plan. Conservation plans consist of three elements:

  - Water conservation program – Evaluation and selection of specific conservation measures for implementation.

  - Water demand forecasting – Calculation of future water demand six and twenty years into the future.

  - Water use data collection and reporting – Collection of specific water use data elements.

  Specific requirements and guidelines, which were developed with the Washington Water Utility Council, are contained in a 1994 DOH/DOE publication. Requirements in all three areas vary depending on the size of the water system and whether the system will need additional water rights within twenty years. Required conservation measures for all systems include:

  - Installation of source meters for new sources.
  - Conservation program promotion.
  - Leak repair if unaccounted for water is greater than 20%.
  - Evaluation of service meter installation and conservation pricing (water rates).
  - Other measures identified by system size if determined to be cost-effective.

  The Executive Branch will pursue some or more of the following recommendations to significantly enhance the state's water conservation program for public water supplies. The recommendations include the following:

  - Develop water allocation standards for all new withdrawals and water duties for existing uses.

- Require all existing Group A systems (15 or more services) to install source meters.
- Require leak detection and repair for all systems with 1,000 or more services. Authorize local governments or watershed plans to require it for smaller systems.
- Require water use audits for systems with 1,000 or more services.
- Require conservation rate structures for all systems.
- Eliminate regulatory disincentives to conservation within existing law.
- Enhance water use data collection and management.
- Better enable water marketing and reallocation of existing supplies.
- Develop model landscape ordinances.
- Develop conservation plans for state-owned facilities.
- Allow local governments and watershed plans to exceed statewide requirements.
- Authorize local governments, watershed plans and individual water systems to develop and implement:
    - Mandatory landscape ordinances for outdoor use;
    - Retrofit and rebate programs for plumbing fixtures; and
    - Commercial, industrial, and landscaping conservation programs.
- Provide technical assistance to water systems in developing and implementing conservation plans.
- Enhance state's ability to review conservation plans and assure compliance.
- Enhance state's ability to provide public information and education.
- Develop water demand forecasting guidelines.
- Provide a utility tax credit for conservation investments by water utilities.
- Make water conservation a condition of receiving state funds.

• Agricultural irrigation- water conservation

Agricultural irrigation is the largest consumptive use of water in the state. About three-fourths of Washington irrigation water is diverted from surface water and the remainder is withdrawn from ground water sources. (See Chapter II. Background: Setting the Context)

Major federal reclamation projects in the Columbia basin, the Yakima basin and the Okanogan basin account for well over half of the state's irrigation land base. The Columbia Basin Project and the Yakima Basin Project include large storage reservoirs that capture high spring flow and release it for irrigation use during the summer and early fall. All major tributary stream systems in eastern Washington have irrigated lands to varying degrees. The impact of irrigation on stream flows varies from tributary to tributary, but generally, irrigation withdrawals and consumptive use depress natural stream flows during the low flow period in the summer and fall. An interesting exception is in the upper Yakima River where water is released from headwaters storage reservoirs to be diverted far downstream. In the upper Yakima River, summer and fall flows are actually much higher than they would be naturally due to storage releases.

However, the lower Yakima River, below the major irrigation diversions, has chronic low flow problems that affect fish.

Water conservation efforts in the agricultural sector also vary widely depending on the situation. Irrigation districts applying for grants and loans from the Department of Ecology are required to have a water conservation plan. Ecology guidelines set out state conservation planning requirements for agricultural irrigation. Districts receiving federally developed water are also required by the Bureau of Reclamation to have a conservation plan. Other independent and private irrigation systems have no current conservation planning requirements.

The Department of Ecology also administers drought-related funds. These are bond funds left over from appropriations made in the 1977 drought. During periodic drought episodes, the agency can provide grants and loans to public irrigation entities for funds to ameliorate water supply problems for irrigation and related fisheries.

A 1988 water use efficiency study report authorized by the Washington Legislature made extensive findings and recommendations regarding irrigation water conservation. Most of these recommendations remain relevant. Only a few have been implemented since 1988 due to resource constraints.

Chapter IV. A. 1. Agricultural Strategy to Improve Fish Habitat outlines the intent of the state to support a programmatic approach for irrigated agriculture (including agricultural water conservation) to address Endangered Species Act (ESA) and Clean Water Act (CWA) certainties.

- **Require use of Reclaimed Water- Water Reuse.** The use of reclaimed water is a promising strategy for reducing the current or future direct draw on streams and associated aquifers. Under modern water treatment technologies and standards, sewage and industrial wastes are cleaned up to the point that it makes more sense to recycle and use that water than to discharge it.

  Public perception makes it difficult to suggest use of reclaimed water for drinking or contact uses (although that is increasingly occurring in other parts of the country). However much drinking quality water is presently used for purposes that could instead use highly treated effluent (e.g. industrial and construction water uses, park, lawn and golf course irrigation, vehicle washing, and street cleaning).

  A major issue regarding water reuse, as in all forms of water conservation, is how should the water savings be allocated. Should reclaimed water be employed to reduce the draw on streams, to help meet new growth in metropolitan areas, or to expand industrial and agricultural production? One technical challenge is that reclaimed water will need its own distribution system and strict cross connection controls. A separate distribution system is expensive, especially to retrofit into an existing developed area. Localities face significant challenges in infrastructure development and siting in order to take advantage of future water reuse opportunities.

The state has been investing considerable energy in reclaimed water. Legislation has been passed requiring establishment of streamlined permitting and discharge standards for reclaimed water. A one-stop state permit system is in place. Discharge standards for underground and wetlands discharge of excess reclaimed water have been adopted. A state Water Reuse Advisory Committee met for several years to help develop policies for reclaimed water.

Reclaimed water legislation exempts reclaimed water projects from water right procedural requirements. However, reclaimed water projects are prohibited from impairing any downstream water rights. This could be a significant deterrent to reclaiming water in areas that currently discharge effluent to a stream. In many situations, downstream water rights may rely in whole or in part on the effluent as a source of supply.

Compensation costs may affect the economics of reclaiming water. This is much less a problem in the Puget Sound region where large treatment plants discharge an average of about 300 million gallons of effluent per day directly to salt water. But in eastern Washington and inland parts of western Washington, protecting existing water rights could be a significant burden on reclaimed water proposals.

A detailed report was issued June 1998 by the Departments of Health and Ecology on the status of water reuse and opportunities for further improvements in the state's program. It includes several recommendations, including requiring the use of reclaimed water to meet non-potable water needs where feasible. Specific recommendations include:

(1) Provide incentives to allow marketing and encourage the use of reclaimed water.
(2) Revise and develop a regulatory structure to require utility planning for water and wastewater be coordinated to encourage reuse.
(3) Departments of Health and Ecology provide direct assistance to watershed planning activities to support reuse opportunities, and address potential water rights issues.
(4) Provide incentives to allow for construction and generation of reclaimed water to equalize the cost with other potable or non-potable sources.
(5) Develop pilot demonstration projects and public education materials on small-scale urban reuse projects, such as greywater.

Funding was provided by the 1999 legislation for reuse and conservation. (See Working Draft Early Action Plan)

- **Use of Trust Water Rights program.** Passage of trust water rights legislation in 1989 and 1991 provided a significant new tool for restoring instream flows. Under these laws, the Department of Ecology is authorized to acquire trust water rights by purchase, lease, receipt of gift, or by financing water conservation. Trust water rights may be reallocated by the agency for offstream or instream uses. Progress has been slow in actually identifying situations for acquisition of trust water rights. The most prominent examples are in the Methow, Dungeness and Yakima basins.

  In the Methow basin, the local water planning committee developed a plan calling for all new water uses to be met from conserved water from improving the efficiency of existing irrigation systems. A water bank is proposed that will accept deposits of saved water (trust water rights) and redistribute it according to a formula in the plan. The plan calls for 90 percent of water savings to be retained instream and ten percent to be reallocated to new agricultural and development uses. The Department of Ecology has proposed rules to establish water bank for the Methow Basin in Okanogan County.

  In the Dungeness basin, the Department of Ecology and a consortium of irrigation water user organizations have signed an agreement to establish trust water rights from current and future water savings to restore flows in the Dungeness River.

  In the Yakima basin, the U.S. Bureau of Reclamation and the Department of Ecology have a cost sharing agreement for financing future water conservation projects. Under federal law specific to the basin, about two-thirds of the water saving is earmarked for instream flow augmentation and one-third for firming up existing junior irrigation water rights. In addition, the U.S. Bureau of Reclamation has been leasing water rights in the Teanaway River subbasin as a test of a potentially larger water acquisition program. The Bureau is working toward permanent acquisition of several large water rights to assure permanent stream flow improvements in the Teanaway River.

  Funding was provided by the 1999 legislature for purchase of water rights. Private groups are also moving in the direction of purchasing and leasing water rights for instream flow improvement. (See Working Draft Early Action Plan)

- **Water right transfers and changes**. Under current law, a water right is appurtenant (legal attached) to a specific piece of land. It may, with the Department of Ecology's approval be severed from that land and transferred to a different place of use. The agency can also approve changes in the point of diversion or withdrawal and changes in the purpose of use. The statutes (RCW 90.03.380 through 390) allow such changes to be approved if no other water rights (including those junior to the right being changed) would be impaired by the change. A state Supreme Court decision requires the agency to protect existing, prior-filed water right applications when evaluating a proposed change or transfer. In addition, courts have confirmed that the Department of Ecology must also consider the effect on the public interest when evaluating a transfer. The state Supreme Court recently confirmed that only water that has been previously put to beneficial use can be transferred or changed.

Water right transfers and changes are becoming increasingly important as new water rights have become more difficult to acquire. They now make up about twenty-three percent of the Department of Ecology's pending water right applications. 1997 legislation enabled establishment of county level water conservancy boards with authority to process water right transfer/change requests and recommend their disposition to the Department of Ecology. Five such boards have been approved and established (in Benton, Lewis, Franklin, Klichitat, and Yakima counties) others are being proposed.

Other legislation passed in 1997 allows an irrigation water user to conserve water and transfer the conserved water to new land as long as the consumptive use under the water right would not be increased. This legislation does allow water spreading in a very limited form. Under these limitations, the transfer should have no additional deleterious effect on instream flows. Governor Locke vetoed more expansive water spreading legislation in the 1998 session because of concerns that it would further diminish instream flows.

Transfers and changes generally have little or no impact on instream flows (and if they do, they are denied or required to mitigate the effect). Therefore, the Department of Ecology believes that more transfers and changes should be encouraged. In addition, as noted in the previous section, there is growing interest in transferring water rights from offstream to instream use on a willing seller, willing buyer basis.

- **Water Storage.** Most Washington rivers experience their lowest natural flows in the summer and early autumn during a period when many water out-of-stream uses reach their maximum need. Natural streamflows peak in the winter and spring when water needs tend to be lowest. This hydrologic reality is one reason why many rivers in the state have reservoir storage. Storage allows water from the natural high flow period to be shifted in time to other periods of the year when it is needed most. The purposes served by most existing reservoirs include power, irrigation municipal/industrial and flood control with secondary purposes that may include recreation and environmental benefits.

  Historically, surface water reservoir projects have not been favorable to naturally occurring fish stocks. Many projects inundated important spawning and rearing habitat, cut off access to upper watersheds, altered downstream water quality and reduced natural stream flows. However, in recent years, new storage projects have increasingly been suggested as a means of restoring or at least managing flows for fish. New storage facilities have been proposed for many years in the Yakima River basin for purposes that include improving aquatic conditions for fish, especially in dry years. Irrigation districts in the Yakima basin have built several small re-regulating reservoirs to reduce operational spill from irrigation conveyance systems (and thus conserve water).

It is also possible to modify the purposes and operations of existing storage facilities to be more fish friendly or even to enhance the production of fish. (See Chapter IV. D. Hydropower and Fish: Pursuing Opportunities.) Federally owned and operated reservoirs have been under great pressure to modify operations to protect or improve conditions for fish. This is occurring in the Yakima basin, in the Green River basin near Seattle, and on the main stem of the Snake and Columbia Rivers.

Offstream storage reservoirs avoid inundating riverine habitat and blocking fish passage. Water is diverted or pumped during times of high flow into the reservoir and could be drafted from it during times of low flow and high water demand and to augment low stream flows.

In the right setting, it is also possible to store water in ground water aquifers for later pumping and use. This is not very common yet in Washington, but it is in other parts of the country. In some cases, irrigation artificially recharges aquifers through conveyance system losses and application losses into the ground.

Artificial ground water storage and recovery is being proposed in several communities for public water supply and in connection with water reuse projects. These projects inject or infiltrate water into a ground water storage basin during high flows and extract the water for use during low flows. New ground water storage and recovery projects could reduce the draw on streams during the low flow period of the year and thus be beneficial to fishery resources.

- **Other methods to increase water conservation and efficiency and share conserved water.** Water conservation and efficiency measures have been funded both by private and public resources. The potential for private funding is however great due to the limited "new" water supplies. Therefore the issue of how to address the need to put water in the stream and to provide water for unmet needs requires that we look at various options to facilitate conservation and sharing of saved water.

  - ***Water Marketing Concept.*** Water marketing involves efforts to facilitate the movement of water rights from outdated and/or lower value uses to newer, higher value uses. Higher value uses, at least in theory should be able to outbid lower value uses for water rights. The result is an economically efficient allocation of water, although the outcome may not be in the public interest. To compensate for this problem, water right transfers need to be subject to a public interest test.

Since at least 1917, it has been permissible for a water right holder to sever a water right from the land to which it is appurtenant and to move it to a new location for a different purpose. The user could also sell the water right to another person who in turn may move it elsewhere for a new purpose. All such changes require the prior approval of the Department of Ecology. Before approval, the agency must assure that no other water right (whether junior or senior) will be injured by the change in use. The courts have also affirmed that the Department of Ecology has a duty to protect the public interest (including instream flow effects) in considering any such change.

The market, such as it exists, is a regulated one. Both the no-injury test and the public interest test may constrain the free movement of water. In either case impairment can potentially be overcome by compensation, mitigation, or appropriate conditioning of the approval to change a right.

Over one-fifth of the water right applications currently received by the Department of Ecology are for changes in existing water rights. This proportion is expected to increase in the future due to the difficulty of receiving approval for new original diversions or withdrawals and potential public financing of conservation infrastructure. The Department of Ecology has adopted rules that further encourage persons seeking water to attempt to find and change existing water rights.

One of the factors that inhibit water marketing and transfers is the lack of good information on water use and lack of certainty of water rights. The Department of Ecology does not know for certain who the current owners of water rights are. Water right records include only the original owner of the water right. The land to which it is appurtenant may have changed ownership many times since water right was established. An effective market would require better information regarding water right owners as well as willing sellers and buyers.

There is growing interest in the conservation community to buy or lease water rights for dedication to instream purposes. An effective water market is essential for this strategy to be effective. The 1999-01 budget appropriation provides funds (one million dollars) for the state to purchase or lease water rights in strategic locations for instream flow restoration.

Several areas of the state are proposing the establishment of a "water-bank" to facilitate the purchase or lease of water for instream flows and other desired purposes. A water bank is simply a central location where persons with water rights to sell or lease and persons (including the state or private foundations) willing to buy or lease can find one another. A water bank can be set up to accept "deposits" of water rights and to issue them to others. Water banks are operating in other states (e.g. upper Snake and Boise basins in Idaho). The Methow is maybe the first basin in Washington for this approach.

- ***Concepts for sharing saved water as a means of keeping or putting water in streams.*** The "Use it or lose it" principle compels water right holders to use their maximum entitlement or risk losing it or portion of it for nonuse. For irrigation this encourages continued use of inefficient systems and illegal water spreading (using saved water to irrigate new acreage beyond the scope of the water right).

  In 1989 and 1991 the legislature passed the trust water rights legislation in response to "the need to develop and test means to facilitate the voluntary transfer of water and water rights, including conserved water, to provide water for presently unmet and emerging needs". The trust water program is discussed above.

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

Implement State Monitoring and Performance Evaluation
The state will closely monitor the progress of both its own efforts and local collaborative watershed efforts that have been deferred to for development of solutions to instream flow problems. Performance indicators that are under consideration include:

- Number of watersheds with instream flows established by rule.
- Number of watersheds with instream flow protection efforts in place and implemented.
- Number of watersheds with instream flow restoration efforts in place and implemented.
- Number of watersheds in which instream flows are met or exceeded.

The Department of Ecology will assess the measures annually and will report the results to the Governor and the water and fishery committees of the Legislature. (See Working Draft Early Action Plan for details.)

Default Actions
The Departments of Ecology and Fish and Wildlife will discuss with the sponsors of collaborative efforts actions that will be implemented by the state in the event that the local collaborative effort fails or is not completed in a timely manner. Agreement with the local groups and sponsors will be sought on default actions.

However, lack of agreement will not prevent the state from moving ahead with those actions if it believes to be essential to prevent the further decline of the affected fish stocks. In watersheds without a local collaborative process underway, the Departments of Ecology and Fish and Wildlife will hold similar discussions with the responsible local government entities and Indian tribes regarding default actions needed to addressing instream flow problems in the watershed pending any future watershed efforts.

Default actions will be identified for the highest priority watersheds first and then for all other high priority watersheds with endangered, threatened, critical or depressed fish stocks.

Default actions could include actions by the Department of Ecology to:

- Close or withdraw the whole watershed to further appropriation of both surface and ground water. If necessary Ecology will adopt emergency rule to implement this default action.
- Set and enforce instream flows.
- Enforce against illegal and excessive water use.
- Initiate adjudication of all existing water rights in the basin.

ESA Compliance Strategy

The intent of the state is to develop, with federal agency participation, a water restoration template which will include setting instream flow targets, metering, stream gauging, water conservation and efficiency requirements, enforcement and mechanisms for purchase of water to put back in streams. The template, once approved by NMFS and USFWS, will serve as a "water module". Implementation of water restoration plans consistent with the "water module" will be covered by section 4(d) rules and eventually an HCP, if appropriate.

For agricultural irrigation, water quantity will be covered in the programmatic approach being proposed by the state. (See Chapter IV. A. 1. Agricultural Strategy to Improve Fish Habitat.)

IV. Core Elements

➢ HABITAT
Habitat is Key

CLEAN WATER FOR FISH: INTEGRATING KEY TOOLS

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

Background
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 water quality standards. Some waters are degraded by nonpoint pollution from runoff that carries bacteria, toxins, and excess nutrients from many sources. (See Chapter I. Background: Setting the Context for further discussion of the sources of nonpoint pollution.)

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. The 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, and then only to limited circumstances or geographic scope.

However, with the current listings of salmon, steelhead, and bull trout as threatened or endangered species in Washington State and the implementation of CWA requirements, there will be significant and continuing overlap in the application of these laws to the habitat (including uplands, riparian areas, and waters) upon which salmon depend for survival. Since 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.

The federal Clean Water Act of 1972 requires the state to establish numeric standards for specific pollutants in water bodies, prepare a list of water bodies that do not meet water quality standards, and develop Water Cleanup Plan or Total Maximum Daily Loads (TMDL) for each of the polluted water bodies. The implementation of these requirements is very critical to protection and restoration of salmon habitats.

Discussions have been held between the state and National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and the Environmental Protection Agency (EPA) to explore issues and options regarding the consistency and integration of requirements of CWA and ESA. Some duplication and apparent conflicts have been identified which, if unresolved, will complicate and hinder the success of both programs. To the extent practical and feasible, the state and federal agencies are committed to integrating ESA and CWA programs to offer agencies and landowners a predictable, practical and coordinated process to meet the objectives and requirements of both acts. Pilot TMDL and Habitat Conservation Plan (HCP) integration is being implemented as part of a proposed HCP by Simpson Timber Company. Also, the Forest and Fish agreement addresses CWA and ESA requirements. (See Chapter IV. A. 2. Forests and Fish)

Current Applicable Policies

Water Quality requirements are contained in the Clean Water Act and the state Water Pollution Control Act. They are administered at the state level by the Department of Ecology.

The Water Pollution Control Act sets the state's policy for clean water: to"… maintain the highest possible standards to insure the purity of all waters of the state consistent with public health and public enjoyment…the propagation and protection of wildlife, birds, game, fish and other aquatic life, and the industrial development of the state."

The CWA, passed in 1972, sets the national policy for clean water: to"… restore and maintain the chemical, physical, and biological integrity of the Nation's waters." To accomplish this, section 303(d) of the act specifically requires the states to:

1.) establish and periodically review and revise water quality standards;
2.) perform water quality assessments to identify waterbodies that are not meeting the standards, and to make lists of such waterbodies every two years; and
3.) develop cleanup plans ("total maximum daily loads", or TMDLs) for listed water bodies.

(1) Water Quality Standards

The state has had *Surface Water Quality Standards (Chapter 173-201A WAC)* to protect aquatic life and human health since 1975. The CWA also requires states to periodically review and update their water quality standards in order to comply with new or revised federal guidance, to incorporate new state programs, and to respond to new understandings of aquatic ecosystems and new scientific information. Such reviews must take place at least every three years, and are generally know as "triennial reviews".

The Department of Ecology has also developed and adopted *Sediment Management Standards (Chapter 173-204 WAC)* in order to identify, manage and cleanup contaminated sediments in marine waters. The sediment management standards have been incorporated into the state's surface water quality standards.

(2) Water Quality Assessments

The state did little in the way of conducting water quality assessments and developing cleanup plans until the late 1980s. Biennial water quality assessments have been conducted since at least 1988. Department of Ecology, the administering agency, has identified 666 polluted water bodies in 1996. While the list represents only about 2% of the state's waters, most major estuarine and river systems in the state are on the list, including those important for salmon. Although only 5% of the state's water bodies had sufficient data to be assessed, almost 50% of those assessed ended up on the list. [See figure 4.]

In June 1998 Ecology submitted a revised 1998 list of 636 polluted waterbodies to EPA. The new list has not yet been approved.

While the most common water quality criteria exceeding standards is bacteria, a human health concern, following close behind are temperature, toxics, dissolved oxygen and acidity (pH)—all critical for survival of salmon and other aquatic life. [See figure 5.]

(3) Water Cleanup Plans - TMDLs

What is a TMDL?

- A technically based, scientifically sound approach to address all sources of pollution in a watershed.
- A means to address cumulative affects of nonpoint sources and mixed point and nonpoint sources (e.g., Chehalis TMDL).
- Address all types of pollution (e.g., temperature, dissolved oxygen, toxics, etc.).
- Tailored to specific watershed situations (not one size fits all).
- Can adjust uses to be protected and standards to be met (under EPA guidance).
- Schedules establish expected milestones—targets to be reached.
- Effectiveness monitoring and adaptive management are cornerstones to ensure progress towards goals.

What is the process of developing TMDLs under the CWA?

1. Select the pollutant(s) for the TMDL.
2. Estimate the assimilative capacity of the waterbody to absorb the pollutant(s) and not exceed water quality standards, including a margin of safety.
3. Estimate pollutant loadings from all sources.
4. Use predictive analyses to determine the total allowable pollution loading.
5. Allocate the allowable pollution among the point and nonpoint source discharges so the water quality standards are achieved.
6. Develop an implementation strategy to achieve the desired loading and allocations, including reasonable assurance that the strategy will be achieved.

7. Develop a monitoring plan to measure progress and effectiveness.

In 1991 two environmental groups filed suit against the Department of Ecology (Ecology) and the Environmental Protection Agency (EPA) for allegedly not making satisfactory progress in required actions under section 303(d) of the CWA, including water quality assessments and development of water cleanup plans. Following several years of court skirmishes, 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 15-year schedule for the state to develop TMDLs and begin implementing cleanup plans for each of the 666 waterbodies identified on the state's 1996 pollution list. The schedule is based on greatly increasing the pace of TMDL development, and devising more efficient ways of developing them. In addition, the state also agreed to develop implementation plans as a part of each cleanup plan. The implementation plans are to contain lists of pollution sources, control measures to be implemented, timeframes for the measures to be put into place and to meet water quality standards, and monitoring plans to measure performance and achievement of standards.

To date Ecology has developed, and EPA has approved, water cleanup plans covering 32 different water bodies. Many of these were developed in close coordination with local governments, or were largely based on their programs. One additional cleanup plan was developed by EPA for the state addressing Columbia River dioxins. This plan remains the only cleanup plan to have undergone consultation between EPA and the National Marine Fisheries Service (NMFS) under the Endangered Species Act, so there is little precedent for that process. Ecology currently has about 15 more water cleanup plans in various stages of development. The settlement agreement requires that cleanup plans be developed as appropriate for all water bodies listed as impaired.

Examples of completed TMDLs that address fish-related issues:

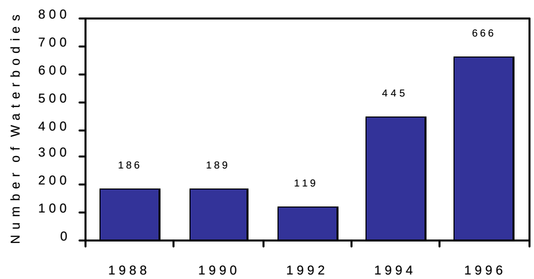
- Lower Yakima River TMDL: DDT, suspended sediments;
- Chehalis River Basin TMDL: dissolved oxygen, temperature;
- Green-Duwamish River TMDL: ammonia.

Common elements of these TMDLs:

- aquatic resources, especially fish, were severely affected by poor water quality;
- ESA listed or potentially listed fish in each watershed;
- water quality sampling and flow monitoring identified cause and extent of problems in each watershed;
- TMDL technical analysis and modeling identified existing pollution loading and established reduction targets to meet water quality standards;

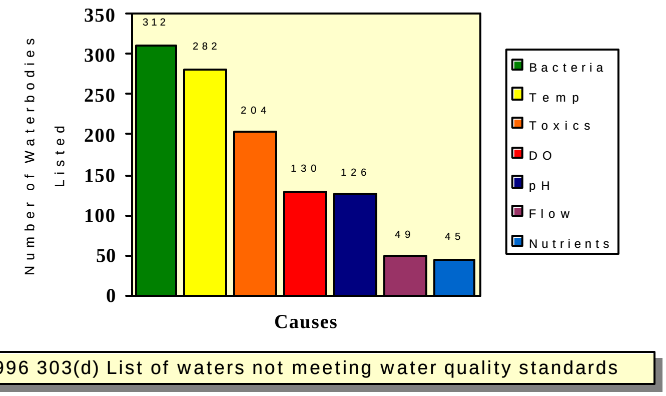
- in two of the three, both point and nonpoint sources of pollution were involved, including combinations of agriculture, forestry, stormwater, and municipal and industrial discharges;
- implementation plans were developed in conjunction with other local and state planning efforts;
- pollution fixes will involve efforts by state, local, federal and tribal governments as well as local interests.

Figure 4: Number of Waters Not Meeting Standards in Washington



* 303(d) Lists of waters not meeting water quality standards

Figure 5. 1996 List of Polluted Waters
Major Causes of Listing



4) General and individual NPDES permits

The discharge of pollutants into the state's surface waters is regulated through NPDES permits. Ecology issues these permits under authority delegated by EPA. Permits typically place limits on the quantity and concentration of pollutants that may be discharged. In most cases the permits are issued for five years. Permits are required for (1) wastewater discharges to surface waters from industrial facilities or municipal sewage treatment plants, (2) stormwater discharges from industrial facilities and construction sites of five or more acres, and (3) stormwater discharges from municipal storm water systems that serve populations of 100,000 or more.

Permits are usually issued to individual permittees for a specific facility or a general single permit is issued to cover a group of dischargers that have similar discharges. General permits are available for fish hatcheries, dairies, gravel operations, aquatic herbicide application, stormwater from municipal, industrial, Washington State Department of Transportation (WSDOT) road construction and construction sites of five or more acres. Several of these permits expired and are in the process of being renewed.

5) CWA and ESA Integration Issues

The concurrent listings of salmon under the ESA and polluted water bodies under the CWA have shown the need for state agencies to collaborate and jointly address both issues. This makes sense to both agency regulators and landowners. There are both similarities and differences in the requirements of the ESA and CWA. Some broad policy issues must be addressed to effectively and efficiently move forward with consistent implementation of both Acts.

Both ESA and CWA call for the development of plans to restore and protect degraded resources, i.e., salmon and water quality. However, there are differences in the processes, content, and implementation requirements, as well as the degree of flexibility allowed under each program. Three specific areas are especially problematic: the extent of *regulatory certainty* for agencies and landowners where salmon restoration and water cleanup are both needed; the apparent differences in the *priorities and timetables* where actions are needed under both the ESA and CWA; and apparent differences in the *scientific standards* for approval of the actions.

Regulatory Certainty -- Agencies and landowners have limited time and resources to install, maintain and implement restoration and cleanup activities. There is a need for some assurance that implementing approved plans under the ESA and CWA will result in predictable outcomes over agreed upon timeframes.

Priorities and Timetables -- The CWA requires the state to prioritize water bodies not meeting water quality standards. Priority setting factors include the presence of endangered species, risks to human health, and others. The TMDL settlement agreement includes a 15-year timeframe for addressing all polluted waters. The state and local entities are also developing priorities for restoration projects for salmon recovery efforts. These priority setting processes and timelines must be integrated and must be acceptable under both the ESA and CWA.

Scientific S*tandards* -- The state's water quality and sediment quality standards are based on criteria adopted to protect aquatic life (including salmon) and human health. Although some of these criteria are currently undergoing review and updating by the state, they have not previously been subject to consultation under the ESA. It is essential that the water quality criteria are approved by EPA and determined by NMFS and USFWS to be adequately protective of salmon. In addition, jointly adopted criteria must be established for the approval of cleanup plans for water quality and recovery plans for salmon, and for the future evaluation of their success.

II. Goal 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, especially for temperature, turbidity and dissolved oxygen.
- Implement Water Cleanup Plans for waterbodies in ESA listed areas first.
- Implement nonpoint source "best management practices" and nonpoint action plans.

- Integrate Endangered Species Act and Clean Water Act programs by working cooperatively with federal agencies, especially EPA, NMFS, USFWS to:
  - Obtain or decide *regulatory certainty* for agencies and landowners under ESA and CWA.
  - Understand and agree on *priorities and timetables under ESA and CWA*.
  - Reconcile *science-based criteria* for defining required progress (for example, temperature standards applicable to water cleanup plans under the CWA will be reconciled with temperature criteria under the ESA).

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

Ensuring cool and clean water for fish requires agreement on:

- A common set of performance measures (including water quality standards) to assess progress in achieving physical and biological integrity.

- A statewide package of adequate Best Management Practices (BMPs) for different land uses to address nonpoint pollution sources, such as the BMP agreed to in the Forest and Fish Report on riparian zone protection, road management and unstable slopes. The BMPs will vary but a package of BMPs will be agreed upon for different land uses. Watershed assessment tools (such as TFW watershed analysis and TMDL studies) will be agreed to as the means to tailor those BMPs for specific watersheds if necessary to address local conditions, cumulative effects and assimilative capacity.

- A practical approach to monitoring how well we are achieving agreed upon performance measures and a common and predictable adaptive management approach to gauge progress and make necessary adjustments.

- Specific timelines for adaptive management reviews of not less than 5 years or more than 50 years.

- A combination of regulation, voluntary actions, and funding that will provide us with an acceptable level of certainty (such as baseline forest practices rules, a schedule to complete and update watershed analysis and funding for adaptive management).

Water Quality Standards

The Department of Ecology will adopt revisions of the state's surface water quality standards and sediment management standards to ensure protection of salmonids. The state is currently in the latter stages of completing its latest review of water quality standards, and is proposing significant changes to the standards. These changes will primarily address the antidegradation policy and the application of "use-based" standards.

- The antidegradation policy currently included in the standards allows high quality water (i.e., water quality that is better than required under the standards) to be degraded only when necessary and in the public interest. Even then, all known, available and reasonable control, prevention and treatment technologies must be used prior to discharge of wastes. Some waters that constitute an outstanding natural resource may be set aside from any further degradation. The current proposal would establish mechanisms and procedures in the standards to implement these policies. Programs designed to attain or implement water quality standards, such as waste discharge permits or the forest practices rules, must also meet these provisions.

- The second major area proposed for revision is to change the structure of the water quality standards from the current "class-based" to a "use-based" structure. Currently, each water body is classified from class "AA" down to class "C". For each class, numeric criteria are assigned to protect all of the designated uses in that class. This system appears to under-protect some species needing very cold water (e.g., bull trout), yet over-protects naturally warm waters and man-made conveyances. No clear process exists for assigning classes or uses to water bodies.

The current proposal is to change to a use-based system, where individual uses with specific associated numeric criteria, are assigned to specific water bodies. This approach appears to provide the best long-term framework for the standards. It will provide more real-world choices than the current class system, and it will be easier to determine which criteria are appropriate for which water body. One outcome of the proposal is that new or revised numeric criteria are being developed for some designated uses, including some of the criteria for the protection of salmonids. Ecology is conducting case studies on several types of water bodies to test the proposed approach.

- The third area is the revision of the numeric and descriptive standards. Water temperature, the level of dissolved oxygen and acidity are critical factors for salmon spawning and rearing. Recent research performed by the National Marine Fisheries Service (NMFS) has also shown that juvenile salmon survival is significantly reduced in watersheds with high levels of toxics. That research has been corroborated by information collected by the Puget Sound Ambient Monitoring Program. The revision of the water quality standards will consider and will include new scientific information and understanding of the aquatic ecosystems.

The existing water quality standards also address contaminated sediments. Puget Sound and coastal estuaries are critical habitats for salmon, and sediments in many of these areas contain high levels of toxic contaminants. A wide range of adverse impacts on the health and survival of juvenile salmonids and other marine species are associated with exposure to contaminated sediments. There are numerous ongoing and planned activities that serve to prevent and/or reduce the potential for adverse impacts on the health and survival of juvenile salmonids migrating through areas with heavily contaminated sediments. However, current levels of toxic contaminants in sediments at many sites in Puget Sound and other marine waters exceed the sediment management standards. Consequently, many sites with contaminated sediments have been identified on the state's 303(d) list of impaired waterbodies. Ecology is currently updating the sediment management standards, and expects to have that work completed the end of 1999 or early 2000.

Water Cleanup Plans-TMDLs

As stated earlier Total Maximum Daily Loads (TMDLs) are essentially 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 dischargers, including both point and nonpoint source activities. The allocations generally result in a need for reductions in discharges. In addition, implementation plans to achieve the reductions are required. These address timing and methods of pollution control to ensure reductions, implementation tracking, effectiveness monitoring and adaptive management.

TMDLs are generally based on watersheds. While the Clean Water Act (CWA) does not allow the Department of Ecology to delegate TMDL responsibility, the agency is free to develop partnership agreements with local governments and other agencies to define roles and expectations in the development and implementation of TMDLs. Such agreements would likely address the degree of participation by state and local agencies, as well as technical assistance and oversight considerations.

The Department of Ecology plans to develop the Water Cleanup plans in conjunction with other watershed planning efforts underway at state and local levels, including local watershed planning under the Watershed Management Act (ESHB 2514). The exact methods and procedures by which TMDLs will be related to the watershed plans prepared under the Watershed Management Act are not yet clear. The following issues need to be addressed:

- Reconciling and agreeing on the role of local watershed planning in developing and implementing water cleanup plans.
- Determining how strategies for attaining and protecting instream flows will be included in water cleanup plans.
- Determining the applicability and usefulness of existing regulatory programs.
- Funding to develop and implement the water cleanup plans, ensuring that water quality standards will be met and the settlement agreement will be honored.

The Department of Ecology is currently prioritizing waterbodies on the 303(d) list in four areas of the state for the next round of TMDL development. TMDL development for high priority waterbodies will be initiated in July 1999. It is expected that at least 10% of the required TMDLs will be developed through efforts by local planning units under the Watershed Management Act. Implement strategies to correct water pollution problems and meet water quality and sediment quality standards within acceptable timeframes.

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. 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, programs to implement nonpoint source "best management practices", Forest and Fish agreement once adopted by the Forest Practices Board, and inspections and enforcement. Ecology will give priority to development of water cleanup plans that protect salmon.

Additional funding to implement the settlement agreement is needed and must be obtained through EPA grants and legislative appropriation. Ecology has developed a workload model to estimate costs and has drafted a budget request for increased funds. 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.

Clean Water Act/Endangered Species Act Integration

Why should we link clean water and salmon recovery?
Although the two federal acts were developed independently and for the most part have not been jointly administered, in this case there are several compelling reasons to link our clean water and salmon recovery efforts:

- Need to restore both the physical and biological integrity of our watersheds;
- Resources to be protected are inextricably linked;
- Common elements between basic programs (e.g., HCPs and TMDLs);
- Neither program alone can protect resources at a satisfactory level;
- Joint program reduces risk of future legal challenges that could jeopardize individual programs and decisions (i.e., increases "certainty");
- Federally mandated requirements for the state to accomplish both; and
- Clear desire among elected officials and public for "one stop shopping" versus repetitive and potentially conflicting or duplicative planning efforts.

These reasons compel us to have a clear and common description of the requirements to meet ESA and CWA goals and requirements. To accomplish that the focus will be on the following:

\- *Agency Cooperation*
NMFS, USFWS and EPA all have key roles, responsibilities, and authorities. Integration of the two acts will require these agencies to share power and build trust. They need to work with the key players to identify common elements of the CWA and the ESA and the various implementing programs. The Departments of Ecology, Fish and Wildlife, and Natural Resources will continue discussions with NMFS, USFWS, EPA and tribes to

examine the issues, develop options and identify solutions for integration with the ESA and the CWA.

The Governor's Office will seek national agreement with the solutions reached regionally. Ecology and other state agencies will implement the agreements reached regarding ESA and CWA integration. Ecology will use increased resources to develop water cleanup plans in coordination with ESA requirements and in conformance with the settlement agreement. Existing water quality programs will be better focused and enhanced to implement cleanup plans and improve water quality needed by aquatic species.

- *Certainty*

A common definition of certainty is critical. Absolute certainty for landowners or government agencies is not possible under either ESA or CWA. The "no surprises" policy and Habitat Conservation Plans (HCP) have a common element of adaptive management. There is no reason a TMDL cannot have associated with it, these same elements of adaptive management and timelines of relative certainty.

Certainty can come in many forms. While the outcomes of adaptive management cannot be certain, the process can. Predictability can come with agreement on the goals and targets, initial measures to be implemented, the timeframes for implementation, the assumptions to be tested, what steps are needed to test them, how the results will be interpreted, who will be involved in the interpretation, and how the results will be used. These are the basic elements of adaptive management.

Certainty can also come in the timeframes for adaptive management. If we agree that a given assumption may take five years to test or a given outcome may take fifty years to achieve, we will trigger adaptive management for five year increments and significant predictability, and certainty can be achieved for up to fifty years.

Finally, certainty can come in knowing how the results of monitoring progress will be used. Performance monitoring (i.e., did you do what you said you would do?) may result in enforcement actions. Validation monitoring (i.e., were your assumptions correct?) may result in a change in a best management practice (BMP). Any changes in water quality standards will have similar results. Effectiveness monitoring (i.e., did you achieve expected outcomes?) may result in a review of all or most BMPs. Specific timelines for these actions also adds certainty. For example, a change in a BMP could result in a two to three year timeline to implement the BMP and changes in watershed analysis could be incorporated in the five-year cycle for updates.

When all the above has been completed for a specific watershed, larger geographic scale (landscape level), or statewide (such as forest practices rules) a TMDL and HCP can be approved for the time period designated in the adaptive management element. It is not expected that both HCPs and TMDLs will or must be done in all watersheds, but where that is necessary or preferred, the capability to do so must exist.

- Implementation of the framework for integration

The integration framework has been tentatively affirmed with the Joint Natural Resources Cabinet, EPA, NMFS, and USFWS. Federal agencies are addressing the CWA/ESA integration issues and options in consultation with state and tribal governments and with input from interested parties. The state will seek endorsement, of the framework for integration, by leadership in the Clinton Administration. The state will implement the framework as part of the statewide salmon recovery and clean water strategies. Details can be worked out over time if the framework can be agreed upon now. Resolving these issues will result in significant gains in salmon recovery efforts. Failure to resolve them threatens both salmon recovery and clean water.

Alternatively, the state may decide on a path to force resolution of the issue. Our ability to move forward on commitments to do TMDLs is primarily tied to legislative policy and budget support. This in turn is tied to resolution of this ESA/CWA issue for forestry, agriculture, urban development, and salmon recovery in general and the need to offer agencies and landowners a predictable, practical and coordinated process to meet the needs of both laws. Priorities and timetables for both ESA and CWA will be synchronized, and any conflicts in procedures and technical criteria will be resolved.

Incentives and Enforcement

- The Department of Ecology and other state agencies will encourage voluntary actions to address water quality problems caused by waste discharges, riparian conditions and nonpoint source pollution. This encouragement will be through incentives such as technical assistance, grants and loans, and other means. These actions will be encouraged both prior to the development of water cleanup plans in order to stabilize water quality or as alternatives to formal water cleanup plans where appropriate, and as a means to implement such plans.

- The Department of Ecology will take immediate corrective and compliance actions where appropriate and practical to address water and sediment quality problems posing imminent threats to water quality prior to development of water cleanup plans. Targeted, rapid source control actions are more cost effective and efficient in some cases.

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

The Department of Ecology along with other agencies will:

- Track progress toward implementation and resolution of the CWA and ESA integration issues.

- Continue to conduct ambient monitoring and perform water quality assessments every two years, using its own data and other available data, to determine compliance with water quality standards.

- 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 cleanup plan implementation strategies in meeting water quality standards. If progress toward meeting water quality standards is inadequate, the implementation strategies will be evaluated and revised.

Default Actions
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 CWA/ESA integration issues are not satisfactorily resolved the state would likely lose support from various interests for completing the water cleanup plans and they would then be developed by the federal EPA. If satisfactory progress is not made, it is also likely that legal action would be pursued by the plaintiffs of the existing lawsuit and others in federal court.

IV. Core Elements

➢ HABITAT
Habitat is Key

FISH PASSAGE BARRIERS: PROVIDING ACCESS TO HABITAT

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

Background
Upstream migration to spawning beds for adult salmon and instream migration for juveniles is fundamental to survival of the species. One hundred years of human development in Washington State's rivers and streams has created numerous barriers to salmon migration. Impaired fish access is one of the more significant factors limiting current salmonid production in many watersheds. See Chapter II. Background: Setting the Context for further discussion of impacts of barriers on salmon.

The purpose of this chapter is threefold: (1) to describe the types of human activities in or near stream channels that block or impair salmon passage; (2) to identify the strategies currently used by the state to rectify these problems; and (3) to outline the approach the Joint Natural Resources Cabinet (JNRC) proposes to strengthen these strategies and implement new ones in ways that promote voluntary, collaborative approaches, coupled with enhanced enforcement of existing laws.

It is important to note that resolution of fish passage and screening issues is in the implementation stage. The concerted efforts of the Washington Department of Fish and Wildlife (WDFW) the last two decades have elevated awareness to the extent that fish passage at least has had additional dedicated funds earmarked to accelerate barrier correction. This and the obvious correlation between salmonid production and the ability to access habitat have mobilized many governmental and private entities. Although fish screening has not had the same amount of attention, there is an increasing effort to bring this issue to the same level of focus as fish passage. This is appropriate given the difficulty in separating these issues, oftentimes at the same structure.

In the 1980s and extending to the present, WDFW created and refined a fish passage unit. The unit's primary responsibilities are to maintain databases on fishways and barriers, inventory road culvert barriers, inspect fishways and notify owners of maintenance needs, conduct workshops, and conduct construction projects to fix barriers. This unit has emphasized partnerships with legal jurisdictions to identify and correct high-risk barriers in a cost-efficient manner. Risk is associated with the size and gradient of the stream, which in turn requires more intensive design to reduce failure, destruction of property, and loss of fish. Various volunteer groups, with assistance from WDFW and the Conservation Commission, have also mobilized to identify and correct mostly privately owned barriers, which typically have lower risk.

Despite the passage of a fish screening law as early as 1905, WDFW was unable to enforce the law requiring fish screens on irrigation diversions because of screening technology problems. Early fish screens were *"passive"* and required frequent manual cleaning by the water user, they were deemed impractical and soon abandoned by irrigators. It was not until self-cleaning screens were developed that the primary technical problems blocking implementation of a comprehensive, enforceable fish screening program, were resolved. The WDFW screening program has been built on a three-way partnership among diversion owners, the state, and federal government. Efforts are directed to screen construction, operation, inspection, and maintenance, often with reimbursable contracts. More recent efforts have also emphasized upgrades of screens to most recent standards utilizing federal (Bonneville Power Administration {BPA}- Columbia River) and/or state capital budget funding.

In 1987 the WDFW began an inventory of pump diversions in upper Columbia Basin tributaries supporting salmon and/or steelhead (non-anadromous areas excluded). This pump diversion inventory effort was extended in the 1990s with federal funding to the mainstem Columbia River (estuary to Chief Joseph Dam) and the Snake River. To date, about 1,100 pump stations of all sizes have been located. Typically, only 25 - 40 percent are adequately screened to protect salmonid fry from entrainment and impingement. Virtually all gravity diversions (canals and ditches) in "resident fish only" waters are believed to be unscreened. This is because gravity screens are relatively costly and complex (compared to pump diversions); require professional design and construction; and require more intensive operations and maintenance (O&M) oversight. Generally, gravity diversions are considered more injurious to fish than pump diversions of equal size (flow rate) because entrainment in a gravity diversion mimics natural, voluntary downstream migration into side channel rearing habitat.

The following is a more detailed description of barriers caused by specific activities:

1. Barriers Caused by Roads, Highways, and Railways
The Washington State Department of Transportation (WSDOT), Transportation Data Office, indicates that there are at least 80,000 miles of streets, roads, and highways in Washington (Table 6). In addition, the Department of Natural Resources (WDNR) through aerial photo interpretation, has estimated there are (including forest roads and other unpaved roads) 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.

Over 100 years of road building, development, and hydrologic changes have resulted in a minimum of 2,400 human-made barriers at road crossings. This number is extrapolated from data collected from surveys of less than 10% of the roadways of the state. An estimated 10% of the barriers are on state roadways, 40% on county and municipal roads, and the remainder of the barriers are on non-public and forest roads. These structures block fish access to an estimated 3,000 miles of freshwater spawning and rearing habitat. Most road-related barriers are the result of improperly placed or maintained culverts.

Table 6. Inventory of roads within Washington State, categorized by jurisdiction and total mileage.[1]

Agency/jurisdiction		Mileage
Local		
	County roads	41,094
	City streets	12,910
	Port districts	2
	College and universities	123
	Total	54,129
State		
	Department of Transportation	7,040
	Department of Fish and Wildlife	1,929
	Parks and Recreation Commission	655
	Department of Social and Health Services	35
	Department of Natural Resources	9,500
	Department of Corrections	159
	Total	19,318
Federal		
	USDA Forest Service	5,453
	USDI National Park Service	270
	Department of Energy	154
	Bureau of Indian Affairs	902
	Total	6,779
Grand total		80,226

Culverts represent a substantial portion of fish passage barriers in state roads. Culverts may not have caused fish passage barriers when initially placed, but alterations to the stream channel may change stream velocity, gradient, or morphology. Insufficient maintenance may result in blocked culverts, down-cutting at the downstream culvert opening, water piping around the culvert, or, over time, general degradation of the culvert which results in leakage or collapse. These changes may cause a previously passable culvert to become impassable. In addition, some culverts were not originally designed to provide appropriate fish passage. Examples include undersized or steep culverts which increase velocity, inadequate jump pools at the downstream culvert entrance, or insufficient flow across the bottom of the culvert.

When highways are built along river bottoms, they may prevent lateral migration of the stream channel, which cause in-river barriers to develop over time. These barriers are not often attributed to the adjacent roadway, and are often difficult to correct. Further, some of the most productive rearing sites for juvenile salmon in streams are located in backwaters along the edge of the stream channel and in side channel areas. Highways built next to streams and rivers often disrupt access to these off-channel sites by physically isolating them from the main channels.

[1] These totals do not include roads under private ownership (railroads, timber holdings, agriculture, etc. adapted from Wagner and Sekulich 1997).

2. Barriers Caused by Water Diversion and Storage Dams
There are about 1,000 dams obstructing the flow of water on many streams in the state. These are structures that can store ten acre-feet or more of water. Dams are constructed from simple berms built with streambed materials to very complex dam systems that use a variety of pumping, screening, and other mechanisms. The uses for the water stored vary by regional principal uses in the Puget Sound Region are municipal, hydropower and industrial, whereas most water used in the Columbia River Basin is for hydropower and irrigation. Some storage dams serve several functions, such as flood control, water supply, recreation, and irrigation. (Hydropower dams are addressed in Chapter IV. D. Hydropower and Fish: Pursuing Opportunities.*)*

For many early storage and diversion dams, no fish passage facilities were constructed, resulting in the loss of several significant salmon runs. For example, irrigation reservoir storage dams in the Yakima River basin blocked sockeye runs estimated at 200,000 adult fish (Palmisano et al. 1993). At some irrigation impoundments, adult passage is hindered by poorly designed ladders and screens. Such dams not only prevent passage into productive spawning and rearing areas, but also destroy free flowing reaches of streams - either by impounding the reaches or causing unnatural sediment deposition. Dams slow rivers and turn them into a series of controlled reservoirs causing an unnatural flow regime and higher water temperature.

Irrigation diversions associated with dams range from small (a few cubic feet per second), to large (thousands of cubic feet per second). Unscreened or improperly designed diversion dams can impede upstream migration of adult salmon, alter the distribution of rearing juvenile salmon within the stream system, or actually cause the juveniles to enter the irrigation system (entrainment). In addition, juvenile fish can be impinged on the screen itself if it is not properly designed. Palmisano, et al. (1993), citing several studies by National Marine Fisheries Service (NMFS) found about 70% of the water diversions in Washington lacked proper screening in the late 1970s, and that 30% continued to be improperly screened or designed even after efforts to improve screening. For waters with resident salmonids only, virtually all gravity diversions are unscreened. Although the full extent of fish losses resulting from inadequate screening is unknown, it is well documented that significant injury and mortality occurs.

3. Problems Caused by Stream Channel Structures
Fish passage barriers include structures that were placed in the stream with little thought on salmon migration needs. Lake outlet screens were placed in the 1950's and 1960's to prevent the out-migration of hatchery trout from planted lakes, and to control lake levels. Most of these screens have been decommissioned, but those remaining often diminish spawning and rearing habitat for salmon.

Some fish hatcheries in the state impede salmon passage either through the water delivery system or the trapping system. Fisheries managers have used hatcheries for the purpose of increasing runs of salmon in Washington State. For some hatcheries with a goal to supplement natural runs, barriers are an important element. Trapping adult salmon enables fishery managers to achieve a number of objectives, including research, broodstock collection, and exclusion of some non-targeted fish. However, these facilities may delay passage of target and non-target species, displacement of spawners, and passage-related mortalities. Not all WDFW hatchery water intakes have fish screens that comply with WDFW′s own current biological protection criteria. WDFW has inventoried all hatchery intakes and has developed a priority list for upgrade/replacement of inadequate screens.

Design, siting, and construction of hatchery barriers must include considerations of the seasonal movements and habitat uses of all species within that stream. An annual broodstock trapping and release protocol should be established to ensure the needs of both the target and non-target species are considered. The broodstock traps should be monitored yearly, and the protocol should be revised accordingly to meet natural production needs.

Pump diversions can be difficult to detect, especially if there are no associated water control structures. They also can have a cumulative negative effect on instream flows when multiple pumps are operating simultaneously, especially in smaller tributaries.

Current Applicable Policies
As early as 1881, Washington residents recognized the need to preserve fish access to habitat and passed laws to prohibit the construction of human-made barriers. The legislature also recognized that unscreened irrigation diversions posed a serious threat to economically important salmon and steelhead runs and in 1905 required that water diversion owners install and maintain fish screens on rivers where state salmon hatcheries were located. Over the years, fish passage and screening laws have been amended a number of times to broaden the scope and provide greater protection for fish life. Fishway and fish screen replacement/upgrade authorization legislation was enacted in 1963 (RCW 75.20.061, RCW 77.12.425). Despite these laws, the state continues to have an acute problem of habitat loss and reduced salmon productivity due to non-compliance with fish passage and screening laws.

Based on the various statutory authorities relating to fish passage and screening, the Department of Fish and Wildlife adopted, on January 13, 1997, a policy on fish protection at water diversions/flow control structures and on fish passage. Below are specifically pertinent sections from that policy (POL-M5001), which is a cornerstone to the existing approach to address these issues.

"*Purpose*

This policy applies to water diversions and man-made fish passage barriers in all state waters. It compiles and defines Department application of state laws and applies to all state and private facilities and activities. Its purpose is to restore and maintain healthy fish populations by achieving compliance with state requirements to provide effective fish passage into and out of fish habitat and to prevent fish loss and injury to fish while diverting or controlling water from lakes, rivers or streams. This policy is important to restore fish populations that are at low levels and to maintain healthy fish populations.

1. *Existing laws address fish passage; fish protection at water diversions and flow controls structures; actions that are necessary to construct, operate, or maintain devices that provide fish passage and protect fish; actions that adversely affect those devices; and fishing in those devices.*

A. …
B. …
C. …

D. A Hydraulic Project Approval (HPA) is required for construction, operation, or maintenance of a fishway, fish screen, bypass, or other fish guard. The Department will ensure coordination among the appropriate programs and divisions to facilitate a consistent, timely approach to fish passage and protection. Compliance with and onsite possession of the current edition of the Irrigation and Fish pamphlet constitute an HPA for non-equipment maintenance *and operation of existing irrigation and stock-watering diversions.*

2. ~~*Remedies to illegal obstruction to fish passage can include collaborative plans.*~~

A. Persons managing, controlling, or owning a dam or other obstruction across or in a river or stream shall remove the dam or obstruction or construct, operate, maintain and repair durable and efficient fishways approved by the Department for the purpose of allowing the free passage of fish around or through the obstruction. The Department must approve plans and specifications for the fishway prior to construction.

B. Fishways shall be operated, maintained, and continuously supplied with sufficient water to ensure the free passage of fish into and through the device.

B.…

B. If the Director determines that upgrades to a previously approved fishway are necessary to meet a higher state of efficiency for the protection of fish life, the Department may remove, relocate, reconstruct, or modify the device, without cost to the owner. After the Department has completed the upgrades, the fishway shall be operated and maintained at the expense of the owner.

3. ~~*Remedies to illegal water diversions and flow control structures can include collaborative plans.*~~

A. It is unlawful to divert water to control flow from a lake, river, or stream unless the water diversion or flow control structure is equipped with a fish guard to prevent the entry of fish into the diversion or flow control outlet and, if necessary, with a means of effectively returning fish from immediately in front of the guard to the waters of origin. The Department must approve the plans for the guard prior to construction.

B. The owner shall operate and maintain the fish guard in effective condition to prevent fish loss and injury as long as water is being diverted.

C. …

D. …

4. ~~*Failure to comply with Sections 2 and 3 above can result in criminal proceedings.*~~

5. ~~*Illegal diversions and obstructions to fish passage are subject to judicial actions to enjoin a public nuisance.*~~

6. ~~*There are exceptions to fish passage and protection laws that will be minimized wherever possible to ensure fish stock recovery and maintenance.*~~

7. ~~*There are guidance documents (attached) to facilitate protection of fish at diversions and flow control structures and fish passage*~~*.*

The "Screening Requirements for Water Diversion" dated 6/29/95, the "Decision

Guidelines for Fish Passage Barriers at Road Crossings" dated 7/23/96, the "Fishway Design Guidelines for Salmonids" dated 5/22/96, and the "Water Crossing Structures" dated 11/10/94, define the conditions required for acceptable fish protection and fish passage decisions and design. The HPA constitutes design approval. In addition, there is a protocol titled "New Fish Protection Technology Development" that prescribes the process for developing experimental juvenile fish protection concepts."

The Washington State Legislature recognized the extent of the fish passage barrier problem in Second Substitute Senate Bill (2SSB) 5886 passed in 1997. The bill directed a task force of representatives from state and local governments, tribes, business, and environmental and regional fish enhancement groups to recommend how to develop a program to identify and remove fish barriers. As directed in the bill, the report of the task force (Wagner and Sekulich 1997) recommends: (1) coordination and priorities, (2) funding, and (3) needed legislative action.
Most of the analysis and recommendations by the task force focus on barriers caused by the transportation system, yet the principal components apply to other barriers as well. Studies assessing the degree of passage problems caused by factors other than roads are limited. One exception is a report generated by WDFW addressing barriers at its hatcheries (Barber et al. 1997). Comprehensive inventories have not been done in many areas of the state, so the locations of many barriers are unknown. In streams where inventories have been completed, priorities have often not been established to prescribe an order of correction, particularly from a watershed planning perspective. One recommendation from the Task Force included the creation of the Fish Passage Barrier Removal Grant Program by the passage of SSHB 2879 by 1998 Legislature.

In addition to the fish passage statutes, construction or modification of any dam or controlling works for the storage of ten-acre feet or more of water and the storage of water in any reservoir are governed by chapter 90.03 RCW - Water Code, chapter 43.21A RCW- Department of Ecology - Water resources, and chapter 86.16.035 RCW - Control of dams and obstruction. These laws are administered by the Department of Ecology, Water Resources Program.

Correcting the fish passage barriers and screening problems is a crucial component in the recovery of salmonids. In many cases the blocked habitat is in good condition and can be utilized as soon as access is gained. A significant amount of work is already underway to correct known barriers, especially culverts, and to properly screen diversions.

However, several issues must be addressed to remove fish passage barriers and screen diversions in a scientifically tenable and economically feasible manner. Perhaps more so than for other Core Elements of Recovery, the strategy must also have a well-defined means to establish priorities, because of the widespread nature of these problems and the limited funds available to meet all needs. Also to be successful in this strategy, the state will closely collaborate with the tribes, federal and local governments, irrigation districts, public utility districts, and private landowners during the development and implementation of regional and local watershed responses.

II. Goal 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?*

To accomplish the goal and objectives, a sustainable fish passage barrier and screening program must be implemented to:

- Continue and expand comprehensive inventories that locate, assess, evaluate, and prioritize barriers and unscreened or inadequately screened diversions;

- Secure long-term funding, with emphasis on correction of high priority projects first to maximize salmonid production benefits, regardless of ownership, while still recognizing that project priorities can be stratified to take advantage of funds that can only be spent on specific jurisdictions. Also secure long-term funding program to continue and expand post-correction compliance monitoring and establish on-going maintenance and replacement programs to avoid creation of new problems;

- Coordinate design criteria and guidelines and implement guidelines to fix passage barriers owned by state, local and private parties;

- Implement screening program consistent with current regional protection criteria adopted by NMFS, WDFW, Oregon Department of Fish and Wildlife (ODFW), and Idaho Fish and Game (IFG) in 1995 and approved by United States Fish and Wildlife Service (USFWS)- for interim bull trout protection in 1998;

- Coordinate permitting activities, monitoring and data management, and compliance with fish passage and screening laws;

- Broaden the understanding of fish passage needs, especially juvenile salmonid migration habits and limitations and knowledge of fish passage and screening design and correction;

- Integrate fish passage and screening needs into land and water use planning to reduce the opportunity for additional problems to develop.

Watershed based inventory and prioritization

Inventory of fish passage barriers and unscreened diversions is a very important activity for the protection and restoration of salmonids. The results of recent inventories conducted by the state, tribes, and local and private entities have increased the awareness of fish barrier problems and their impacts on all salmonid species.

The intent of the inventory and punishment program is to identify and prioritize fish passage barriers statewide and develop a comprehensive database. It is estimated that less than 80% of the state has been inventoried. Before 1998, the most regimented fish barrier inventories were conducted by WDFW on the state highway system (using WSDOT funds) and on county-owned roads in Skagit, Kitsap, and Thurston counties, with a commitment from WSDOT and these counties to cooperate with WDFW in follow up correction efforts. Diversion inventories by WDFW concentrated on the mainstem Columbia River and Snake River and the anadromous portions of the tributary subbasins.

During the 1998 legislative session, $5.75 million was included in the WDFW supplemental capital budget to address fish passage. Most of these funds were passed to WSDOT to administer a grant program, about $700,000 of which was awarded to grant applicants for barrier identification and prioritization. Another $270,000 is being used to inventory problems on WDFW lands and another $120,000 to complete an inventory on county roads in Jefferson County. In addition, there were complementary operating funds appropriated to WDFW to provide technical assistance to these applicants and to formulate and maintain a centralized database to track the status of barriers, including priorities and correction status.

The Department of Fish and Wildlife (WDFW) has just completed a manual (Salmonid Screening, Habitat Enhancement and Restoration Division, 1998) that details the protocol for locating, assessing, and prioritizing barriers and for conveying the necessary information to WDFW for incorporation into a centralized database. The information will then be available to agencies and local interest groups. This effort offers a solid opportunity to build partnerships for watershed restoration, but falls short with respect to inventory and prioritization of inadequately screened water diversions. In preparation for possible funding increments to address diversion inventories, WDFW is preparing a protocol for fish screening assessment. It will be an added module to the manual, and will be available in the fall of 1999.

Support for the manual was expressed by the 1999 legislature through ESHB 2239. The bill required all agencies administering natural resources based grant programs that may include fish passage barrier removal projects to use fish passage prioritization selection criteria for inventory and correction contained in the WDFW manual.

In addition, a broad-based effort called the Watershed Recovery Inventory Project (WRIP), sponsored by WDFW, included workshops and surveys to solicit information on fish passage barriers from sources inside and outside the agency. Part of this effort resulted in a database directory that can be used for contacts to obtain more detailed information on a multitude of habitat issues. There are undoubtedly similar efforts and databases that have not been included in the WDFW database or in the WRIP directory. Examples include the efforts of the co-managing tribes of Washington State, Washington Rivers Council, Washington Trout, and various basin and watershed plans and assessment (sponsored through Forestry Module process, Conservation Districts, Washington State Department of

Natural Resources, and U.S. Forest Service), independent county and city inventories, and assessments by various interest groups, volunteers, and private consulting firms.

The Washington State Department of Transportation (WSDOT) plans to address all fish barriers on state-owned highways located in the inventory with their 20-Year Plan. The 20-Year Plan is a three-pronged approach. It first designates highest priority fish passage barriers and systematically removes these barriers. Second, as projects requiring hydraulic permits are constructed, additional barriers are removed. And third, some fish barriers are removed as a result of WSDOT's routine maintenance activities (Johnson, et al. 1998).

The Washington State Department of Natural Resources (WDNR) has replaced over 100 large culverts in streams per year and in the past few years the replacements are generally in response to flood damage, evidence of an undersized culvert, or normal deterioration. Until recently no formal department program existed for fish barrier assessments or repairs. Some road maintenance managers have chosen to prioritize projects based on the evidence of apparent fish barriers. That is changing.

In 1997 the WDNR signed a Habitat Conservation Plan (HCP), which covers a variety of anadromous and resident fish species in Western Washington. One of the Riparian Conservation Strategies committed to in the plan includes the inventory, assessment, and prioritization for removal of roads causing fish blockages. Over the course of the current biennium, WDNR will be working with the appropriate state and federal agencies to formulate a strategy for completing this very sizable project. In additions the Forests and Fish Report (Summarized in Chapter IV. A. 2. Forests and Fish) requires inventory and assessment of the condition of existing forest roads and orphan roads constructed prior to 1974 and not used. See Appendix D. Roads, contained in the Forests and Fish Report, dated April 29, 1999. The fish passage concerns will be included in the state Forest Practice Rules.

Inventories for culverts on county roads have been conducted by WDFW and, in some cases, by the county. Thurston, Kitsap and Jefferson Counties along with Chelan, Snohomish, King, and Pierce Counties and the cities of Olympia and Tumwater have been the most active in barrier inventory and correction efforts. Funding appropriated by the 1999 legislature to the Salmon Funding Board may be available to state, counties and cities to continue the inventory program.

Engrossed Substitute House Bill 2496, Salmon Recovery Planning Act of 1998, Section 10 directs the Conservation Commission to form a technical advisory group to identify limiting factors for salmonids. ESHB 2496 Section 2 defines limiting factors as, "conditions that limit the ability of habitat to fully sustain populations of salmon. These factors are primarily fish passage barriers and degraded marine areas, riparian corridors, stream channels and wetlands". However, this language failed to address screening issues.

In order to meet this directive under ESHB 2496, the Conservation Commission has divided the state into seven geographic regions. The regions are consistent with the seven Salmon Recovery Regions identified in Chapter III. A Road Map to Recovery. The loss of access to freshwater and saltwater is a limiting factor in all of the regions. The habitat limiting factors analysis will be completed on a water resources inventory area (WRIA) basis. Fish passage barriers will be a priority item in the analysis of the limiting factors for salmonids in streams, rivers, tributaries, estuaries, and subbasins in the salmon recovery regions. The analysis will be completed for the seven regions in June 2001.

Information and data on known and potential barrier and screening problems is/will be collected and formatted into a geographic information system (GIS) as part of the watershed-based inventory. This allows coordination of barrier removal and screening with other habitat recovery efforts within a watershed. This information can be used in watershed management planning efforts. One component of the inventory and prioritization protocol used in the grant program ensures that data points are easily mapped.

State Actions for Effective Fish Passage

1. Address Fish Passage Comprehensively

- The state resources agencies (the Departments of Fish and Wildlife, Transportation, Natural Resources, and Ecology, and the State Conservation Commission) 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. This effort will be integrated, as much as possible, into existing watershed management efforts, limiting factors analysis done under the Salmon Recovery Planning Act of 1998, and other planning and restoration efforts (e.g. flood reduction, and stormwater management). This will ensure that all potential blockages and diversions are assessed and correction and prevention projects and activities are coordinated with other protection and restoration efforts in the watershed.

- The state will support detailed studies and analysis to evaluate the biologic, economic, and societal impacts of removing or decommissioning large dams in areas where preliminary investigations show the dams are significant contributors to the limiting factors for salmon recovery and where mitigation is unable to address the problems. Studying dam removal does not, however, mean that the dam will be removed or breached.

- The Department of Fish and Wildlife (WDFW) will recommend changes to land use plans, shoreline management programs, stormwater plans and floodplain management plans to prevent any further impacts on fish passage from construction of roads, diversions, and other structures.

- WDFW will recommend fish passage and screening options at federally owned and operated dams to maximize effectiveness for juvenile and adult salmonid passage.

- The Departments of Fish and Wildlife and Transportation in collaboration with other agencies will explore alternative mitigation opportunities to address impacts of fish passage barriers both on-site and off-site, while recognizing that fish passage (access to habitat) and restoration of habitat productivity (integrity of habitat) are both necessary components to salmonid recovery. That is, trading one component for another does not truly fulfill recovery efforts. The state will rely on policy guidance designed by the mitigation work group established under the Salmon Recovery Planning Act, (ESHB 2496, Section 16).

- Comprehensive funding strategies will be implemented to use federal, state, local, and private dedicated funds and project mitigation funds to fix the most important problems first and fund maintenance and replacement to avoid future barriers. Volunteer-based organizations will be used, where appropriate, to gain the best use of limited funds.

2. Standardize Fish Passage Design

Design of barrier corrections and fish screens is site specific. Slight miscalculations in design or implementation can reduce the ability of the project to pass or protect fish. Inadequately designed culverts may quickly degrade in fish passage capability. WDFW engineers have compiled a design manual (Environmental Engineering Division, 1998) to facilitate training and technical assistance to those conducting design work on fish passage barrier corrections, which is available on the WDFW web site.

To increase potential for success, juvenile passage design standards need to be created and additional design options provided. These standards must be reviewed periodically with fishery scientists and engineers involved in designing and installing structures that may delay or impede salmonid passage. Existing structures must be reviewed on a periodic basis, to ensure that performance standards continue to be met.

3. Increase understanding of Fish Passage and Screening Needs

Both WDFW and WSDOT will continue ongoing training and education programs to make professionals aware of current fish passage and screening statutes, barrier identification, prioritization, and design criteria. WDFW will be supported in its efforts to establish firm guidelines on barrier and diversion assessment methods and establishing annual training courses in both protocol and design options.

Training of hydraulic engineers in fish passage barrier correction will continue to broaden fish passage barrier knowledge. WDFW now conducts periodic workshops for state, county, and city engineers and for agency personnel who work with volunteer organizations. These training and education efforts in concert with a substantive ongoing grant program are essential to lessen the time for correction of all barriers and inadequately screened diversions in the state, from 40-60 years to 20-30 years.

For some species, little is known about needs and extent of upstream movement and timing of juvenile salmonids. Steelhead, some chinook, and coho salmon spend a year in river systems before out migration. Over wintering habitat needs, flood incident needs, and seasonal stream use is not always understood. This knowledge is essential to the design of a comprehensive recovery strategy and determination of design flows for passage. Culverts that are currently designed for adult migration may be insufficient for juvenile migration.

There is also a lack of personnel with expertise necessary to organize and conduct expanded inventory, prioritization, design and construction work in fish passage and screening. Outreach and training materials and programs need further development to ensure that a consistent and systematic approach is taken to identify, prioritize, fund, design and construct corrections.

The Departments of Transportation and Fish and Wildlife received a grant from the Federal Highway Administration to research juvenile fish passage needs, and to create a comprehensive fish passage database for the Snohomish Watershed. Lessons learned on the Snohomish will be applied statewide as funds become available.

4. Streamline Permitting Process

During the 1998 Legislative Session, HB 2879 was passed to allow permit streamlining for certain types of fish habitat enhancement and restoration projects. Projects that meet the criteria established in the law, and do not have adverse environmental impacts that cannot be mitigated by the HPA are exempt from local permits and fees and do not require review under SEPA. This legislation enables some projects to move forward quickly with only an HPA from WDFW. This statute will be reviewed to ensure its broadest application, including federal cooperation in permit processing. (See Chapter V. C.

Permit Streamlining)

5. Use volunteer support

Public outreach, education, and training are necessary for the Statewide Strategy to Recover Salmon to have an effective passage and screening program. Support networks of local partnerships and well-informed, active constituency operating on a watershed approach is crucial to continue accelerating fish passage and screening efforts. Better partnerships are needed with the numerous stream restoration and habitat groups that currently exist.

The state and its partners must promote correction efforts through the direct involvement of citizens that live and work within watersheds. The state will enlist volunteers and coordinate the efforts of Regional Enhancement Groups in programs that involve hands-on salmonid restoration efforts combining stream restoration with barrier removal and fish screening, particularly on low-risk projects.

6. Enforcement and incentives

The aggressive enforcement approach to correct fish screens is ineffective if the complexity and cost of the agency-approved fish screen is too great a hardship on the diversion owners and they choose to resist. Consequently, the WDFW seeks to reduce the hardship to a reasonable level by cost-sharing installation on gravity screens using capital budget funds. The "regulatory approach" has proven to be most effective where the owner's cost of compliance is less than the cost of resistance. WDFW has taken this approach with mainstem Columbia and Snake River pump diversions. A regulatory approach works better with pump diversions because as the cost of compliance increases with diversion size, the economic value of the water usually increases at the same rate. Owners of large, agri-business pump stations can afford to screen properly because of the revenues generated over many acres of irrigated cropland. Small pump stations irrigate few acres and yield smaller revenues, but the cost of screening is proportionately less.

7. Implement Comprehensive funding strategy

The pace of the efforts to remove or correct passage barriers and correct screening problems depends on a full inventory, funding availability, and a means to establish a collaborative process among owners of problem facilities and state and local governments.

Funding for barrier correction and screening has been insufficient to address the entire problem. The mean barrier correction cost from WSDOT's Fish Passage Grant Program is more than $80,000. This program represents a broad variety of culvert barriers owned by both small and large jurisdictions. It is a good representation of current anticipated road related barrier correction costs.

Through 1997 an estimated $4-6 million per year was spent on fish passage barrier corrections by state, federal and local agencies. With a conservative estimate of 2,400 road-related barriers statewide and an average cost of $100,000 per barrier, under that funding level, it would take 40 to 60 years to address barriers created by existing roads within the state.

During the 1998 legislative session budget enhancement was approved, which provides funds for dedicated fish passage projects, along with barrier correction during road improvement projects when construction crews are already mobilized, and is expected to cut the time span in half. In addition, the Conservation Commission also works directly with private landowners to inventory and correct barriers, which helps ensure an accelerated process.

An appropriation of $5.75 million was included in the supplemental capital budget for fish passage barrier identification and removal. $3.7 million of these funds were distributed through the Fish Passage Grant Program (ESHB 2879) to local governments, tribes, conservation districts and salmon enhancement groups.

The grant program as established by the legislature in HB 2879 requires a 25% match from the project sponsor. The remaining $2.05 million was used to complement inventory efforts and fix priority barriers owned or identified by WDFW. About 80% of the total have been earmarked for correction of prioritized barriers. Design engineers from WDFW provide technical assistance in these correction efforts with workshops that began in October 1998, with the aforementioned design manual that will soon be available on the Internet, and direct interaction with engineers in other agencies to familiarize them with fish passage issues and design criteria.

In addition Congress has appropriated, for Federal Fiscal Year 1999, $20 million to the State of Washington. The federal money was allocated to local governments for salmon and steelhead projects and activities. Some of the projects and activities submitted by local governments and approved by the Governor's Salmon Recovery Office, relate to fish passage barriers.

The Washington State Department of Transportation (WSDOT) dedicated Fish Passage Funds are used to correct barriers on state owned roads that were identified with the Priority Index model method referenced in the protocol manual. The higher priority projects are addressed before those with lower priority ratings. WSDOT Road Work Funds (also known as Safety Mobility Funds) are used to correct barriers that are affiliated with scheduled roadwork on public roads. These barriers do not necessarily have a high Priority Index rating, but since roadwork is already being conducted, the barrier problem is corrected to take care of two problems at once. It is more efficient to do the barrier correction while work crews are already on site because the equipment is already mobilized. In this way, some costs of construction are already covered.

For the 1999-01 biennium the legislature appropriated over $10 million dollars to WSDOT to invest in fish passage barrier removal projects and stormwater retrofit projects. This is in addition to the $4 million in WSDOT base program. About $119 million dollars of federal and state funds were also appropriated by the legislature for salmon recovery. The newly created Salmon Recovery Funding Board will administer the funds. A significant percentage of the funds could be provided for fish passage barrier correction and fish screens.

In addition, some base level funding, less than $2 million a year, for correcting screens is provided by Bonneville Power Administration (BPA). About half of this amount goes from BPA to United States Bureau of Reclamation (USBR) for screen design and civil works in the Yakima River system and the other half is used by WDFW in its screening program.

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

A monitoring protocol will be developed to gauge the success of fish passage and screening corrections. The monitoring protocol will address both adult and juvenile fish passage. Baseline and post correction data must be collected and analyzed through an established program. Funding for monitoring is needed.

The monitoring program will include the following elements:

1. *Implementation*

- Review whether a sustainable fish passage and screening program has been established,
- Have sufficient funding sources been established?
- Review whether inventories and prioritization of blockages and diversions to be fixed have been established,
- Once the program is established and funded, review progress for correction relative to schedule.

2. *Effectiveness*

- Establish a Quality Assurance/Quality Control procedure for review of corrected problems.

3. *Validation*

- Sample corrected barriers to ascertain upstream/downstream migration by adults and juveniles and sample screened diversions to ensure fish protection.

- Data collection, analysis, and dissemination are critical components of an effective passage and screening program. Many problems have been identified but more exist.

- Additional inventories are needed to plan and effectively prioritize correction work within a watershed. Inventories must include barriers on city, state, federal, tribal, and private lands and the remaining county roads. Diversion inventories must be expanded to western Washington and to resident fish only waters. Inventories should follow established protocols.

- Support is needed to 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 the watershed to ensure that all potential problems are assessed. In this way, the priorities of all barriers and diversions within the system can be compared and the most cost-effective projects done first.

- Development and maintenance of a GIS-based, Internet-accessible database of fish blockages and diversions statewide is also essential. In addition, data compilation of hydrologic data and fish species distribution information would be invaluable in promoting quality assessment and design work.

- Continuous monitoring and maintenance of existing structures is an integral part of an effective passage and screening program. For example, a road culvert may not be a fish passage barrier when initially installed, but could become a barrier due to debris blockages, down-cutting at the downstream culvert opening, upstream piping around the culvert, or, over time, general degradation of the culvert which results in leakage or collapse.

  In most instances, a degraded culvert will continue to meet its primary function, moving water under the roadway. As such, road maintenance engineers need to be aware of the inspection and maintenance needs of each potential barrier to ensure continuous fish passage and prevent a facility from degrading to the point of an unnecessary major rebuild.

The Department of Fish and Wildlife (WDFW) has an established inspection program for monitoring performance and maintenance of gravity diversion (canals and ditches) fish screens in anadromous waters. Unfortunately, this accounts for less than 200 individual diversions statewide, although these sites are among the largest and potentially most detrimental diversions to fish life in Washington. All fish screens are subject to loss, damage and deterioration over time.

- An on-going monitoring program to verify screen condition/compliance is necessary to assure that juvenile fish continue to be protected after initial installation, particularly on pump diversions where the screen is totally submerged and not easily inspected. Because the vast majority of diversions in the state (estimated to number in the thousands) are pump diversions, periodic inspections of <u>each</u> pump diversion screen (e.g. a ten-year cycle with 10 percent inspection rate each year) accompanied by database maintenance and compliance correspondence to diversion owners, will protect the capital investment in new screens. An alternative approach might be to inspect <u>high priority</u> pump diversions on a more frequent basis (e.g. a three or five-year inspection cycle).

Default Actions
The theme for the Statewide Strategy to Recover Salmon calls for agencies to use collaborative, incentive-based approaches when working with private and other governmental parties to recover salmon. Examples include the WSDOT Fish Passage Grant Program and the WDFW outreach program with counties and cities that includes an inventory conducted at state expense, provided agreements are made where corrections made by WDFW are reimbursed and the jurisdiction follows through with correction of remaining barriers.

For fish passage and screening, a potential default action would be to require the removal of the barriers using enforcement tools under the fish passage and screening laws described in section I. B, in the cases when barrier or diversion owners prove uncooperative.

ESA Compliance Strategy
State and local agencies are pursuing various options to address ESA uncertainty as it relates to correction of existing barriers and construction of new structures such as culverts. The following is a listing of some of the efforts being pursued:

1. Exceptions under 4(d) rules governing several ESUs (i.e., Puget Sound chinook, Lower Columbia steelhead) for habitat restoration activities specifically for correcting road and stream crossings including culverts, and to eliminate push-up dams to allow or improve fish passage.

2. Exceptions under a programmatic 4(d) rule and eventually an incidental take permit under a programmatic HCP for the Forests and Fish. (See Chapter IV. A. 2. Forests and Fish.)

3. Incidental take statements under ESA section 7 consultation for WSDOT construction projects funded by Federal Highway Administration (FHWA).

4. Incidental take statements under ESA section 7 consultations for land and water activities authorized, funded or carried out by the U.S. Corps of Engineers, US Forest Service, US Bureau of Reclamation, Federal Emergency Management Agency, and other federal land and water

management agencies. Specifically this pertains to irrigation diversion screens, dams, levees, dikes and other instream structures.

5. Incidental take permits under programmatic section 10 HCP for the Hydraulic Project Approval and possibly other permits.

IV. Core Elements

➢ HARVEST

Harvest Management to Meet the Needs of Wild Fish

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

Background

Debate is ongoing about the relative contributions of harvest, hatcheries, hydropower, and habitat factors to the decline of salmonids. Where habitat productivity and access are still adequate and the genetic resources of the wild population have been maintained, providing the sufficient numbers of wild spawners to the stream will recover wild stock abundance rapidly without further assistance. The high reproductive potential allows salmonid stocks to recover to harvestable levels within a few generations (approximately 3 to 15 years). Examples of such recoveries have included upriver bright fall chinook in the Columbia River, fall-run chum outside the Columbia River, summer-run chum in Hood Canal, and coastal cutthroat trout in Puget Sound.

It also appears that wild coho salmon in the lower Columbia River and southwest Washington′s Willapa Bay are recovering rapidly or are much more abundant than previously thought. The presence of adipose-clipped, hatchery coho are providing new assessment tools and insights into wild stock abundance and location. But there are many more examples of where stocks have failed or are failing to recover due to habitat loss and degradation. In such cases, recovery strategies will rely heavily on factors other than harvest. The recovery of Mount St. Helens ecosystems has been faster than many predicted, but this is just one example of a single event followed by complete habitat protection whereas many other habitat and access degradations are continual and cumulative (see discussion below - Puget Sound Chinook case study).

Although a number of Washington salmonid populations are experiencing depletions, several populations also have been quite abundant and have surplus production that can be harvested to support the many commercial, cultural, economic and recreational benefits that are traditional Pacific Northwest values. In addition state, tribal and federal agencies invest in significant hatchery production both to help recover wild stocks but also to generate fishery benefits.

To allow sufficient numbers of wild spawners to escape harvest, managers need to be able to determine the total estimated run size and the allowable numbers of fish that can be caught. This determination is complicated by the different productivity levels of the various wild and hatchery stocks. The challenge is the ability of fish managers to target harvest on wild stocks with surplus production and fish produced for harvest by hatcheries while protecting weaker stocks until their productivity improves. Without such approaches there is little justification for major investments in hatchery programs intended to enhance salmon fisheries.

Managers use the timing and location of runs, gear and size restrictions, and the mass marking of hatchery fish, to target fisheries at healthy species and stocks. The tools to allow targeted fisheries are based on stock identification. Fish scales have been used for years to identify population differences in ages and life history, and are very useful to distinguish hatchery fish released as yearlings. The coded-wire tag has been used since the 1970s to identify primarily the origin of hatchery fish, although limited use with wild stocks has provided insights into factors affecting productivity.

Genetic stock identification (GSI) was put into large scale use in the 1980s to better understand the contributions of various salmon populations to fisheries. DNA methods are currently being developed to expand on the capability of GSI. The use of patterns in the otoliths (ear bones) of fish is a way to mark millions of hatchery salmon prior to hatching by changing the incubation water temperature. Mass removal of hatchery fish adipose fins is the latest identification tool to be used for Pacific salmon, although it has been used for steelhead management for years. This method is unique because it provides a visual mark that allows fishers to selectively retain marked hatchery fish while releasing species and stocks that need protection. Many of these stock identification tools are used together.

Another important component of fish harvest management is understanding the productivity of wild stocks. This requires accurate assessments of the number of spawners, the number of offspring produced (recruits), and sources of mortality, including their contributions to fisheries. Various methods are used with differing success depending on the species. Counting juveniles and adult fish at barriers and/or traps produces the most reliable results.

Spawning ground surveys and redd counts are other indicators that are used. Estimating the number of fish impacted by harvest activities requires tracking reported catch, the amounts of unreported catch, bycatch, dropout rates from nets, predation, and hooking mortality. Estimates of population size and all fisheries-caused mortality are difficult to obtain and require dedicated, costly monitoring efforts.

As stated in Chapter II Background: Setting the Context, salmon production capacity and survival is affected by other human activities such as land use changes impact on freshwater life stages. Many Puget Sound chinook populations are cases in point, where the Department of Fish and Wildlife (WDFW) estimates that as little as 5% of the historic production potential for these populations is represented by total current harvest impacts, including interceptions in Canada. Puget Sound chinook were listed as Threatened under the federal Endangered Species Act in March 1999, and provide a good case study about how habitat and fishery harvest factors may both limit current status and play a role in future recovery. What the example points out is this: in a case where habitat conditions are limiting factors responsible for depleted population status, harvest restrictions by themselves cannot ensure sustainable recovery. This is because additional spawners in the system do not automatically equate with greater production. A high likelihood of recovery exists only when integrated actions are taken to reduce mortalities throughout the fish's life cycle.

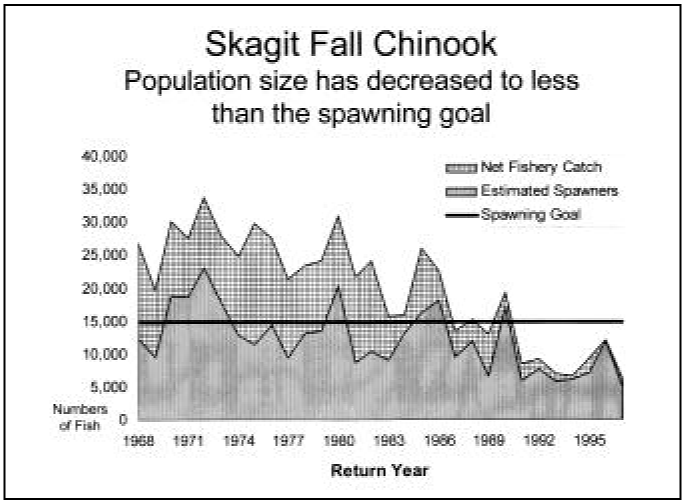


Figure 6. It is extremely important to manage harvest to ensure that a sufficient number of salmon return to spawning grounds. In fact, the proportion of Puget Sound chinook populations that is taken by harvest has fallen dramatically in the past three decades. While figure 6 only displays catches in Puget Sound net fisheries and spawning escapement over time, the same trend exists when looking at total catches and run sizes.

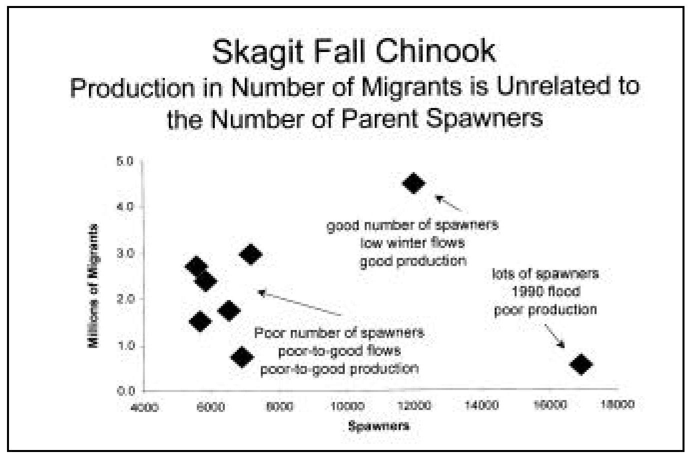


Figure 7. Providing adequate number of spawners may not be as important as the productivity of those spawners in their habitat. For example, there has been little relationship between the number of spawners and the subsequent number of migrating juvenile salmon fall chinook in the Skagit River in recent years.

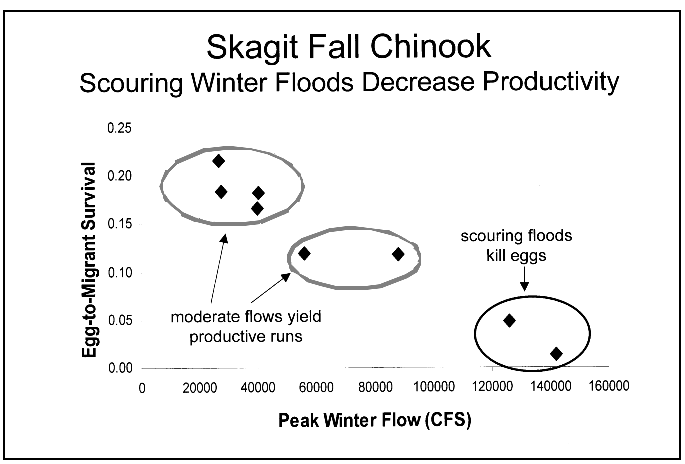
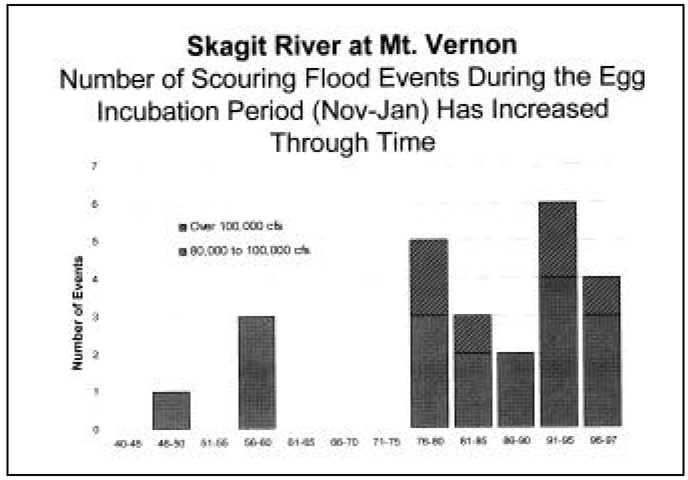


Figure 8. Instead, we see a significant negative relationship between peak Skagit River flows during the critical egg-incubation period and the number of juvenile fall chinook salmon which survive to migrate to sea. Extreme high flows (so-called 100-year floods) scour egg nests and kill salmon eggs.

Figure 9. The number of extreme flooding events in the Skagit River has increased dramatically in the past ten years, increasing the frequency of the so-called 100-year flood to about every five years. Some major causes for increased flooding in Puget Sound watersheds include de-vegetation (logging, clearing for development), which causes rain water to run off rather than slowing it to sink into the soil; increased impervious surfaces (roads, parking lots), which encourage water to run off; and channelization of the river bed (diking), which increases the volume and intensity of flood flows within the river, causing scouring of the river bed.



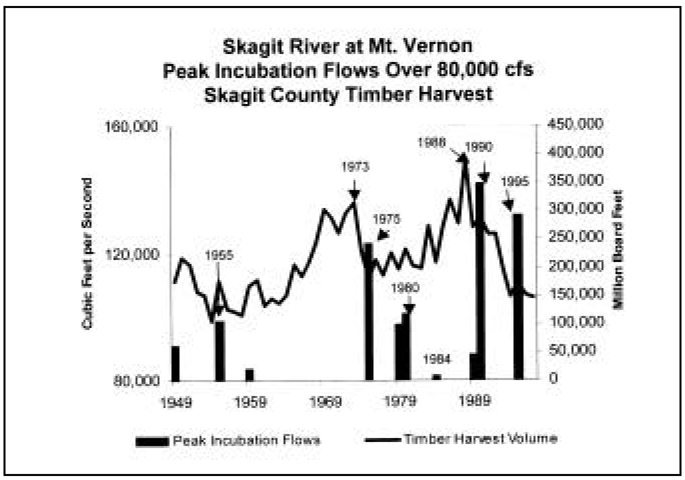


Figure 10. It is not easy to draw simple conclusions about the cause of increased flooding in the Skagit basin, but an examination of timber harvest volumes shows that flooding increases immediately following periods of stepped-up timber harvest. Factors such as these can significantly reduce salmon productivity. In the case of Skagit River fall chinook, rebuilding is inhibited because even when sufficient numbers of salmon reach the spawning grounds, a large proportion of the eggs laid by those spawners often never survive to migrate to the sea.

Summary of recent activities

The Department of Fish and Wildlife, by developing the Wild Salmonid Policy (Harvest and Hatcheries elements are part of the Statewide Strategy to Recover Salmon) is providing substantial commitment to fish management actions that ensure sufficient wild spawners escape fisheries and reach spawning grounds. One important indication of harvest management intent under the Statewide Strategy to Recover Salmon can be seen from recent actions already taken to implement policy directives. A sampling of these actions is presented below:

1. *Comprehensive coho management planning*: Efforts by the state and Puget Sound tribes continue 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. Elements of the plan will be carefully evaluated prior to adoption to ensure that wild spawning escapement goals will be consistently met, and that hatcheries are managed to do no harm to wild fish.

2. *Comprehensive chinook*: State and tribal staffs are currently developing a Comprehensive Chinook Management Plan for Puget Sound. This framework will provide the basis for NMFS to develop a A4(d) rule@ under the ESA that authorizes and limits Atake@ 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. A similar section is being developed that reviews and provides a framework for limiting risks from hatchery programs. The plan will incorporate performance measures and a schedule for periodic review. It also will provide an umbrella for regional and watershed recovery plans being developed at the local level, where the essential ties to adequately managing habitat and hydro activities must be made.

3. *U.S.-Canada Pacific Salmon Treaty*: In 1998 through the Locke/Anderson Agreement@, 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 by 22%; (2) reduced impacts on Puget Sound chinook by 50%; (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 referred to as attachment A 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. See Appendix C for a summary of the U.S. Canada Agreement.

4. *The US v Oregon Columbia River Fisheries Management Plan* is currently being reviewed and negotiated by the state(s), tribes and federal government to implement appropriate changes in harvest and hatchery approaches.

5. Fisheries that differentially harvest healthy stocks or species have been expanded from past years. The first use of the adipose clip mass mark 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 deep South Puget Sound. Fishers are allowed to retain two marked hatchery coho and required to release unmarked, wild coho. These fisheries have been implemented consistent with provisions of a U.S. District Court stipulated agreement between the state and tribes on coho mass marking and selective fisheries.

6. 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. However, several areas in southern Puget Sound, southern Hood Canal and Bellingham/Samish Bays were open to chinook fishing to allow harvest on hatchery chinook. Further, WDFW and the Puget Sound tribes reached conceptual agreement on a chinook mass marking and selective fisheries agreement to be filed with the federal court. Some chinook mass marking commenced in 1999 throughout Puget Sound; similarly mass marking of Lower Columbia River hatchery spring chinook also occurred in 1999.

7. Puget Sound commercial sockeye fisheries in 1998 were constrained to limit impacts on other species, notably chinook. These limitations will continue in 1999 with new fishing measures required to reduce

release mortalities by non-Indian purse seine fishers and a log book program to be implemented in non-Indian commercial fisheries and verified by WDFW on-water bycatch monitoring efforts. A targeted fishery on wild and hatchery Hood Canal coho has been possible in 1998 and 1999 because of strict harvest controls enacted by WDFW and tribal comanagers for summer-run chum salmon and providing adequate levels of wild coho escapement in recent years.

8. *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 overcapitalization 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.

9. The Department of Fish and Wildlife (WDFW), as mandated by the legislature, recently completed a report and video to the legislature on the capacity of current and alternative fishing methods and gears to release non-target species with low mortality and transform gear and fishing methods to become more selective in protecting depleted species and stocks. The report included recommendations on approaches to developing more selective gears and generated a commitment by the commercial salmon industry to cooperate with WDFW in development of a selective fisheries implementation plan.

10. *Evaluation of the Strategies for Washington's Wildlife* - Resident Native Fish Program, 1987-1997. This WDFW evaluation describes the activities in implementing the Strategies for Washington's Wildlife Strategic Plan as it relates to the Resident Fish Program. Five major areas were examined including bull trout and Dolly Varden and resident streams and beaver ponds. The report includes assessments of the current status of the resources, major activities and accomplishments, and notes problems and strategies to address in the future.

11. The following WDFW/tribal stock rebuilding plans are completed or under development:
    - White River spring chinook
    - Skagit spring chinook
    - Yakima spring chinook
    - Dungeness chinook
    - Nooksack Watershed Plan for chinook
    - Green River chinook and coho
    - Lake Washington chinook and steelhead
    - Upper Columbia River chinook and steelhead

12. *ESA Recovery Plans under development*:
    - Hood Canal summer chum (WDFW, tribal, NMFS) - also basis for ESA A4(d) rule@
    - Bull trout (WDFW, USFWS, other states)
    - Lower Columbia River Steelhead Initiative (WDFW, DOE, various local partners) has built the foundation for associated 4(d) rule development by NMFS

13. *Escapement goal review*: Salmonid escapement goals are now being established, reviewed and revised for specific local stocks throughout the state, including:

< lower Columbia River chinook and coho
< Snohomish even-year pink
< Willapa Bay coho and chinook
< Nooksack natural coho

Current Applicable Policies

1. Federal Statutes and Court Decisions

U.S.-Canada Salmon Treaty

The Pacific Salmon Treaty Act (16 U.S.C. 3631) implements the treaty between the U.S. and Canada (signed January 28, 1985) regarding the conservation and management of Pacific salmon. The Pacific Salmon Commission was established as the international organization for implementing the provisions of the treaty, with subsidiary Northern, Southern, and Fraser River Panels. Overall principles of the Treaty include "a) prevent overfishing and provide for optimum production; and b) provide for each party to receive benefits equivalent to the production of salmon originating in its waters." For the various salmon species, management objectives are:

> (1) Chinook: provides a long-term abundance-based framework for managing all chinook fisheries subject to the Treaty; introduces harvest regimes that are based on estimates of chinook abundance, that are responsive to changes in chinook production, that take into account all fishery induced mortalities and that are designed to meet MSY or other agreed biologically-based escapement objectives; halts the decline in spawning escapements in depressed chinook salmon stocks; sustains healthy stocks and rebuilds stocks that have yet to achieve MSY or other biologically-based objectives; defines specific obligations of all the various fisheries in maintaining healthy chinook salmon stocks, rebuilding depressed naturally spawning chinook stocks that are not meeting escapement objectives and providing a means for sharing the harvest and the conservation responsibility for chinook stocks coastwide among the Parties; and develops biological information pursuant to an agreed program of work and incorporates that information into the coastwide management regime.@
>
> (2) Fraser River sockeye/pink: obtain spawning escapement goals by stock or stock grouping; meet Treaty defined international allocation; and achieve domestic objectives.@
>
> (3) Coho: constrain total fishery exploitation to enable key management units of natural coho stocks to produce maximum sustainable harvests over the long term while maintaining the genetic and ecological diversity of the component populations; improve long-term prospects for sustaining healthy fisheries in both countries; establish an approach to fishery resource management which is responsive to resource status, cost-effective, and sufficiently flexible to utilize technical capabilities and information as they are developed and approved; and establish an objective basis for monitoring, evaluating and modifying the management regimes as appropriate.

(4) Southern B.C. and Washington chum: The U.S. will harvest chum as provided in Chapter 6, annex IV; linked to Canadian inside run sizes and harvest levels; require live release of chum salmon from Canadian and U.S. non-Indian purse seine gear from August 1 through September 15 each year in order to protect migrating Puget Sound summer chum salmon.

Native American Treaty Fishing Rights - U.S. v Washington - U.S. v Oregon
Federal treaties with Northwest Indian Tribes protected certain fishing rights for these tribes. As a result, the Department cooperatively manages the state′s fishery resources with two dozen Treaty Tribes from the Puget Sound, coastal, and Columbia River regions. The Federal Courts have specified the treaty-fishing-right responsibilities of the Department in several major cases (*U.S. v Washington*, *U.S. v Oregon*, *Hoh v Baldrige*), dozens of sub-proceedings and hundreds of Fishery Advisory Boards. For example, the *U.S. v. Washington* (Boldt) Decision set forth treaty Indian/nontreaty sharing (up to 50% of the allowable harvest@), and established tribes as co-managers with the state. A sampling of guidance and court orders relevant to *U.S. v. Washington* includes:

(1) Puget Sound Salmon Management Plan and associated documents, such as Equilibrium Brood, Future Brood, Status Reports, Management Periods, and regional plans, for example:
- ≡ Hood Canal Salmon Management Plan

(2) Comprehensive Coho Management Plan (in development)

(3) Puget Sound Chinook Comprehensive Rebuilding Plan (in development)

(4) *Hoh v. Baldrige* Order and Management Plan

(5) Annual state-tribal management agreements (for example, as developed through the North of Cape Falcon Process)

Centennial Accord
In 1989, the State of Washington and the twenty-six federally recognized Indian Tribes of Washington entered into the Centennial Accord. This ACCORD illustrates the commitment by the parties to implementation of the *government-to-government relationship*, a relationship reaffirmed as state policy by gubernatorial proclamation January 3, 1989. This relationship respects the sovereign status of the parties, enhances and improves communications between them, and facilitates the resolution of issues.@ (Centennial Accord, 1989)

Endangered Species Act
The Endangered Species Act provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. See Chapter II. Background: Setting the Context.

Pacific Fisheries Management Council and North Pacific Fisheries Management Council:
The Fishery Conservation and Management Act of 1976 (16 U.S.C. 1801-1882), also known as the Magnuson Fishery Conservation and Management Act, established a 200-mile fishery conservation zone, effective March 1, 1977, and established Regional Fishery Management Councils comprised of Federal and State officials. The

concept of a fishery conservation zone was subsequently changed to the Exclusive Economic Zone (EEZ), with the inner boundary being the seaward boundary of the coastal States. The Act provides for management of fish and other species in the EEZ under plans drawn up by the Regional Councils. The Department of Fish and Wildlife represents the state of Washington as a voting member on the Pacific and North Pacific councils, and plays a direct role in the management of our offshore fishery resources.

Salmon fishing seasons throughout Washington are either directly or indirectly set as a result of a month-long public process associated with Pacific Fishery Management Council ocean season setting. Although the Council has jurisdiction for fisheries outside Washington waters in the EEZ, all impacts to salmon stocks must be managed in a coordinated fashion, from the ocean to the spawning grounds. People interested in salmon, from fishers to environmental group representatives, gather in a series of meetings called the North of Cape Falcon process@ at which the complete suite of fishery impacts on each stock can be evaluated against conservation objectives, and fishing seasons be negotiated among stakeholders.

2. State Statutes

RCW 75.08.012, 75.08.080 and 77.04.055- Duties of the Department:
The Department of Fish and Wildlife is charged with the responsibility for both conserving the fish and wildlife resources of the state, and for providing opportunities for the commercial and recreational use of these resources. Within the Department the Fish Management Program is tasked with the management of the fish and shellfish resources and associated fisheries.

In particular, RCW 75.08.012 with regards food fish and shellfish, provides the following Mandate of the Department:

> *The department shall preserve, protect, perpetuate and manage the food fish and shellfish in state waters and offshore waters.*
>
> *The department shall conserve the food fish and shellfish resources in a manner that does not impair the resource. In a manner consistent with this goal, the department shall seek to maintain the economic well-being and stability of the fishing industry in the state. The department shall promote orderly fisheries and shall enhance and improve recreational and commercial fishing in this state.@*

RCW 75.08.500-520 - External Marking of Hatchery-produced Chinook and Coho Salmon:
Directs the Department to develop a program of selective harvest of hatchery-origin salmon by externally marking hatchery salmon.

RCW 75.28.760 - Wild Salmonid Policy:
Directs the Department to establish a wild salmonid policy jointly with the appropriate Indian tribes (*NOTE: The joint State/Tribal Wild Salmonid Policy, and Washington Fish and Wildlife Commission Additional Guidance to Agency Staff are detailed in Section II.).*

Chapter 75.40 RCW - Compacts:
This chapter designates the Department of Fish and Wildlife as the state of Washington′s representative to the Columbia River compact and the Pacific Marine Fisheries Compact; it also recognizes the U.S. - Canada Salmon Treaty. The Columbia River Compact is an interstate compact between Washington and Oregon, regarding the management of fisheries in the Columbia River. The Pacific Marine Fisheries Compact is a compact between the states of Alaska, California, Idaho, Oregon and Washington to coordinate fishery management along the west coast. RCW 75.40.060 authorizes the commission to implement provisions of the U.S.-Canada Salmon Treaty.

Chapter 75.50 RCW - Salmon Enhancement Program:
The Department of Fish and Wildlife is directed to produce salmon through projects that enhance salmon and restore habitat. A program of regional fisheries enhancement groups is created and several specific tasks are identified for the Department. The Fish Management Program reviews and approves projects.

Chapter 75.52 RCW - Volunteer Cooperative Fish and Wildlife Enhancement Program:
Creates a program of volunteer projects in cooperation with the Department of Fish and Wildlife. Projects include fish cultural activities, habitat improvement and restoration, and research. The Fish Management Program reviews and approves projects.

Chapter 75.54 RCW - Recreational Salmon and Marine Fish Enhancement Program:
Establishes a program for enhancing the stocks of salmon and marine bottomfish in Puget Sound. Particular emphasis is placed on delayed-release chinook salmon in freshwater pond sites.

3. Washington Fish and Wildlife Commission Mission for WDFW

In 1996, the Commission adopted the agency mission as:

"Sound Stewardship of Fish and Wildlife"

The legislative mandate relating to food fish was incorporated into the Department of Fish and Wildlife′s Goals, Policies and Objectives as:

- *Maximum Fishing, Hunting and non-consumptive recreational opportunities compatible with healthy, diverse fish and wildlife populations.*
- *Sustainable Management of Marine Resources to Maintain the Economic Well-being and Stability of the State′s Fishing Industry and to Enhance Recreational and Commercial Fishing in State and Offshore Waters.*

4. Key Policies for Annual Preseason Fishery Management Planning - 1999 North of Cape Falcon Policy:

The Department′s Wild Salmonid Policy shall guide Department staff in defining the conservation objectives and non-treaty harvest management regimes consistent with meeting treaty harvest rights while striving to ensure that treaty and non-treaty fishers contribute equally to necessary harvest restrictions.

Harvest Management
- *When assessed from a statewide perspective, harvest management of chinook, coho, pink, sockeye and chum salmon shall not be for the exclusive use of either the sport of the commercial fishery.*
- *Marine area harvest management objectives for sockeye, chum and pink stocks, in priority order, are to (1) provide the harvest benefits to the commercial fisheries, and (2) identify and provide meaningful recreational harvest opportunities of healthy wild and hatchery stocks.*
- *The harvest management objectives for chinook and coho stocks, in priority order, are to (1) provide meaningful recreational fishing opportunities, and (2) provide commercial harvest of healthy wild and hatchery stocks.*

Monitoring
- *Fishery participants will be required to comply with monitoring and evaluation programs designed to account for species and population impacts.*

Gear Conflict
- *Recreational and commercial fisheries shall be structured to minim ize gear conflicts. Unanticipated management issues identified in-season shall be resolved by involving the appropriate sport and commercial representatives in a dispute resolution process managed by Department staff.*

Incidental Mortalities:
- *Limits on the incidental mortalities of non-target species will be defined as necessary for commercial and recreational fisheries. Management regimes will include strategies to limit seabird mortalities consistent with the federal Migratory Bird Treaty Act.@*

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

Goal:
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:
- Stewardship of salmonid populations will come first in managing the resource.
- Maintaining and increasing the productive capacity of fish habitat will be an absolute requirement and commitment for recovery.
- Hatchery programs will be held to a standard of doing no harm to wild populations, and will be used to aid recovery where appropriate.

- 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 interjurisdictional impediments to salmon recovery.

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

Strategic principles and outcomes for protection and recovery

A basic vision of the future necessarily integrates all elements of protection and recovery that must work together to ensure long-term resource health.

1. *Stewardship of salmonid populations will come first in managing the resource.*

This basic principle of ensuring adequate annual wild spawning populations will be a central focus of protection and restoration. Ensuring healthy populations is the first step to providing sustainable fishing opportunity. When faced with uncertainties, managers will err on the side of the resource. Also, so- called hatchery management zones (areas where wild fish were intentionally overharvested so that fisheries could access abundant hatchery fish without fishing selectively) will be converted to emphasize attainment of sufficient numbers of wild spawners.

2. Maintaining and increasing the productive capacity of fish habitat will be an absolute requirement and commitment for recovery.

Current harvest impacts typically only represent a small fraction of the historic production capacity of Washington's wild salmonid populations. Fishery and hatchery actions alone will do little for sustainable recovery in most cases. Determined, effective actions to protect and restore habitat are the key for long-term resource productivity. For example, resolving serious hydropower impacts to salmon and steelhead in the Columbia River is essential for sustainable recovery.

3. Hatchery programs will be held to a standard of doing no harm to wild populations, and will be used to aid recovery where appropriate.

The abundance of fish in the natural habitat is one essential measure of resource health. But these populations also must be genetically diverse and adapted to local spawning and rearing conditions in order to be productive. This requires carefully limiting interbreeding between hatchery and wild fish, as well as minimizing competition, predation, and other negative ecological interactions between them.

4. Status and productivity of wild salmonid populations, and their habitats, will be regularly monitored to evaluate the performance of protection and recovery actions.

Accurate estimates of spawning populations, juvenile production and mortality rates are essential for measuring responses to harvest, hatcheries and habitat actions. This information needs to be correlated with habitat conditions and productivity. Managers will maintain up-to-date inventories of population and habitat status for various species, e.g., an expanded Salmon/Steelhead Habitat Inventory and Assessment Program (SSHIAP) and a revised Salmon and Steelhead Stock Inventory (SASSI). Mass marking all hatchery fish is an essential assessment tool to positively identify wild adults on spawning grounds and in fisheries as well as monitoring wild juveniles in downstream migrations.

5. Fishery approaches will be implemented and evaluated to protect depleted populations while providing more stable and sustainable access to healthy species and stocks.
Better protection of depleted populations is needed in mixed stock fisheries. This also coincides with the need to provide more compatible, sustainable access to hatchery fish and healthy wild stocks. Selective fisheries for marked hatchery fish will be emphasized as a management strategy. When stocks are predicted to return below established adult spawning goals, fishery managers will follow guidelines for minimizing incidental fishery impacts.

6. Commercial and recreational fisheries will continue to be restructured to improve their stability, management and profitability.
Selective fisheries for marked hatchery fish are already being implemented as a recreational fishery strategy. New gears and methods that allow selective capture and release of depleted species/stocks will be promoted in commercial salmon fisheries. Commercial license buy back will be used to reduce fleet sizes and thereby increase manageability and profitability.

7. Washington will work with Canadian, tribal, federal and other state managers to resolve the inter-jurisdictional impediments to salmon recovery.
A large share of the harvest of Washington salmon stocks historically has occurred in Canada and Alaska, and new Pacific Salmon Treaty provisions are expected to reduce outside interceptions to complement state conservation actions. In addition, state and tribal co-managers are committed to reviewing existing management agreements, and modifying as appropriate, to ensure effective harvest and hatchery management measures are enacted to protect wild stocks.

Highlights of Wild Salmonid Policy population management guidelines
Numerous strategies have been identified to implement this protection and recovery vision. While not presented in detail here, some highlights of the Wild Salmonid Policy (WSP) are presented below, as it represents essential guidance for the full range of implementation activities being pursued by WDFW, tribal and other state and federal managers. The Wild Salmonid Policy and additional staff guidance, although not included in their full detail here, are fully incorporated in the Statewide Salmon Recovery Strategy by their reference here. Discussing those policies that pertain directly to harvest does not imply that these actions alone can recover and maintain healthy wild salmonid populations.

Note: *The Final Environmental Impact Statement (FEIS) for the Wild Salmonid Policy contains the complete policy alternative (Alternative 3) that was adopted by the WDFW's Fish and Wildlife Commission, including the essential habitat elements. The policies contained in the WSP were developed to work in concert across the elements, i.e., habitat, harvest, hatcheries and hydro. The supporting background for the interrelationships of these elements and the rationale for choice of Alternative 3 are* *contained in the Appendices to the FEIS. This material presents important information on the requirements of healthy salmonid populations and can be easily accessed at WDFW's website (http:www.wa.gov/wdfw/).*

1. Goal of the Wild Salmonid Policy

> "THE GOAL OF THIS WILD SALMONID POLICY IS 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."

The Wild Salmonid Policy (WSP), adopted on December 5, 1997, by the Washington Fish and Wildlife Commission (Commission) is the blueprint for ensuring fish population management (harvest and hatcheries) and habitat management meet the needs of wild fish. The WSP is comprised of two documents. One contains policy provisions developed jointly with many Western Washington Treaty Tribes. The second part is a complementary document that contains additional Department of Fish and Wildlife Commission policy guidance to WDFW staff on deferred issues to be resolved at the watershed level throughout Washington. Although the Treaty Tribes have not formally "signed on", the policy is being integrated into the regular management forums with individual tribes. Implementation at the local watershed level with comanagers and local governments is the level where significant progress is being made. Beginning in December, 1997, biologists in the Department of Fish and Wildlife began incorporating the guidance of the WSP into daily management decisions.

2. Summary of joint policies on harvest (excerpted from the WSP):

a. *Framework for Implementation of joint policy for fish populations, escapement, harvest management, and hatcheries:* (#1) The fishery and hatchery management principles that are stated in this joint policy shall be implemented by affected signatory tribal parties and WDFW, who shall cooperatively review and, where there is agreement, jointly amend management agreements and plans relating to affected fisheries. Such review and agreements shall utilize best available science and be made with appropriate consultation with affected stockholders.

b. *Spawner Escapement Policy:* (#2) AThe wild populations or management units to which this spawner escapement policy applies will be defined on a comprehensive, statewide, or regional basis, recognizing scientific uncertainty, in accordance with policy statement #1. The parties will review existing court orders, joint agreements, and management plans to determine if it is agreed whether modifications are necessary to be consistent with the goals of this policy. Within this context, sufficient escapement of appropriate naturally spawning fish will be provided to encourage local adaptation and maximize long-term surplus production that sustains harvest, and to provide for recreational opportunities and ecological benefits. Exceptions to this general policy may be developed on a regional basis through agreement of the Department and affected Tribes to provide for recovery and rebuilding of wild stocks or where natural productivity is low.@

c. *Hatchery Fish and Spawner Abundance:* (#2, continued) Where hatchery fish are cultured to augment the naturally produced population in a stream, spawning of hatchery origin adults beyond what is needed for broodstock will be evaluated through a case-by-case analysis of the effects on the naturally spawning stock characteristics. However, the goal would be to develop harvest strategies that optimize harvest on the hatchery production and hatchery production strategies that are consistent with section 6 of this Policy and protect naturally spawning populations.

d. *Conserving Genetic Diversity Policy:* (#3) Genetic diversity within and among stocks will be maintained or increased to encourage local adaptation and sustain and maximize long-term productivity. Conditions will be created that allow natural patterns of genetic diversity and local adaptation to occur and evolve.@

e. *Ecological Interactions Policy:* (#4) Wild salmonid stocks will be maintained at levels that naturally sustain ecosystem processes and diverse indigenous species and their habitats.
Healthy populations of other indigenous species will be maintained within levels that sustain or promote abundant wild salmonid populations and their habitats.

f. *Harvest Management Policy:* (#5) The fisheries will be managed to meet the spawning escapement policy as well as genetic conservation and ecological interaction policies.

g. *Continued Public Input and Science Upgrades:* (#16) This policy reflects Department and Tribal Parties′ consideration of the best science and public input that could be agreed to and incorporated at this time. The Department and Tribal governments believe that this Policy identifies important Fish Management and Habitat parameters and frameworks that will lead to rebuilding of salmonid stocks. However, the Department and Tribal parties intend that this Policy be a living document, to be updated with improved science as it is developed.

3. Summary of additional harvest policy guidance

The concept in policy statement #16 is also key to resolving differences among WDFW, individual tribes and other managers. The policy is intended to adapt to new science and information over time and WDFW is committed to such review, including specific forums and workshops that could facilitate analysis of specific policy elements. An expectation is that over time the differences between the state and tribes′ joint policy and the Commission′s additional policy guidance to WDFW staff will narrow based on information gained through implementation of the policy and other evaluation, research and monitoring activities.

In addition to this joint commitment to updating the policy with improved science, the additional staff guidance further recognizes the need to work through potential policy differences with tribal and other managers, as well as emphasizes the need to work closely with the public. The implementation of the policy and additional staff guidance clearly is expected to occur through thoughtful, collaborative processes and *not* as a result of unilateral approaches. The current record of implementation activities indicates a significant measure of success in meeting this implementation intent. Relevant process guidance in this area includes:

- *Further description of legal authority and additional implementation guidance:* The Wild Salmonid Policy provides the standards and goals to be applied in harvest, genetics, hatchery, and habitat protection programs. Where the Department and all tribes could not reach a common goal or standard, the Department and tribes deferred further agreement and discussion to the particular watersheds and tribal regions. This approach preserves to the Department and tribes the prerogative to provide additional fishery management guidance, directives, or policies that would better address the needs and situations in specific watersheds and regions.

- *Using this guidance to work with tribal management of treaty fishing rights:* WDFW staff should be aware that the additional guidance is not endorsed by tribal governments, although individual tribes may use or support provisions herein. The additional management goals and standards should then be pursued if preceded by review of the relevant facts and management oversight for resolving issues with tribal fishery management. In doing so, staff must consider whether applicable court orders affect the Department guidance and consider how the Department can use existing court frameworks and processes to modify and improve protection of wild salmonids through agreed management with tribes.

- *Involving citizens and working with other governments:* WDFW staff shall involve public citizens in watersheds as provided herein, and work with Oregon, and interstate and international forums in the manner described.

NOTE: Very specific descriptions of legal authority and guidance to WDFW staff on co-manager and public involvement are included in the policy.

Excerpts of key additional policy guidance related to harvest are included below.

1. <u>Wild Spawning Escapement</u>. Department staff will review its management and co-management actions to ensure that harvest or hatchery programs do not prevent consistent return of the wild spawners needed to utilize available fish habitat. Department professional staff should use spawning escapement science that is crafted from the observed performance of state and tribal fish managers when they have consistently put adequate numbers of viable wild fish on the spawning grounds over the past two decades. To achieve spawning escapement policies, the Department should be conservative in proportion to the uncertainties that exist in the fish population management process.

2. <u>Use of Incidental Catch Limits</u>. The Department should seek to implement a stock-specific 10% incidental catch limitation for current primary stocks when individual annual runs are projected to return at levels below prevailing (and attainable) spawning escapement requirements. The 10% will be calculated in terms of adult equivalents to make its use feasible in chinook salmon management. Past experience and the experience of others show that a specific and objective constraint on incidental catch should be used to ensure proper escapement.[1]

3. <u>Rebuilding populations in hatchery management zones</u>. Current secondary stocks will be subject to specific rebuilding strategies. The goal for hatchery fish management areas is to transform these areas into productive wild fish areas using harvest and habitat strategies.

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[1] The intent of the incidental catch guidance is to minimize fishery impacts on stocks needing protection. Analogous approaches that control overall exploitation impacts are being explored for a number of populations as potential surrogates.

4. Use of marked hatchery fish and selective fisheries. Mass marking and a mixture of non-selective and selective fisheries should be used in future Pacific salmon management. The Department should continue to make use of a hatchery program consistent with other elements of policy and to allow selective fisheries, where a high abundance of hatchery fish will be necessary to ensure success. However, future hatchery programs should be made consistent with the needs of wild salmonid populations as described in the WSP.

5. Genetic review of populations. The Department should use quantified genetics-based standards to safeguard the future health of wild salmonid populations. The long-term declines in average size and age composition of many salmon populations have reduced both their reproductive and adaptive potential and their monetary value in the commercial marketplace. The genetically-based minimum spawner abundance numbers described in this policy guidance are not a replacement for MSY escapement objectives. Instead, these minimum spawner numbers are intended only to protect the genetic material of locally adapted populations, not as a substitute for ensuring use of available habitat or for protecting small populations from risks of natural mortalities that take increased percentages of smaller populations and create risks of extinction. Stock transfers and the breeding of hatchery fish in the wild should be controlled to promote local adaptation and to maximize the productivity of wild populations.

Implementation Actions

Although harvest implementation actions are not a focus of this draft of the Statewide Salmon Recovery Strategy, certainly they define the changing face of fishery management, and describe how we intend to meet the obligations outlined in the WSP.

1. Short-term implementation:

Short-term implementation will revolve around ESA compliance as well as further implementation of WSP objectives for example:

$ ESA compliance efforts –See section IV.

$ 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 Sound coho and chinook that outline specific timelines for specific harvest and hatchery actions that will meet Wild Salmonid Policy intent.

$ Implementation of chinook mass marking will continue during 1999 and 2000 for major portions of Washington with the new mass marking machines being put into use. 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 addition license reduction, pending additional funds.

$ Incentives and opportunities for selective commercial fisheries will be implemented in several areas throughout the state; effectiveness of new approaches will be evaluated, with use of increased bycatch monitoring.

$ The Salmon and Steelhead Stock Inventory (SASSI) will be updated by the end of the year. Plans will be implemented to link habitat inventory and assessment data with population status information through an integrated SSHIAP/SASSI system.

2. Long-term implementation:

Long-term implementation will revolve around further implementation of WSP objectives and may include restructuring of recreational and commercial fisheries to increase selective ability to protect depleted stocks and species while improving sustainable access to hatchery fish and healthy species; and new statewide smolt monitoring and habitat inventory programs to provide the tools to measure performance of specific habitat, hydropower, harvest and hatchery actions.

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

Fishery and population monitoring

1. Fish population assessment methodology - tracking recovery

The goal of this recovery strategy is to ensure that natural production of wild salmonids is maintained and increased. Progress in recovery ultimately will be determined by an abundance of naturally produced salmonids in functional ecosystems that are well adapted and have high reproductive performance. Management actions designed to promote natural life history patterns, characteristics, and genetic diversity are key parts of recovery. All kinds of planning can occur, restoration activities can proceed, management actions can be implemented, and parameters can be measured, but if the number of wild spawners returning to spawning grounds does not improve, recovery will not have occurred.

Fish managers have a variety of tools available with which to evaluate stock status and rebuilding. Two basic monitoring elements are annual enumerations of adult spawner abundance relative to the spawner escapement goals, and measures of stock productivity such as the amount of fish from a particular stock that is harvested and the numbers of juvenile fish produced. For these measures to be meaningful, managers must, first, determine appropriate spawner escapement goals and calculate the potential productivity of each stock in existing habitat.

Updates of the Salmon and Steelhead Stock Inventory (SASSI) provide another essential tool to measure progress and effectiveness of harvest management changes. If the number and distribution of wild production types increases over previous SASSI versions, and the proportion of depressed and unknown status stocks in each ESU decreases, that result would represent positive progress toward rebuilding.

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 harvest effects 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 sampling; and
- $ Evaluation of genetic characteristics.

2. Catch accounting

The ability to monitor the impacts of fishing (including both landed harvest and non-landed mortality) while conserving specific stocks all depends upon accurate catch accounting. It is also an important component, along with tagging information, to determine wild stock productivity, effectively target fisheries, and comply with allocation agreements. Presently, catch estimates often do not provide a complete accounting of total impacts for a particular stock due to the wide range of fisheries that impact wild stocks, the amount of unreported and discarded catch, and other catch reporting challenges. This can lead to underestimates of both exploitation rates and productivity for wild stocks. The monitoring and evaluation of wild salmonid productivity can not be complete without accurate information on harvest.

3. Spawner enumeration

The key measurement of the success or failure of a recovery strategy is the number of wild spawners sustained over time. The first task is to identify locations and methods to better enumerate the number of spawning adults each spawning season. An additional need is to evaluate expected increases in productivity of stocks in river systems where management objectives are being converted from hatchery to wild harvest rates (those areas where wild fish intentionally had been overharvested so that fisheries could access abundant hatchery stocks without fishing selectively). The progress towards becoming more locally adapted and reestablishment of natural genetic diversity patterns can be evaluated by molecular tests and changes in stock fitness.

Adult abundance can also be difficult to assess and even more difficult to predict. The key to furthering an understanding of adult abundance is accurate enumeration of spawners and quantifiable accounting of harvest. Adult enumeration is best for migratory species where natural and constructed barriers with fishways are present.

4. Identifying hatchery and wild origin salmonids in fisheries and on spawning grounds

Wild stock abundance can be masked by the presence of hatchery fish. No consistent method is currently available to differentiate between natural origin salmonids and the progeny of hatchery fish which spawn in the wild. The presence of hatchery adults in freshwater and the magnitude of hatchery releases have been enough to cause NMFS to postulate that true wild stocks could be much less abundant than measures indicate. The preponderance of mixed stock origin and composite production stocks in SASSI, and the proliferation of small-scale enhancement projects, are two examples of why there is concern about the masking of wild stock abundance.

Continued mixed-stock harvest may depend on the ability to identify, and then differentially harvest, hatchery stocks. Both intrinsic and extrinsic markers have been key to fisheries management, and the ability to identify the life-stage, species, and sex have been used to evaluate and shape the harvest of fish and wildlife species for many years. The removal of the adipose fin from coho and chinook salmon (as has been done with steelhead for years) is proving to be very useful to monitor and evaluate harvest, especially when coupled with other stock identification tools such as the coded-wire tag, otolith marks, scale analysis, and genetic stock identification. Adequate sampling in fisheries and on the spawning grounds is critical to the success of these identification methods.

5. Assessment of juvenile and adult natural production

Estimates of both freshwater and marine production must be made in order to assess whether abundance and productivity are increasing, and to identify at which life cycle stage survival is most limiting. These data are key in determining which conservation and rehabilitation tools should be implemented to benefit specific wild salmonids populations. For example, in a river system where juvenile survival is low due to scouring floods during egg incubation, actions to decrease the frequency and severity of scouring floods would most benefit that population. However, if marine survival is the limiting factor, then harvest-related actions may be more appropriate.

Juvenile production is poorly understood and the effects of poor juvenile survival generally have been underestimated. Limitations to natural juvenile production include insufficient number of spawners, genetic and behavioral makeup of adults, excessive winter flows, limited summer flows, passage, environmental constraints, lack of nutrients, and the abundance of pathogens and predators. The relative importance of limiting factors to freshwater production has been the focus of debate based on very little actual data. That is why effective monitoring and evaluation of juvenile production is so important to wild salmonid recovery.

When monitoring productivity, each salmonid species presents different monitoring and evaluation challenges. The first step in monitoring productivity is to select a sufficient number and distribution of sites to assess freshwater and, for species that use marine waters for transition, marine production. Counting the migratory smolts and adults at weirs gives the most comprehensive estimates of natural productivity for anadromous species.

Traps at natural and artificial barriers and fish ladders can be used to estimate population abundances. In some instances weirs were built in small streams for the enumeration of adults and juveniles. Another very effective technology has been floating smolt traps used in medium to large river systems. Other methods such as mark-recapture, spawning ground surveys and snorkeling are useful for some species. Because many stocks have similar productivities, life-history patterns and abundance fluctuations, monitoring sites can be used to estimate wild fish abundance for larger geographical areas. *Because suitable monitoring locations are limited, they should be identified prior to the establishment of habitat monitoring and evaluation locations to ensure that changes in habitat parameters can be compared to changes in salmonid production. It is extremely important to develop complementary population and habitat monitoring approaches.*

A limited number of wild production assessment sites are currently in place. These need to be expanded to document wild salmonid abundance and also correlate productivity with environmental conditions. Results from past work indicate that different stream systems and different species have different correlations with various limiting factors. For example, wild salmonid production is significantly influenced by high winter flows, low summer flows, and flows during spawning.

6. Evaluating and monitoring genetic characteristics

Evaluating and monitoring genetic characteristics involves identifying the amount of successful reproduction between different groups of fish. This information can be used to define distinct stocks and determine the structure of genetic diversity within a species. It also can be used to examine changes to within and among stock genetic diversity through factors such as reduced population sizes and the variance of reproductive performance.

Genetic tools have proven to be very useful in understanding the effects of past fish management practices (such as the determining whether a current population is native or not). The patterns of genetic diversity relate to the amount of local adaptation. For example, if numerous strays are observed spawning with a local stock but genetic distinctness prevails, the reproductive success of the strays must be low. This situation may mean that the effects of the strays is negligible, but would also mean that any interbreeding between the local population and the strays results in a decreased productivity of the local stock. Advances in genetic technology continues to improve and is allowing further insights into the interactions of wild and hatchery salmonids.

In addition to molecular measures of genetic variation, quantitative genetic characteristics and heritable life history traits are also important to document. Salmonids typically have a large amount of additive genetic variation that, when coupled with the relatively high reproductive potential (lots of eggs) and a low likelihood of any juvenile surviving to spawn, can result in rapid changes in stock attributes such as fish size, run timing and age at reproduction. When these traits are primarily shaped by nonrandom harvest in fisheries instead of local adaptation pressures, the productivity of the stock will decline. Rebuilding programs need to monitor and evaluate the effects of fisheries on life-history characteristics if fish are expected to be more successful at spawning naturally.

7. Specific actions in the three monitoring and evaluation categories follows:

<u>Implementation</u>

$ identify a sufficient number of natural production monitoring sites in each ESU
$ review SASSI stock 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 time lines

<u>Effectiveness</u>

$ annual determination of changes in the stock status of wild fish populations statewide - SASSI update
$ annual reviews of recovery program effectiveness towards 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 at 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 CWT indicator stock or other programs.

Default Actions
If strategies designed to protect and/or restore wild salmonids are not successful, based on information collected and analyzed through monitoring and evaluation program, 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 in such a case necessarily would relate to the level of attendant risk and uncertainty toward meeting desired recovery objectives. In many cases, severe harvest restrictions already have been implemented in numerous salmonid fisheries, and the only alternative available for increased protection would be complete closure.

If for some reason, 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.

1. Spawner escapement policy
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 ensuring 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 as directed in this policy.

The other component of spawning policy relates to the diversity and adaption of local populations to their habitats. If monitoring indicates genetic selection is impeding achievement of these objectives, then modification to fishery regulations will be implemented as appropriate. Changes in hatchery and habitat management strategies may also be indicated.

2. Differential harvest strategies for hatchery and wild fish

Both the Wild Salmonid Policy and legislative mandate requires mass marking of hatchery fish to ensure performance assessment of hatchery management guidelines and provide for selective fishery opportunities. These mass marking and selective fishery programs are being adopted under joint agreements and/or federal court stipulations with the tribes.

If these marking programs cannot be successfully implemented, then: (a) hatchery programs to augment salmon harvest likely will be proposed to be modified or discontinued, with funds being alternately reprogrammed to support other fishery enhancement or wild salmonid recovery activities; (b) programs to coded-wire tag hatchery fish as surrogates to estimate fishery exploitation rates and survival of wild stocks will be reevaluated if hatchery releases are reduced or discontinued in some areas; and (c) recreational and non-Indian commercial fisheries that rely upon hatchery chinook and coho will be limited by varying degrees by their ability to selectively harvest available hatchery fish, resulting in some economic loss to Washington chinook and coho fisheries.

These fisheries now total at least $55 million annually, not including economic benefit to support industries and communities. The areas most impacted by harvest limits would tend to be smaller coastal communities that rely heavily on fishery, logging and tourism income.

3. Population monitoring

If adequate funding does not become available for WDFW, or cooperating managers and groups, to monitor responses in fish population abundance/biological characteristics, habitat quality/quantity and ecosystem health, then a sound foundation will not exist for evaluating performance of recovery programs. In ESA listed areas, where uncertainty of recovery is high, lack of adequate monitoring would mean that no viable recovery plans would be deliverable or acceptable to the federal government or reviewing courts.

The consequence of this could be severe restrictions of all activities affecting fish population status, including land/water use, harvest, hatcheries and hydropower. Strict regulation would replace adaptive management strategies. Where the uncertainties of recovery are not as great (lower risk or well proven actions), intensive monitoring may not be as critical. Generally, funding needs are identified that already take this risk and uncertainty into account.

4. Fishery impact assessment

If impacts to depleted stocks cannot be assessed because of lack of WDFW funding or unwillingness by industry to support agreed costs, 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.

5. Transformation of fishery gear and methods to optimize differential harvest

WDFW is optimistic that current commitments from the non-treaty fishing industry for collaborative development of expanded selective fishery methods will be successful. However, if such efforts do not occur to develop improved gears and methods to appropriately protect depleted species and stocks while harvesting healthy populations, then WDFW will likely develop incentives which allocate harvest opportunity based on a fishery's ability to minimize impacts on non-target species and/or provide similar incentives. If such incentive approaches do not produce needed changes in the fishery, WDFW will continue to regulate and restrict fishing opportunity consistent with stock protection needs and prevailing harvest approaches.

ESA Compliance Strategy

Initial recovery plan frameworks and associated 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. Additional conservation planning activities leading to expected 4(d) rule proposals by NMFS in 1999 include upper Columbia River steelhead (associated with delisting of hatchery steelhead component) and lower Columbia River steelhead.

Section 10 permits will need to be obtained for incidental takes in those areas where 4(d) rules are not in place, which currently includes any activities affecting listed (or soon to be listed) steelhead, chinook and coastal cutthroat ESUs in the Columbia River. In addition the harvest, hatchery and assessment elements of watershed recovery plans will be completed in the year 2000 for Nooksack, Dungeness and Elwha chinook within Puget Sound. These plans/rules will include specific limitation on harvest impacts for listed stocks.

IV. Core Elements

➢ HATCHERIES

Hatchery Management to Meet the Needs of Wild Fish

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

Background

To understand why hatcheries are operated and managed as they are today, one must understand the role hatcheries have played in the past, currently play and will play in the future. As the management objectives have varied, so have hatchery practices. The two, although different, cannot be thought of separately. For example, practices which have been used to produce legal size trout for opening day, which require over one year of rearing, have always been very different from those used to rear fall chinook, which are released after only 90 days of rearing. While the trout may have an average life expectancy of only a few days after being released, the salmon may live four or five years and travel thousands of miles from its hatchery of origin. Different expectations for the product of a hatchery require different hatchery practices.

The lack of basic life history information and an understanding of the stock concept (e.g., adaptive differences between stocks, homing behavior, the lack of understanding about carrying capacities, rudimentary knowledge of fish behavior and poorly developed culturing practices), resulted in many of the transplants failing; others had various levels of success. Those that were successful, no doubt 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.

As scientific knowledge expanded to include the stock concept and the values of biological diversity, the importance of wild salmonid stocks became more recognized and attention was focused on specific hatchery practices (and related fish management objectives). The genetic changes that can result from various hatchery practices and the value of local adaptation of stocks received increased attention. The ecological impacts of large-scale hatchery releases also began to be understood. The effects of not allowing salmon above hatchery racks, which had always been justified on the basis of protecting the hatchery population from disease, were questioned.

In general, hatchery programs and the fish management objectives that guided them received increased scrutiny. Overall health and related fish production of the ecosystem became increasingly more important than considering hatchery production alone. Not to be forgotten however, was the dilemma still faced by fishery managers B a majority of the traditional constituents demanded to use the resource for consumption and, in fact, believe that was why the Department of Fish and Wildlife (WDFW) existed in the first place. This is a fundamental assumption of many citizens, although it is secondary to the stewardship of the state=s natural resources. Whether people fish for steelhead, bass, walleye, salmon or trout, or whether they fish in fresh or saltwater, the ability to catch and keep fish for consumption is the basic reason many participate in their sport.

Summary of Recent Activities

One important indication of how the Statewide Strategy to Recover Salmon will be implemented for hatcheries to improve protection and recovery of wild stocks can be seen from recent actions already taken to implement new policy directives. A sampling of these actions is summarized below:

1. WDFW is currently conducting a comprehensive evaluation of the hatchery program. Three major areas of statewide emphasis are to:

   Manage hatcheries in a manner that is consistent with wild salmon protection.
   Release locations are being reviewed to increase access to hatchery fish by fishers while reducing interbreeding with wild fish. Locations that have good water quality for rearing eggs and juveniles are not necessarily good locations for adult broodstock recovery and harvest. External marking, such as the removal of the adipose fin, will be used as a tool to increase harvest and identify interactions with wild fish.

   Increase the survival and contribution of cultured fish to fisheries.
   Wild broodstock development and stock recovery efforts have been expanded. Mass marking by adipose fin removal is now being proposed for most hatchery chinook salmon to complement ongoing steelhead and coho marking. Experimental programs to return hatchery fish to Columbia River locations largely isolated from wild fish have allowed select area terminal fisheries, producing a threefold increase in survival and a tenfold increase in fishery contribution.

   Increase compatibility of operations with wild fish.
   Excessive interbreeding of hatchery fish that stray and mix with wild fish can result from inadequate harvest and poor homing to the release location. Negative ecological interactions at juvenile life stages can be lessened by releasing actively migrating smolts and sizing hatchery programs appropriately for the amount of available habitat.

2. Statewide, Multi-regional, Long-term or Programmatic Activities: Many of the following activities were cooperative with federal, state, tribal co-managers, and/or involved public citizen groups. They include:

- Discontinued Department releases of hatchery origin coho fry into Puget Sound (Nooksack, South Sound tributaries), Strait of Juan de Fuca and Washington Coastal tributaries. These fish would have competed with naturally produced Awild@ fry in those streams. Some low-number fry plants by co-op educational groups continue.

- The success of mass marking of hatchery steelhead in providing differential harvest and facilitating spawning grounds stock assessment has led to mass marking of other species:

  (1) Coho mass marking: Over 30 million brood 1997 Puget Sound, Coastal and Columbia River hatchery coho have been mass marked. Instream assessments of marked fish on the spawning grounds are being conducted, and Washington=s first selective ocean fishery on mass marked hatchery coho was held in 1998, and selective fisheries have been expanded in 1999.

  (2) Chinook mass marking: WDFW, in cooperation with treaty tribes and the state of Oregon, has implemented mass marking of Washington hatchery chinook. This action will allow exploitation of marked hatchery fish while increasing protection to depleted natural populations, and will also provide a tool for assessment of hatchery straying onto natural spawning grounds.

- Stock Rebuilding Plans completed or under development:

  White River spring chinook
  Skagit spring chinook
  Yakima spring chinook
  Dungeness chinook
  Nooksack Watershed Plan for chinook
  Green River chinook and coho
  Lake Washington chinook and steelhead
  Upper Columbia River chinook and steelhead
  Snake River fall chinook
  Snake River spring chinook
  Nisqually fall chinook
  Hood Canal/Strait of Juan de Fuca summer chum conservation (recovery) plan
  Bull trout
  Lower Columbia River Steelhead Initiative
  Puget Sound chinook comprehensive hatcheries plans, to be applied toward NMFS ESA compliance

- Yakima Fisheries Project has been ongoing for more than ten years. Focused on spring chinook supplementation and species interaction, it will also provide information about supplementation that will be of value throughout the entire Columbia Basin.

- Shifted releases of some hatchery fall chinook to sites downstream from naturally rearing fish to minimize return of adult hatchery spawners into areas used by native chinook.

- Analyzed trends in life history characteristics of hatchery reared salmonids over time. This information was reported in AStock Characteristics of Hatchery-Reared salmonids at Washington Department of Fish and Wildlife Columbia River Hatcheries@ Annual Report #H98-03.

- Conducted research on post-release residualism and migration speed of hatchery reared salmonids in the Elochoman River and Ringold Hatchery, and their related behavior to type of release. This information is reported in AMitchell Act Hatcheries Evaluation: Annual Report H97-04.@

- Adjusted the timing of release for Hood Canal hatchery chum salmon to avoid potential ecological interactions with wild summer chum salmon smolts.

- Eliminated direct catchable trout plants in the Quilcene and Hamma Hamma Rivers that may be impacting wild stocks.

- Continued Dungeness River chinook salmon rebuilding project. It includes an eight-year captive broodstock program, identification and corrections of limiting habitat and/or harvest constraints as well as a successful out-planting strategy.

- With the Jamestown S'Klallam Tribe, reduced coho yearling plants into the Dungeness River because large annual coho surpluses could be impacting other critical salmon stocks in the system.

Current Applicable Policies
In addition to information provided in section I. B. of the harvest chapter, WDFW hatcheries must follow some more specific guidance:

1. Additional Federal Requirements Relevant to Hatcheries

- *U.S. v. Washington*
  - $ Hood Canal Production Plan 1985/89
  - $ Squaxin Island Agreements (3)
    Pre-1982 Fisheries Advisory Board Settlement
  - $ 1985 South Sound Fall Chinook Agreement

- Mitigation Agreements
  - Mitchell Act
  - Tacoma Public Utilities
  - PacifiCorp
  - Douglas County PUD
  - Chelan County PUD
  - Grant County PUD
  - Clark County PUD
  - Lower Snake River Compensation Plan (USFWS)
  - James River Corporation
  - Lewis County PUD
  - Puget Sound Energy (Baker Spawning Beaches)
  - Seattle City Light (Marblemount Improvements)
  - Cowlitz County PUD
  - Washington Water Power
  - BPA - Lake Roosevelt
  - Quileute Agreements
  - USFWS/NMFS ESA Operation Authority
  - Puyallup Lands Settlement
  - Administering Aquaculture Disease Control Regulations

2. State Statutes Specific to Hatcheries and Artificial Production

RCW 75.08.010
The Department of Fish and Wildlife with the Department of Agriculture will develop regulations which provides for the inspection and control of diseases and pests that may affect private aquaculture products and wildstock fisheries. The Hatcheries Program has primary responsibility for implementing and administering private aquaculture disease control regulations.

RCW 75.08.285
The director of the Department of Fish and Wildlife may prohibit the introduction, transportation, or transplanting of fish, shellfish, organisms, material or equipment which in the director=s judgement may transmit any disease or pests affecting fish or shellfish. The Hatcheries Program has primary responsibility for implementing and administering public fish disease control regulations.

RCW 75.08.230

Sales of Salmon and Eggs. Proceeds exceeding estimates in the budget approved may be allocated as unanticipated receipts. Allocations under this subsection shall be made only for hatchery operations, financed by sources other than state general revenue.

RCW 75.08.255
The director of the Department of Fish and Wildlife may take or remove any species of fish or shellfish from the waters or beaches of the state. The director may sell food fish or shellfish caught or taken during department test fishing operations. The director shall not sell inedible salmon for human consumption. Edible salmon and carcasses may be given to state institutions, schools or economically depressed people, salmon not fit for human consumption may be sold for other purposes. A portion of surplus salmon sold from state hatcheries may be required to be processed and returned by the purchaser to the state for distribution.

RCW 75.20.090
If a fishway is impractical, fish hatchery or cultural facility may be provided in lieu. This is to compensate for fish loss due to the construction of dams or other hydraulic projects.

RCW 77.12.440
The Department of Fish and Wildlife shall establish, conduct, and maintain fish restoration and management projects as outlined by the Federal Fish Restoration Act (64 Stat. 430; 16 U.S.C. Sec 777). The agency director shall comply with the act and related rules, adopted by the Secretary of the Interior.

RCW 75.50.030
Salmon enhancement plan. The Department of Fish and Wildlife shall develop a detailed salmon enhancement plan with proposed enhancement projects. Maximum opportunity for the public to participate in the development of the salmon enhancement plan shall be provided. Joint or cooperative enhancement projects shall be considered for funding.

RCW 75.52.150
Cedar River spawning channel. The legislature hereby declares that the construction of the Cedar River Sockeye Spawning Channel is in the best interest of the state of Washington. The policy committee will continue its oversight until the policy committee concludes that the channel is meeting the production goals.

RCW 75.08.420
State purchase of private salmon. The Agency may purchase quality salmon smolts for release into public waters if all fish rearing facilities are operating at full capacity. This is to explore opportunities to cooperatively produce more salmon for the public fisheries without incurring additional capital expenses.

RCW 75.50.100
All revenue from the sale of salmon carcasses and eggs that return to Regional Fishery Enhancement Group (RFEG) facilities shall be deposited into the regional fisheries enhancement account. This revenue is to be used by the group which produced the surplus.

RCW 75.54
Recreational Salmon and Marine Fish Enhancement. The Hatcheries Program has primary responsibility for salmon enhancement activities.

3. Other Legal Requirements Relevant to Hatchery Operations

$ Federal – Endangered Species Act (Production/genetic standards)
$ Federal – Clean Water Act (Effluent Standards)
$ Federal – Occupational Safety and Health Act (Personnel safety)
$ Federal – Fair Labor Standards Act (Personnel/Safety/Labor)
$ State/County – SEPA and Shorelines permits

The joint State/Tribal Wild Salmonid Policy, and Washington Fish and Wildlife Commission Additional Guidance to Agency Staff. (See section III.)

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

Goal:
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
- 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?*

Policy Guidance - Highlights of the Wild Salmonid Policy (WSP)

The blending of new scientific knowledge and traditional assumptions about the use of fishery resources has forced managers to examine and change both hatchery practices and management objectives. Hatchery programs and the harvest management regimes which they support are being reviewed for compatibility with naturally self-sustaining wild salmonid populations, as set forth in the WSP. Successful programs will be expanded and others will be reformed based on a comprehensive hatchery review that is currently underway. But, this effort is challenged by the continual loss of the habitat that supports the naturally spawning fish resource and an ever increasing human population.

Whether the purpose of the hatchery is mitigation for lost habitat, a desire by users to catch fish, or the need to restore or save some stocks from extinction, statewide salmon and steelhead hatchery production plans are now reviewed annually by WDFW and the Treaty Tribes, the result of which is a document called the Future Brood Document. This review process ensures there is general agreement among cooperating managers on the need for a specific program.

The Wild Salmonid Policy is the blueprint for ensuring fish population management (harvest and hatcheries) and habitat management meet the needs of wild fish. Managers and biologists immediately after its adoption by the Fish and Wildlife Commission began incorporating the guidance of the WSP into daily management decisions. *The Wild Salmonid Policy, and additional guidance to WDFW staff, although not included in their full detail here, are fully incorporated in the Statewide Salmon Recovery Strategy by their reference here. The complete text of the WSP and Additional Guidance to WDFW Staff can be found on the WDFW web .*

The WSP is comprised of two documents. One contains policy provisions developed jointly with many Western Washington Treaty Tribes. The second part is a complementary document that contains additional Department of Fish and Wildlife Commission policy guidance to WDFW staff on deferred issues to be resolved at the watershed level throughout Washington. Although the Treaty Tribes have not formally "signed on," the policy is being integrated into the regular management forums with individual tribes. Implementation at the local watershed level with comanagers and local governments is the level where significant progress is being made, and this is the level at which deferred issues in the Additional Guidance are being resolved.

Note: The Wild Salmonid Policy adopted by the WDFW=s Fish and Wildlife Commission contains not only fish population management (harvest and hatcheries) policies, but also includes habitat elements essential for salmon restoration. The policies contained in the WSP were developed to work in concert across the elements, i.e., habitat, harvest, hatcheries and hydropower - Discussing those policies that pertain directly to hatchery production does not imply that these actions alone can recover and maintain healthy wild salmonid populations.

Joint Policies Relating to Hatcheries and Artificial Production (identified by Policy Number)

1. *Framework for Implementation of joint policy for fish populations, escapement, harvest management, and hatcheries:* The fishery and hatchery management principles that are stated in this joint policy shall be implemented by affected signatory tribal parties and WDFW, who shall consult with its affected stakeholders, according to federal court processes including Puget Sound Management Plan, Hoh v. Baldridge plan, in the context of existing court ordered or approved planning processes and other places where fisheries are cooperatively managed by WDFW and affected tribes utilizing applicable law and best science.

2. *Spawner Escapement Policy*: The wild populations or management units to which this spawner escapement policy applies will be defined on a comprehensive, statewide, or regional basis, recognizing scientific uncertainty, in accordance with policy statement #1. The parties will review existing court orders, joint agreements, and management plans to determine if modifications are necessary to meet the goals of this plan. Within this context, sufficient escapement of appropriate naturally spawning fish will be provided to encourage local adaptation and maximize long-term surplus production that sustains harvest, and to provide for recreational opportunities and ecological benefits. Exceptions to this general policy may be developed on a regional basis through agreement of WDFW and affected Tribes to provide for recovery and rebuilding of wild stocks or where natural productivity is low.

<u>Hatchery Fish and Spawner Abundance</u>: Where hatchery fish are cultured to augment the naturally produced population in a stream, spawning of hatchery origin adults beyond what is needed for broodstock will be evaluated through a case by case analysis of the effects on the naturally spawning stock characteristics. However, the goal would be to develop harvest strategies that optimize harvest on the hatchery production and hatchery production strategies that are consistent with section 6 of this Policy and protect naturally spawning populations.

3. *Conserving Genetic Diversity Policy:* Genetic diversity within and among stocks will be maintained or increased to encourage local adaptation and sustain long-term productivity. Conditions will be created that allow natural patterns of genetic diversity and local adaptation to occur and evolve.

4. *Ecological Interactions Policy*: Wild salmonid stocks will be maintained at levels that naturally sustain ecosystem processes and diverse indigenous species and their habitats. Healthy populations of other indigenous species will be maintained within levels that sustain or promote abundant wild salmonid populations and their habitats.

5. *Cultured Production/Hatcheries Policy*: Use programs of stable, cost-effective artificial production to provide significant fishery benefits while having no significant adverse impacts on the long-term productivity of naturally spawning salmon and their ecosystems.

6. Water Quality and Sediment Quality, Delivery and Transport Policy: Provide for water and sediments of a quality that will support productive, harvestable, wild salmonid populations, unimpaired by toxic or deleterious effects of environmental pollutants.

7. Fish Access and Passage Policy: Provide and maintain safe and timely pathways to all useable wild salmonid habitat in fresh and marine waters, for salmonids at all life stages.

8. Continued Public Input and Science Upgrades: This policy reflects WDFW and Tribal Parties= consideration of the best science and public input that could be agreed to and incorporated at this time. WDFW and Tribal governments believe that this Policy identifies important Fish Management and Habitat parameters and frameworks that will lead to rebuilding of salmonid stocks. However, WDFW and Tribal parties intend that this Policy be a living document, to be updated with improved science as it is developed.

Summary of additional population management guidance

The Wild Salmonid policy is intended to adapt to new science and information over time, and WDFW is committed to such review, including specific forums and workshops that could facilitate analysis of specific policy elements. It is expected that, over time, the differences between the state and tribes= joint policy and the Commission=s additional policy guidance to WDFW staff, will narrow based on information gained through implementation of the policy and other evaluation, research and monitoring activities.

In addition to this joint commitment to updating the policy with improved science, the additional staff guidance further recognizes the need to work through potential policy differences with tribal and other managers, as well as emphasizing the need to work closely with the public. The implementation of the policy and additional staff guidance clearly is expected to occur through thoughtful, collaborative processes and *not* as a result of unilateral approaches - in fact, much of the Additional Guidance speaks directly to the process of implementing, in specific watersheds and regions, additional directives or prescriptions relevant to particular situations. The current record of implementation activities indicates a significant measure of success in meeting this intent.

Following is a partial list of topics relevant to hatcheries and population management covered in the Additional Guidance.

1. Marking of all hatchery-origin fish: Encourages marking, prescribes marker, provides for specific exemptions from this directive, and allows for alternative marking means for pink, chum and sockeye salmon.
2. Gene banking: Limits use of Agene banking@
3. Supplementation: Prescriptions for use of supplementation.

4. Gene Flow: Provides limitations on proportion of naturally spawning population that is of hatchery origin based on genetic similarity between native fish and hatchery fish.
5. Resolving Conflicts Between and Within Species and Stocks: Prescribes priorities between and among stocks and species based on origin.

Hatchery Tools, and Hatcheries as Tools, in the Toolbox

1. Stock Restoration

The current programs for 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 like taking eggs and planting either fry or smolts from carefully collected wild broodstock.

These hatchery efforts are always intended to take place as part of a larger coordinated effort between other agencies, tribes and local governments/citizens. Those coordinated efforts can include such activities as habitat protection or restoration projects, additional fish harvest controls, and other culture techniques. In the next two years, as many as 13 population groups of salmon and trout in Washington likely will be listed as either threatened or endangered by the National Marine Fisheries Service (NMFS) or U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA). Given the present status of wild salmonids and their habitats, it should be clear that the conservation role of hatcheries likely will increase in the future.

2. Disease Control

Fish and egg transfers are becoming increasingly restricted to prevent disease transmission (Co-Manager=s Disease Policy). 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 adult, but they also increase the production cost per fish produced by requiring more ponds to grow the same number of juvenile fish.

3. 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. Stock transfer guidelines and hatchery spawning guidelines were developed by Washington Department of Fisheries in the early 1980s. The spawning guidelines direct field staff on operational issues such as: using equal number of males and females when spawning; taking eggs from throughout the run rather than on only a few days; and utilizing methods of fertilization that help preserve as much genetic variation as possible in hatchery brood stocks. The stock transfer guidelines help preserve the diversity and fitness of existing stocks by limiting transfers of non-local hatchery strains. Genetic risk assessment methods are currently being developed and refined as scientific knowledge advances.

4. Ecological Interactions
Minimizing the competition between hatchery and wild fish is beneficial to both. The planting of fish at some hatcheries is now delayed in order to prevent overlap with the out-migration of local native populations. Most often this is done at hatcheries that produce coho and steelhead on streams that have naturally producing steelhead, pink or chum salmon. This helps prevent predation on pink, chum and steelhead fry. 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 an example of how scientific research has pointed hatcheries in a different direction. This idea, long supported by theory, recently has been supported by scientific research. In Washington, 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. In a sense, wild and hatchery fish themselves will increasingly be viewed as an integral habitat component.

5. Fishery Enhancement
New tools are being developed and implemented to make programs designed to produced hatchery fish for harvest more compatible with protecting wild populations. For example, the marking of all hatchery fish so they can be visually identified by fishers. Managers then can require fishers to release wild fish, while permitting retention of hatchery fish that are intended for harvest. 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.

6. Public Outreach
The public has always shown an insatiable thirst and keen interest in Washington=s fish and watershed resources by placing a high value on knowledge and information. Hatcheries have and will continue to play a vital role as a place where citizens can become 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 (over 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.

7. Accountability Issues

Whether in a stock restoration role or fishery utilization context, it is important to know the extent to which hatchery resources are being effectively managed. Making WDFW and the tribes more accountable for their hatchery production, as in making all government programs more accountable, has been an area of emphasis in the recent past. By reviewing and refining specific management objectives and the hatchery production that supports them, accountability is more clearly defined. As new scientific techniques are developed, it has/will become possible to identify hatchery fish when encountered in the wild (e.g., mass marking/tagging machine and genetic analysis).

Mass marking of hatchery steelhead (via the adipose fin clip) has been occurring for almost 10 years. Mass marking of hatchery coho and chinook salmon, recently required by the Washington State Legislature, will readily allow field identification of hatchery fish. Information generated by mass marking/tagging can be used to more accurately estimate the number of adults (and thereby the benefit/cost of those adults) produced by our hatcheries.

Mass marking hatchery fish also allows managers to monitor the straying of hatchery fish and their potential interbreeding with wild fish. The high harvest rates on hatchery fish can help minimize the number of hatchery strays and marked fish can also be removed from populations at fish weirs before spawning.

Continued Implementation Activities and Timelines:

Continuing implementation actions to improve hatchery operations and compatibility with wild stocks can be viewed in short-term and long-term timeframes. 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.

1. Short-Term: Several short and long-term (continuing) activities will contribute to changes in hatchery practices and programs, for example: The comprehensive programmatic review of all hatchery programs; research aimed at refining practices that reduce ecological interaction with wild fish; comprehensive harvest management planning activities such as regional/watershed planning exercises and revision to state/tribal management plans; review of all hatchery activities, including supplementation and hatchery-aided stock recovery programs, concurrent with ESA authorization. Continuation and expansion of mass marking of hatchery fish will provide a major tool with which to evaluate the ecological effects of hatchery fish on wild fish, as well as to provide a directed selective-harvest opportunity on marked hatchery fish.

Long-Term: Various planning and review efforts will identify hatchery implementation actions that require significant capital investment. Examples of such actions would be construction of lower tributary release, 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 would be another example, as would be retrofitting existing hatchery facilities to accomplish objectives such as better support stock rebuilding efforts, improve brood stock management and improve homing. 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 5 to 10-year period once funding sources are identified.

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

A critical component of adaptive hatchery management is effective monitoring and evaluation. For a more detailed discussion of how monitoring and evaluation is integrally tied to adaptive management and risk assessment, refer to part V of the Statewide Salmon Strategy. WDFW must monitor and evaluate the influences of hatchery operations on ESA listed and naturally-produced fish to ensure either no jeopardy or positive benefits occur to the populations. There is an expectation that an enhanced level of information is necessary to ensure compatibility of hatcheries with wild salmonid populations.

Monitoring and evaluation of hatcheries are comprised of three primary objective categories: Implementation, Strategy Effectiveness, and Validation. Implementation addresses the extent to which actions have been taken as planned. Strategy Effectiveness addresses how well the actions undertaken are effective in meeting explicit objectives or criteria. Validation involves examining the appropriateness of assumptions critical to the strategy itself. This objective is usually associated with research efforts focused on key priority questions linking relationships between strategy components and fish populations, or linking changes in habitat parameters and fish populations. It is usually the best approach to use to assess cause and effect relationships.

The hatchery programmatic 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.

Monitoring Implementation

Implementation progress can be monitored by comparing future actions with management changes outlined in the programmatic review. Additional ways include comparing future actions with species plans, specific recovery plans, and the future brood document. Species plans and specific recovery plans are in various states of development, but the future brood document is developed annually. Other documents detailing WDFW hatchery operations are the Hatchery Operation Plans and Performance summaries, which are published periodically.

For recovery programs, implementation progress would consist of beginning recovery actions in a timely manner, adhering to the size of the project as designed (for example, taking the appropriate number of eggs), and gradually ending the project as recovery occurs. For production programs, implementation progress would consist of creating and following the time lines for determining competition and other negative interactions with wild stocks, and ensuring progress to identify all hatchery fish, especially the expanded mass marking of coho and chinook.

Strategy Effectiveness

This monitoring category focuses on how well specific conservation and production programs achieve their intended results. In many cases, results will be assessed at more immediate response levels or scales that ultimately determine success at not impacting long-term productivity or fitness of wild stocks. Three main areas to focus on include identification of hatchery fish, genetic interactions, and ecological interactions.

1. Identify hatchery origin salmonids in marine areas, freshwater, and fisheries.

The abundance of wild salmonids in many areas remains unknown because the presence and number of commingled hatchery fish cannot be determined. This Amasking@ of wild stock abundance is problematic because the effectiveness of recovery actions, responses to operation and management changes, and even the need for hatchery recovery programs can be obscured. In some forums such as ESA, the inability to verify (lack of direct evidence) the origin of salmonids on the spawning grounds has lead to the presumption that fish are of hatchery origin or the progeny of hatchery fish which spawned in the wild.

The presence of hatchery adults in freshwater and the magnitude of hatchery releases have been enough to cause NMFS to postulate that wild stocks could be much less abundant than measures indicate in some areas. The state has contributed to this perception through its management and proliferation of small enhancement projects.

The preponderance of mixed stock origin and composite production in the Salmon and Steelhead Stock Inventory (SASSI) is one important example of why there is concern about the uncertainty of true status of wild populations due to the contribution of hatchery-origin spawners. SASSI had a mixture of stock status designations where the ratio of hatchery and wild fish were unknown. The risk assessment approach being developed in species and recovery plans has to be based on the ability to identify hatchery and wild fish in natural spawning habitat to be effective.

Another key evaluation need is determining whether or not specific hatchery programs are necessary. In some cases harvest data indicate large numbers of hatchery fish are released without meaningful contributions to fisheries. An unknown component of this result is the amount of unreported by-catch and under reporting of landed catch due to non-compliance with landing laws. More often, the effectiveness of the hatchery operation is unknown because hatchery returns cannot be differentiated from wild fish. This can lead to unfounded claims of success or failure of hatcheries without substantiated information.

There is a need to evaluate the current natural production prior to initiating recovery actions, especially in areas and for species that are not easily assayed for population abundance. This is especially true with turbid, glacier fed streams; with species such as coho salmon that tend to Adisappear@ into a watershed; and for other salmonids that do not die after spawning. The past existence of Ahatchery harvest management zones@ for one or more anadromous species throughout various parts of the state has led to a perception that an insufficient number of naturally spawning wild adults returned to adequately seed available habitat. Subsequent attempts to mitigate for assumed over-harvest often occurred without any assessment of existing natural populations.

In addition, habitat problems including the increase in flood events; popularized the stocking of hatchery fry and smolts (often mis-referred to as supplementation), and the use of egg incubation devices to increase egg-to-fry survival. Many efforts to increase natural production have been initiated without determining the abundance of wild fish without evaluation as to their effectiveness or impact on the natural populations. Such efforts will be critically reviewed and modified or discontinued through implementation of the Wild Salmonid Policy.

2. Genetic interactions

Evaluating and monitoring genetic interactions involves identifying changes to within and among stock genetic diversity that can occur through interbreeding and reduced population sizes. Genetic tools have proven to be very useful in understanding the historical genetic population structure of salmonids and also the effects of past fish management practices. Genetic technology continues to improve and is allowing further insights into the interactions of wild and hatchery salmonids.

In addition to molecular measures of genetic variation, quantitative genetic characteristics and heritable life history traits are also important to document. Characteristic traits such as spawning time, size, and age structure have developed in stocks because those individuals that were successful at completing their life cycle passed their characteristics to progeny in subsequent generations. Some hatchery programs need the hatchery fish to be similar to nearby wild stocks, especially if the hatchery fish are part of a rebuilding program and are expected to be successful at spawning naturally. In some cases objectives are harvest oriented with a desire to minimize interactions with hatchery fish. Being able evaluate the outcomes of each type of program is an important part of genetic monitoring and evaluation. In both cases the monitoring objective is to measure whether exchange in genetic characteristics and performance of wild fish is being impacted.

3. Ecological interactions

Evaluating and monitoring ecological interactions involving hatchery salmonids has come under increased scrutiny during the past decade. Ecological risks may extend to many species whereas genetic risks typically extend to only individuals of the same species or hybridization with a closely related species. The goal for ecological monitoring and evaluation is to select management and research actions that are contingent upon ecological risk tolerance levels.

Ecological interaction risk assessment requires five tasks: 1) determine non-target taxa objectives including taxa of concern, status of taxa of concern, and determining the acceptable impact level; 2) determine or hypothesize spatial-temporal overlap of target taxa with taxa of concern at various life stages including overlap between released salmonids and returning hatchery adults; 3) determine or hypothesize ecological interactions that might occur and the likely magnitude of those interactions (strong, weak); 4) assess ecological risk by weighing the positive and negative interactions that might occur; and 5) determine the scientific uncertainty of the overall assessment.

Specific types of interactions can be classified as beneficial or negative. Beneficial ecological interactions include nutrient enrichment, and, prey and predator swamping. Negative interactions include competition for resources that would be used by wild fish in the absence of hatchery salmonids, direct predation or through increasing the abundance and awareness of predators, behavioral anomalies, pathogenic interactions, and nutrient mining by removal of carcasses into the hatchery for broodstock.

4. Tracking recovery

Effective monitoring and evaluation must track performance in relation to meeting a goal. Defining the specific performance measures to monitor and evaluate is one of the fundamental principles of the statewide recovery plan. Increased local adaptation through a reduction in the levels of hatchery fish breeding in the wild, a decreased reliance of supplementation and hatchery-assisted stock recovery programs, and lessening negative interactions are all ultimate objectives of wild salmonid recovery. One important monitoring approach will be to track the progress of meeting desired objectives through SASSI. Progress would be to increase the number and distribution of wild production types and reduce the number of non-native and mixed origin stocks in each ESU. Biological data such as the abundance and overlap of hatchery origin fish on the spawning grounds, and genetic measures of stock diversity and relatedness of hatchery and naturally spawning populations will be used to improve the information used to arrive at the SASSI classifications. In addition, the decline of risks and hazards identified in the artificial production components of recovery and comprehensive management plans are specific measurable criteria that will be used to track rate of progress and level of recovery.

Validation

The adaptive management process requires learning from past results. Understanding whether or not the observed changes and outcomes were produced by the specific management actions that were taken require validation monitoring. Defined studies using the scientific method coupled with the appropriate statistical design and testing need to be used to differentiate between random outcomes and those produced intentionally. An example of the need for this type of evaluation is to determine if the recovery actions are responsible for an increased abundance, if it is just the result of increased ocean survival, or both. Other major monitoring areas include examining the reproductive success of adults produced through recovery programs and determining if modified release and adult capture efforts reduce wild and hatchery overlap.

Default Actions

Specific implementation actions for each hatchery operation will be developed as part of the programmatic hatcheries review. Reforms to hatchery operations such as moving release locations away from natural production areas, modifying rearing and adult attraction water to improve homing, and changes to production levels will occur when hatchery production has impacted wild stocks negatively through genetic interactions, ecological interaction or excessive harvest. The species and stocks cultured at a facility may be changed.

As a default, hatchery closures will occur when negative impacts cannot be corrected or where there is inadequate funding for necessary modifications. In addition, hatcheries will be reprogrammed or discontinued where the contribution to fisheries is poor and uneconomical. The time lines and funding requirements for the various implementation strategies will be outlined in specific reviews and recovery plans.

If wild stocks cannot be maintained at healthy levels, the use of hatcheries to mitigate for habitat destruction will have to be greatly reduced unless mitigation production levels are restructured to meet specific population rebuilding needs under a formal supplementation or gene pool preservation program. Supplementation programs intended to increase the natural spawning population will be programmed for a limited time and will be part of a larger program to restore the habitat to a level that will allow the natural population to become self sustaining. Conversion of supplementation programs to harvest production hatcheries will be opposed unless they are compatible with the recovered wild stock.

ESA Compliance Strategy

Hatchery releases from state and tribal facilities likely will occur under some form of ESA incidental take permits or take allowances under section 4(d) rule for a large share of the state (Columbia River, Puget

Sound and portions of the coast) beginning in 1999. This will require rigorous program reviews, risk assessments and changes to hatchery programs that will be specifically outlined in take applications or sections of recovery plans. In addition specific monitoring provisions will be required under these take provisions. Recovery plans will identify different phases of actions that will be taken over time according to risk of inaction and implementation costs.

IV. Core Elements

➢ HYDROPOWER

Hydropower and Fish: Pursuing Opportunities

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

Background

Hydropower dams and facilities have had profound negative impacts on river systems and on anadromous fish. Chapter II. Background: Setting the Context briefly describes the adverse effect of hydroelectric development on salmon populations and their habitats. There are, unfortunately, no simple fixes and there is considerable resistance to fixes that would reduce power production.

Hydropower facilities fall into three general groups -- federal, non-federal FERC licensed projects, and non-federal projects that are not licensed by FERC. About 60% of the total hydropower capacity in the state of Washington comes from federal dams constructed and operated by the U.S. Bureau of Reclamation (USBR) and U.S. Army Corps of Engineers (USCE) on the Columbia-Snake River system. Bonneville Power Administration (BPA), a federal agency within the U.S. Department of Energy, essentially manages the river by coordinating operations of the Columbia-Snake River system's major dams owned and operated by the U.S. Army Corps of Engineers, (*Bonneville, The Dalles, John Day, McNary, Chief Joseph, and the four lower Snake dams- Ice Harbor, Lower Monumental, Little Goose and Lower Granite - in Washington; Hungry Horse in Montana; and Dworshak in Idaho),* and the U.S. Bureau of Reclamation (*Grand Coulee in Washington and Libby in Montana*).

Non-federal hydroelectric dams are generally operated by private developers, stockholder-owned utilities, municipal utilities, or public utility districts. Under the Federal Power Act (FPA), the federal government regulates most of the non-federal hydroelectric projects. BPA coordinates, however, the operation of three mid-Columbia Public Utility Districts' dams, (*Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids*) as part of the Columbia-Snake River system.

Nearly all non-federal dams must be licensed by the Federal Energy Regulatory Commission (FERC). FERC is an independent regulatory agency within the Department of Energy. It is designated by Congress to carry out the provisions of FPA and to oversee the construction and operation of hydroelectric projects. Modifying the operations at federally licensed hydroelectric projects is also done through FERC. FERC issues licenses for hydroelectric projects for a period of 30 to 50 years.

A few non-federal projects are not licensed by FERC, either because FERC has determined that it does not have jurisdiction over the project, or the project is exempt (generates less than 5 Mega-watt, or it is located on a non-navigable water body), or it was constructed prior to the passage of the Federal Power Act and no modification was made to the project (e.g. Electron dam on the Puyallup river).

More than 80 FERC licensed hydropower projects are operating in Washington State. Many of these licenses are expiring and must be renewed in a process known as re-licensing. Specifically, twenty-two dams, or 14 projects (not all of these are in salmon habitat) have licenses due to expire between now and 2010 and will be subject to the re-licensing process. Re-licensing is a process similar to licensing a new project. When these licenses expire, a licensee who wishes to continue operation of the project must apply for a new license. The licensee is required to submit a final license application two years before the actual expiration date of the license. The licensee must consult during the proceeding with state and federal resource agencies, tribes, and the public.

New license proceedings are an avenue to implement environmental improvements at hydropower projects. The proposed continued operation of a project must be evaluated in light of current laws and regulations (most of today's environmental laws and regulations did not exist at the time many projects were constructed). The process of relicensing hydropower dams has resulted in improvements at several dams through higher instream flows, restoration of flows to de-watered by-pass reaches, fish passage facilities, protection of riparian habitat, and establishing mitigation and restoration trust funds.

The licensing process must comply with the Federal Power Act, the National Environmental Policy Act (NEPA), the Fish and Wildlife Coordination Act, the Clean Water Act, the Northwest Power Act and several other federal statutes (see section B). The Endangered Species Act (ESA) imposes substantive requirements on FERC to protect species listed as threatened or endangered: any proposed action that is likely to jeopardize a listed species or adversely affect its critical habitat requires FERC to consult with the appropriate federal agency, USFWS or NMFS. Modifying the operation at non-federal and non-FERC licensed project can be done using state laws for water quality, instream flows and fish passage and federal fish and wildlife laws.

While the focus of this paper is on the use of FERC licensing process to achieve the stated goal, it is important to note that an applicant could choose to develop a Habitat Conservation Plan (HCP) under section 10 of ESA. Under section 10, the USFWS and NMFS are authorized to issue Incidental Take Permits to applicants who satisfy the requirement of ESA. In the development of HCPs, the state plays a very important role in the negotiations between NMFS, USFWS, tribes, FERC, EPA, State, hydropower project applicants and non-governmental organizations (e.g. American Rivers Inc. is party to the Mid-Columbia HCP agreement).

The following is a brief description of the Mid-Columbia Habitat Conservation Plan. Some components of the agreement can be used in other hydropower HCPs.

Mid-Columbia Habitat Conservation Plan

The non-federal hydropower projects within the Columbia-Snake River system (three mid-Columbia Public Utility Districts) are subject to requirements of FERC licensing, the Endangered Species Act (ESA), the National Environmental Policy Act (NEPA), the Fish and Wildlife Coordination Act, the Northwest Power Act and state authority under the Clean Water Act, and the Federal Power Act. Development of Habitat Conservation Plans (HCPs) under section 10 of ESA are being negotiated by the mid-Columbia PUDs to meet the requirements of ESA and FERC licensing.

In June1998, Chelan and Douglas Public Utility Districts (PUDs) entered into an Anadromous Fish Agreement and Habitat Conservation Plan (HCP) with co-managing federal and state fishery management agencies and tribes[1], power-purchasers, and American Rivers, Inc., a non-profit environmental group. The objective of the agreement is to achieve 100% No Net Impact (NNI) for anadromous salmonids[2] affected by Wells, Rocky Reach, and Rock Island dams on the Columbia River. When the agreement becomes effective, the two PUDs will receive an Incidental Take Permit for the species covered in the planned 50 year FERC license.

The goal of NNI must be achieved in a manner that is compatible with self-sustaining natural populations. The primary means to achieve NNI is to ensure a high survival rate of fish passing through the three reservoirs and project structures. However, some impacts will be unavoidable or extremely difficult to mitigate. Measures taken by the Mid-Columbia PUDs to improve natural production of anadromous fish in the region will compensate for mortality in project and reservoir passage. Two strategies will be used: (1) habitat protection and restoration, and (2) hatchery production of affected species in the mainstem mid-Columbia River and its four major tributaries: the Wenatchee, Entiat, Methow, and Okanogan watersheds.

Passage Program.

The goal of the passage program at each dam is to achieve 91% passage survival within the geographic area of each hydroelectric project, by a combination of project improvements and management actions. Within this overall 91% survival goal is an independent standard of 95% juvenile downstream migration survival at each project. To compensate for the remaining 9%, the PUDs will fund two programs for the duration of the agreement (1) a hatchery program in the region to contribute to the rebuilding and recovery of naturally spawning populations and to compensate for unavoidable losses, and (2) a program (funding) to protect and restore salmonid habitat in areas upstream of the hydroelectric projects and to compensate for mortality at the dams.

1 *The co-managing fishery parties include the U. S. Fish and Wildlife Service, the U. S. National Marine Fisheries Service, the Washington Department of Fish and Wildlife, the Colville Confederated Tribes, the Yakama Indian Nation, and the Confederated Tribes of the Umatilla Indian Reservation.*

2 *Plan Species are chinook salmon, steelhead, sockeye salmon, and coho salmon.*

Current Applicable Policies

Congress, in enacting several laws specific to hydropower, has determined that some basic environmental protection must be afforded at every dam, and should not be balanced away to promote hydropower.

- Pursuant to Section 10(j) of the Federal Power Act, as amended by the Electric Consumers Protection Act, state and federal resource agencies (e.g. U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife and NMFS) may recommend that certain fish and wildlife protection measures are included in a new license. FERC is required to give these recommendations due consideration and must adopt them unless FERC finds them inconsistent with the Federal Power Act. FERC is required to hold a dispute resolution meeting to resolve disagreements between the resource agencies and FERC.

- Under Section 10(a) of the Federal Power Act, FERC must give "equal consideration" to power and non-power values. In doing so, FERC must consider the extent to which a project would be best adapted to a comprehensive plan for developing a waterway. FERC need not act consistently with a comprehensive plan, but must justify a decision not to. The state's primary comprehensive plan is the Washington State Hydropower Development and Resource Protection Plan, completed in 1992.

- Under Section 4(e) of the Federal Power Act, FERC must include measures prescribed by the agency responsible for managing a federal reservation (e.g. a national forest) upon which part of a project resides.

- Under Section 18 of the Federal Power Act, both the Department of Interior (acting through USFWS) and the Department of Commerce (acting through NMFS) may prescribe up and downstream fish passage measures at a hydroelectric project. These prescriptions are mandatory.

- FERC generally preempts state laws and regulations. For example, hydroelectric licensees are not required to obtain hydraulic project approvals (HPAs) from the state Department of Fish and Wildlife. One exception is that the state water pollution control agency (in Washington State, the Department of Ecology) may require mandatory conditions on hydroelectric projects via issuance of a water quality certification pursuant to Section 401 of the federal Clean Water Act. The state has broad discretion to require measures, which are necessary to sustain a designated use of a water body (e.g., salmonid migration, rearing, spawning and harvesting).

- In addition, the Department of Ecology (Ecology) believes it has authority to condition water quality certifications (under section 401 of the federal Clean Water Act) with new, generally higher, instream flow requirements, even on long-existing hydropower projects with state water rights. Hydropower project owners disagree. Pend Oreille Public Utility District has filed an appeal of Ecology's decision to condition a water quality certification for its Sullivan Creek project with instream flow requirements higher than those on an existing water right. The outcome of this litigation will significantly determine the state's ability to influence and modify the operation of hydroelectric projects during licensing proceedings in which the license already holds existing water rights. It is Ecology's view that the United States Supreme Court already has upheld Ecology's authority in this regard. In a 1995 opinion, the court held that,

> "Sections 101g and 510(2) (of the Clean Water Act) preserve the authority of each state to allocate water quantity as between users; they do not limit the scope of water pollution controls that may be imposed on users who have obtained, pursuant to state law, a water allocation." (Jefferson County PUD et. al. v. Ecology).

- Pursuant to the federal Coastal Zone Management Act, the state may object to a project that affects coastal resources under the state's federally approved Coastal Zone Management Program (CZMP). For projects within the CZMP boundaries, the state also may require the applicant to comply with state shoreline permitting laws. While the Coastal Zone Management Act allows the state to either object or concur that a project is consistent with the Coastal Zone Management Program, it does not allow the state to issue a conditional determination.

- For non-federal projects not licensed by FERC state laws apply. This includes state fish passage and screening laws, described in the chapter on barriers, instream flow laws, described in the chapter on ensuring water for fish, and water quality laws.

Overview of Chapter

The strategy for hydropower projects is to use the FERC, process and state existing laws and state authority under the Clean Water Act to pursue modification of the operations at hydroelectric projects federally and non-federally licensed, to implement salmon protection, mitigation and enhancement measures. In areas where FERC licenses are also subject to the ESA's substantive requirements to protect and restore species listed as endangered or threatened, the state will actively pursue immediate modification necessary to prevent further harm to the species. The state will also pursue opportunities to evaluate and recommend removal of dams that have become obsolete and/or are more expensive to repair/upgrade that to remove.

Hydropower issues within and outside the Columbia-Snake River system (all federal and non-federal hydropower projects above Bonneville dam) are addressed differently due in part to the different governance arrangements.

- The state responsibility for hydropower projects not located within the Columbia basin is carried out by the state resources agencies (e.g. Ecology, WDFW).

- Within the Columbia basin 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 system.

Washington's members, together with other state agencies' staff, are responsible for advising the Governor and meeting with constituencies on all issues pertaining to the operation of the dams. The Council members are part of the Joint Natural Resources Cabinet.

The part of this chapter covering the Columbia River Basin Hydropower System is mainly a very brief summary of issues and strategies and it is not intended to be a policy section. A separate process is in place for the Columbia River Basin and is coordinated with the Statewide Strategy to Recover Salmon.

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

Goal:

Achieve ***No Net Impact*** for each 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 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?*

FERC License proceedings will be used by the state resources agencies (Ecology, WDFW, and others) to require environmental improvements at a project. While FERC authority generally pre-empts state laws and regulations, the state will use the FERC proceeding, state laws and state authorities under federal legislation -- the Clean Water Act, Coastal Zone Management Act and Federal Power Act -- to achieve the stated goal and objectives.

The mandatory conditioning authorities included in the Federal Power Act and the Clean Water Act are among the most significant tools to protect, mitigate and enhance the impacts of hydropower facilities. Three basic mandatory protection requirements (see above for statutory authority) assure that:

1) Fish can migrate upstream and downstream of a dam when necessary;
2) That a dam does not result in a violation of state water quality standards; and
3) If a private dam is located on federally owned land, the uses of the federal land are protected.

These basic protections are implemented based on state, tribal, and federal agencies' recommendations or conditions to mitigate the effects a hydropower facility has had on salmon.

The state through the Departments of Fish and Wildlife and Ecology will exercise its discretion in a manner broad enough to address the many ways in which dams degrade salmon habitat. The state resource agencies will work closely with tribal and federal resource agencies (e.g. NMFS and USFWS) in developing appropriate operating conditions. The state agencies will commit the resources necessary to accomplish this and will base their decisions on the biological needs of the resource.

In addition, the state through the Department of Trade and Economic Development (CTED) and the Governor's Office will ensure that any deregulation of the electricity market does not undermine anadromous fish recovery efforts. Hydropower operators should be responsible for mitigating and minimizing the environmental impacts of their activities without regard to other regulatory issues that they may face in the future.

The state will also continue to work with other states through the National Governors Association (NGA) and the Western Governors Association (WGA) to oppose any amendments by Congress to limit state and federal agency mandatory conditioning authority, and to arrive at a coordinated procedure for dealing with certification of FERC licensed projects under Clean Water Act section 401 and the Coastal Zone Management Act.

State Actions on New Hydropower Projects

The state through its resources agencies, Ecology, WDFW and others as appropriate, will oppose all proposals for new hydroelectric projects with the potential for degrading salmon habitat and will use the authorities referenced in section B above in an appropriate manner. The agencies will base their opposition and any denial of water quality certification on ESA listing, the Protected Areas designation developed by the Northwest Power Planning Council and the Washington State Hydropower Development/Resource Protection Plan.

There are 16 new proposed projects mostly in the Nooksack, Skagit and Okanogan basins, where species have been listed or proposed for listing. Most of the projects are proposed in "protected areas" and are not as economically attractive as when they were first proposed (1980s). Additionally, FERC staff is recommending against licensing most of them.

State Actions on Existing Hydropower Projects under Re-licensing

As stated before, many of the licenses issued in Washington either expired or will expire by 2010. There are 22 dams (14 projects) that will require a new license by 2010. Nine of these projects have already started the re-licensing process and consultation. Except for the mid-Columbia PUDs no other applicants are developing HCPs, instead they are all pursuing new FERC licenses. The state will however, use the outcome of the mid-Columbia Habitat Conservation Plan (HCP) agreement as the minimum acceptable standards when making recommendations or requiring conditions to restore and mitigate impacts of hydropower projects.

The re-licensing of all of the projects is allowing the state and federal agencies to review the project under current conditions and requirements. The actions outlined below will be pursued for each project. For projects that have not started the re-licensing process, the state will use the re-opener clause to address impacts of the dams on anadromous fish, especially in areas with existing and potential listing under ESA.

The FERC licensing process has been at times very contentious and can take a long time (e.g., 10 – 24 years). For example, it took FERC 24 years to issue a new license for Cushman project on the North Fork Skokomish River in Mason County, and many years of litigation over the terms of the license are expected. Unfortunately, delay in re-licensing could be damaging to the salmon and the environment, as it would delay mitigation of adverse impacts of projects. Project owners have little incentive to resolve resource disagreements because FERC automatically issues annual license renewals which extend status quo operating conditions pending a final licensing decision. This, in effect, rewards project owners for failing to negotiate in good faith by allowing them to defer mitigation costs.

To improve river conditions and provide faster re-licensing, most utilities and federal and state agencies are now using an "alternative" re-licensing process. The emphasis is on collaboration, increased interaction with state agencies and other stakeholders, and on reaching settlement. While this process is still experimental, it has the potential for resolving licensing sooner and, hence, resulting in earlier implementation of environmental improvements. But also it is possible that long-standing disagreements over resource management, and reluctance by project owners to bear full mitigation costs, could continue to result in a process fraught with conflict, delay and litigation. In addition, at the national level the hydropower industry continues to lobby for amendments to the Federal Power Act and other environmental statutes (i.e. Clean Water Act) that would effectively preclude any resource agency -- state or federal -- from exercising mandatory authority over a FERC-licensed hydroelectric project. This suggests that, notwithstanding statements in favor of increased collaboration, the industry continues to believe and advocate for policies that would ensure the primacy of power values over environmental values.

The state actions for projects under re-licensing are the following:

- WDFW and Ecology will collaborate with FERC, EPA, NMFS, USFWS and other federal agencies to support the use of the "alternative" re-licensing process for all projects being re-licensed, to assist in achieving a settlement between all parties for FERC approval. The state supports efforts going on among states and federal agencies to arrive at a coordinated procedure for dealing with 401 and CZMA certification for FERC projects. The state will more likely adopt the policies and procedures that come out of that effort.

- While the state resource agencies will work cooperatively with federal agencies, hydropower applicants and non-governmental organizations, there is a need to take ***immediate actions.*** These actions are needed if changes in hydropower operations are necessary for the survival and recovery of listed anadromous species. The state will use any and all available tools at its immediate disposal to achieve those changes. The state through its resource agencies will petition FERC for changes to be included in the "annual license" issued by FERC pending the relincensing proceeding or will petition FERC to use the consultation requirement and takings prohibition under ESA to address any necessary changes.

- WDFW and Ecology in cooperation with others will identify the dams that have significant impacts on anadromous fish populations and the specific problems at those dams, such as blocked passage or low flows. Specific strategies to pursue mitigation and restoration actions will then be identified to address the impacts at each dam, based on the severity of harm to anadromous fish, the limiting factors analysis and the conditions of the watershed. The information will be provided to the regional recovery groups to use in identification of key limiting factors.

- Resource agencies will encourage applicants in areas with more than one hydropower project to conduct studies at the watershed level in order to address cumulative impacts and to design the most effective and comprehensive environmental improvements and restoration actions.

- WDFW and Ecology will use the license proceedings to recommend or require implementation of environmental improvements and mitigations to achieve properly functioning populations and properly functioning habitat conditions.

- Ecology will coordinate conditions for 401 water quality certifications, pursuant to Section 401 of the federal Clean Water Act, among federal and state agencies. Necessary conditions will be imposed by Ecology on hydroelectric projects via issuance of the certification, to sustain the designated use of a water body (e.g. salmonid migration, rearing, spawning and harvesting). Ecology and WDFW will require conditioning of new hydropower licenses and amended licenses with instream flow releases that “mimic” natural patterns to assist and enable the restoration of troubled fish stocks. In addition, the agencies will recommend that FERC re-licensing approval be based on an evaluation of the success of future operations in mimicking the natural hydrograph for the watersheds.

- WDFW will recommend to the Department of Interior (acting through USFWS) and the Department of Commerce (acting through NMFS) fish and wildlife protection measures such as passage, when these agencies prescribe up-stream and downstream fish passage measures at a hydroelectric project. These prescriptions are mandatory. FERC is required to give these recommendations due consideration and must adopt them unless FERC finds them inconsistent with the Federal Power Act.

- Ecology will file objection with FERC to a project that negatively affects coastal resources under the state's federally approved Coastal Zone Management Program pursuant to the federal Coastal Zone Management Act. For projects within the CZMP boundaries, the state also may require the applicant to comply with state shoreline permitting laws. While the Coastal Zone Management Act allows the state to either object or concur that a project is consistent with the CZMP, it does not afford the state ability to condition a project

- Resource agencies will require that project applicants monitor the outcome of hydropower restoration efforts. Adaptive management will be one of the basic required conditions of relicensing.

- Resource agencies will have project applicants fund other enhancement efforts as part of an overall mitigation package. This may include the establishment of land and water trust funds to mitigate unavoidable impacts of hydropower operations (e.g. Mid-Columbia PUD agreement).

- Resource agencies will encourage licensees to implement interim mitigation measures during prolonged re-licensing proceedings.

- The state supports detailed studies to evaluate the biologic, economic, and societal impacts of breeching, decommissioning, and/or removing large dams in areas where preliminary investigations show the dams are significant contributors to the limiting factors for salmon recovery and mitigation is unable to address the problems. Studying dam removal does not, however, ultimately mean that the dam is removed or breeched. Where appropriate for salmon recovery, the state will recommend that FERC uses its authority to decommission a project (e.g. removal of the dam at Condit on the White Salmon River) during the re-licensing process.

- WDFW and Ecology will closely monitor implementation of mitigation measures required as a condition in the license issued by FERC. The state will also work to ensure that new licenses include provisions for monitoring and the need to adjust operation practices if necessary without going through a license re-opener process described below.

State Actions on Hydropower Projects not Due for Re-licensing

For projects not subject to re-licensing for a number of years, there is no clear process to bring about changes in project operation. In 1994, FERC adopted a policy to use reserved authority in licenses for hydropower to ameliorate cumulative impacts of such projects in the same river basin as a project under a re-licensing process. This policy anticipates that if FERC issues a license for a project which resides in the same basin as other projects, FERC will reserve authority to reopen the license of that same project if needed to address cumulative effects in relation to other projects at a later date. FERC historically has not been supportive of license conditions that create operational uncertainty.

FERC' s policy statement stipulates that the Commission will "define that reserved authority as narrowly and with as much specificity as possible." Thus, while FERC's support for this policy may appear to be lukewarm, it nonetheless may prove critical to any regional or watershed response for salmon recovery in basins with more than one hydropower project and where impacts of hydropower cannot accurately be assessed and mitigated project by project.

In other cases where an isolated project license contains an explicit re-opener clause, FERC may be reluctant to reopen the license, particularly if the licensee objects. This is because the Federal Power Act seems to suggest that licenses may only be altered upon mutual agreement between the licensee and the Commission.

State actions for hydropower projects not due for re-licensing, in areas with existing and proposed ESA listings are the following:

- WDFW and Ecology in cooperation with other agencies will identify the dams, which have significant impacts on anadromous fish populations and the specific problems at those dams, such as blocked passage or low flows. Specific mitigation and restoration actions will then be identified to address the impacts at each dam, based on the severity of harm to anadromous fish (see section on state actions during re-licensing). The information, when available, will be provided to the regional and watershed recovery groups to use in the limiting factors analysis.

- Resource agencies will seek FERC support on using the re-opener clause to start mitigating the impacts of the dams on anadromous fish now, not 5 to 10 years in the future.

- Resource agencies will work with dam owners to seek voluntary implementation of mitigation and restoration measures and amend FERC license, if needed.

- If voluntary efforts fail, the resource agencies will petition FERC to reopen the license.

- Under limited circumstances [Section 401(a)(3)] Ecology may revoke the existing 401 certificate, which could then impact the validity of the license.

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

The Departments of Fish and Wildlife and Ecology and other agencies will develop a monitoring protocol to closely monitor implementation of mitigation measures required as a condition in the license issued by FERC. The state will also work to ensure that new licenses include provisions for monitoring and the need to adjust operation practices if necessary. The monitoring program will include the following elements:

1. *Implementation:*

- Review the state efforts to recommend fish protection measures during re-licensing.
- Review completed FERC licensing for sufficient protection measures for fish.
- Review state's performance in petitioning for immediate actions, license re-openers and other needed actions to start addressing salmon recovery now.
- Review if re-licensing is occurring at a sufficient pace.
- Quantify goals for increased spawning upstream of dam, water quality improvements, and fish passage improvements.

2. *Effectiveness:*

- Is fish utilization of previously inaccessible spawning and rearing habitat above dams increasing?
- Are downstream effects on water quality improving?
- Is upstream/downstream passage having low enough effects to sustain fisheries on wild stocks?
- Are mitigation activities for unavoidable impacts resulting in "no net impacts"?

COLUMBIA RIVER BASIN HYDROPOWER SYSTEM

Note: This is a description of various processes in place to develop plans for restoration of fish and wildlife resources in the Columbia River Basin. While the focus of this chapter is on hydropower, the discussion of the Columbia River Basin is broader.

The issues for the Columbia-Snake River Basin Hydropower system revolve, in large part, around federally developed and coordinated hydropower and irrigation facilities on a multi-state, international river system. Primarily through NMFS, the Bonneville Power Administration, USCE, USBR and FERC the federal government is ultimately responsible for mitigating the hydropower system impacts on listed stocks.

The state of Washington—through the Northwest Power Planning Council and in consultation with NMFS—influences the development of formal strategies to be implemented and funded by the federal government. Following is a summary of some of the issues and processes guiding recovery strategies and actions to address the impacts of the hydropower system and the dams on the Columbia and the Snake.

A. Summary of Key Governance Structures and Strategies

1. The Northwest Power Planning Council's Columbia Basin Fish and Wildlife Program
The Northwest Power Act of 1980 created the Northwest Power Planning Council, an interstate compact among Idaho, Oregon, Montana and Washington composed of eight members, two appointed by each of the governors of the four states. Its intent is to bring regional influence to what historically had been federally driven activities in the Columbia River Basin.

Every five years the Council develops a fish and wildlife program to "protect, mitigate and enhance fish and wildlife affected by the development, operation and management of hydropower facilities while assuring the Pacific Northwest an adequate, efficient, economical and reliable power supply." This program is based in large part on the recommendations of the region's Indian tribes and the four states' fish and wildlife agencies. The program is intended to serve as the blueprint for BPA's expenditures and activities by the other federal agencies such as the Army Corps of Engineers and the Bureau of Reclamation.

- <u>The Multi-Species Framework</u>

The Northwest Power Planning Council initiated the Multi-Species Framework Project in response to two scientific reviews. Both reviews suggested the region's fish and wildlife program would benefit from a science-based multi-species framework that would help guide policy choices.

The scientific groups also suggested the Council should develop a science-based vision for Columbia Basin fish and wildlife management that recognizes the interrelated parts of the Basin's ecosystem. As a result the Framework is developing a set of alternatives for future management of the Basin and will analyze the biological, social and economic effects of the alternatives.

States, tribes, federal agencies, Council staff and stakeholders are participating in the development and analysis of the alternatives. Regional input and comments are being solicited on the alternatives and analysis through the summer. A draft report will be available for public review in September 1999.

The state governments, tribal governments, federal agencies and the Council expect the Framework to guide the development of, among other things, alternatives hydropower system actions and alternatives tributary habitat and hatchery approaches, by providing information on the likely biological, social and economic outcomes of those alternatives.

The National Marine Fisheries Service recently completed an analysis of ecological effects likely to result from the alternatives, relying on the PATH process.

Federal, state and tribal agencies will develop implementation plans for the alternative selected. For example, federal agencies with specific responsibilities under the Endangered Species Act, Indian treaties, and other authorities will produce a detailed management plan for the federal hydropower system before the end of 1999.

The Council expects to begin Fish and Wildlife Program amendment process sometime in late 1999

2. Columbia River Basin Forum

The NMFS 1999 decision on river system configuration – and its impact on the BPA rate case – has prompted increased attention to the larger issue of the role of the states, the federal government and the tribes in making river-use decisions that affect fish and wildlife recovery strategies and the future of users and industries dependent on the Columbia.

Currently, authority over river-use is diffused among federal, state/local and tribal governments that are carrying out the differing mandates of various laws and treaties. The diffusion of purpose, the potential for conflicts, and the lack of coordination among these laws and governments have led many to wonder whether a different governance structure could lead to improved decisions and actions on the river. The governors of the four Northwest states have worked with tribes, representatives of the federal government and stakeholders on alternative governance options.

The *Columbia River Basin Forum,* formerly known as the three sovereigns, was selected as the option by the governors, tribes, and federal agencies. The Forum is made up of the region's four governors, 11 of the 13 Columbia Basin tribes and the federal agencies involved in the Columbia River. Its purpose is to provide a forum to collaborate on and coordinate basin level policy, planning and implementation issues and processes that effect the Columbia River Basin's fish and wildlife and related habitat. The Forum would have no decision-making authority; but can make consensus-recommendations to decision-making bodies.

The Forum provides a place for regional governments, interested parties and the general public to utilize information and analysis developed through the Framework, by the federal caucus and through the development of the Northwest Power Planning Council's Fish and Wildlife Program to discuss alternative management approaches to the Basin and test regional agreement on the various alternatives.

The federal agencies, for example, expect to discuss their Biological Assessment on hydropower operations and a package of actions in the other Hs (harvest, habitat, and hatcheries) within the Forum. The states, tribes, and the Council have the opportunity to do the same, bringing any particular management or recovery plans forward for discussion. Other regional interests will also be invited to participate in the Forum discussions.

The overall goal of the Forum is to develop a regionally agreed upon recommendation for fish and wildlife recovery that addresses all factors affecting fish and wildlife and other related basin wide resources. The Forum will serve as a policy discussion arena to inform the statutorily mandated and ongoing federal processes and the Northwest Power Planning Council's Fish and Wildlife Program amendment process.

3. Federal Agencies

The 1991 listing of Snake River sockeye, spring/summer and fall chinook on the endangered species list has changed much of the historically decision-making process in the Columbia River Basin. Nine federal agencies are involved in the management of the Columbia River. Several of the agencies will be involved in ESA consultations-required to prepare a biological assessment and biological opinions.

The Endangered Species Act, through the National Marine Fisheries Service, holds the trump card for all decisions affecting endangered fish. If there is a conflict between the regional plan and the needs of ESA-listed fish, the latter has legal priority and spending by BPA and other federal agencies must reflect this priority. In spring of 1995, the National Marine Fisheries Service issued a "Biological Opinion," an interim guide for the operations of the hydroelectric dams to minimize the hydropower system's impact on endangered Snake River fish. The Army Corps of Engineers, the Bureau of Reclamation and the operators of the other mainstem Snake and Columbia dams must operate the dams as directed by the NMFS "Bi-Op"

The U.S. Corps of Engineers is conducting a feasibility study on alternative actions for the lower Snake River dams. The Corps' Environmental Impact Statement (EIS) examines a number of alternatives that are somewhat different from those being considered in the Framework because the Corps' process examines just hydropower actions on the Snake River. The Corps intend to release a draft of the EIS for public comment this fall.

NMFS is required to issue a final recommendation for the long-term configuration of the hydropower system in December of 1999. This recommendation is frequently referred to as the "99 Decision." Included in the recommendations will be the NMFS's official position on whether the four Army Corps of Engineers dams on the lower Snake River should be breached to aid fish migration and habitat or whether other strategies (such as barging juvenile fish around the dams) will be employed, thus preserving the dams as suppliers of electricity and navigation access to inland ports. As part of the "99 Decision" process, there are ongoing studies of the economic, social, and cultural effects of dam-breaching, as well as scientific studies of the effects of dam-breaching on the survival of fish.

- <u>Bonneville Power Administration</u>

The Bonneville Power Administration manages the river by coordinating operations of the federal and nonfederal dams of the Columbia-Snake system. BPA sells the electricity generated at the Army Corps and Bureau dams via five-year contracts with utilities and a few large industrial customers. The revenues generated from these sales exceed $2 billion and are used to pay variety of costs, such as payments to the U.S. Treasury on the $10 billion debt on the construction and maintenance of the dams, $7 billion debt on the region's failed nuclear power program, energy conservation programs and, of course, the bulk of fish and wildlife programs throughout the Columbia Basin.

Most of BPA's power sales contracts expire in 2001. BPA is seeking to renew contracts with its customers for the 2001-2006 time period using processes called a "rate case" and a "subscription period. The rate case will determine prices for power to be sold to different sectors (public utilities, private utilities, and selected large industries), and the subscription period will allow these wholesale customers to sign up for contracts.

In determining the price it will charge, BPA must make certain assumptions on how much revenue it will spend directly for fish programs and how much revenue will be forgone because of the need to spill water over the dams (not through the turbines) for the sake of the fish. How much BPA spends -- and how it spends it -- is dictated by formal U.S government treaties with Indian tribes and Canada and at least two federal laws, the Endangered Species Act and the Northwest Power Act. At the same time, the price BPA can charge its customers is limited, in a practical sense, by the projected market rates for power during the subscription period.

For the most part, BPA's annual fish and wildlife expenditures are spent to implement the Council's program. The federal, state and tribal fish and wildlife managers rank and prioritize annual project proposals which are then analyzed by a panel of independent scientists for their scientific merit and relevance to the Council's program. The scientists forward their report to the Council which then decides which projects it will recommend that BPA fund with electricity ratepayer dollars.

In anticipation of its rate case, BPA has announced a set of principles and management tools designed to meet its fish obligations, which will be the subject of further scrutiny and deliberation in the rate case.

4. Columbia Basin Indian Tribes
Thirteen federally recognized Indian tribes are active and effective participants in Columbia-Snake basin decision-making. Individually and through membership organizations such as the Columbia River Inter-Tribal Fish Commission and the Columbia Basin Fish and Wildlife Authority, they continue to provide management and policy direction at both the watershed level and in the ongoing debates over hydroelectric system operations and configuration.

As sovereign governments, the tribes and the state exercise cooperative management authority and responsibilities over fish and wildlife. Through treaties and executive orders, the tribes secured and reserved federally protected rights to hunt and fish.They are interested in restoration of stocks sufficient to meet their reserved rights to fish at all usual and accustomed places for quantities of fish that meet their cultural and nutritional needs as well. Neither the Northwest Power Act nor the Endangered Species Act fully accounts for the federal government's trust and treaty obligations to the basin's tribes.

To ensure coordination and effective representation in the Framework, the Forum and the Council's planning efforts, the Tribes have formed a Tribal Caucus. The Tribal Caucus serves to identify consensus views among the participating Tribes.

The Federal and Tribal Caucuses and the Northwest Power Planning Council will provide mechanisms for communication between the states, tribes and federal agencies.

5. Mid-Columbia Public Utility Districts
As stated earlier the three mid-Columbia Public Utility Districts -- Chelan County PUD, Douglas County PUD, and Grant County PUD-- own and operate five dams on the mainstem Columbia. The 100+ miles of river that the Mid-Columbia dams influence are some of the most fragile and valuable in the system. Steelhead, chinook, coho and sockeye all traverse the Mid-Columbia stretch.

The pending FERC re-licensing of the five dams has prompted detailed assessments of the impact the dams have on adult and juvenile salmon. The Washington Department of Fish and Wildlife, the Department of Ecology, the Yakama Indian Nation, the Confederated Tribes of the Umatilla Indian Reservation, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service have worked with the biologists, managers and commissioners of the three PUDs to develop the mid-Columbia Habitat Conservation Plan (HCP) described above.

Details of Grant County PUD's participation in the HCP are still being discussed, but Douglas PUD and Chelan PUD have agreed to ensure that their dams' operations, hatchery work and habitat rehabilitation result in *No Net Impact* of fish.

Grant County PUD has invested a great deal on surface collection and by-pass facilities at Wanapum and Priest Rapids dams but the failure of the systems to meet requirements for reductions in fish mortality has complicated Grant's participation in the Mid-Columbia

HCP. Negotiations with Grant on the hydropower, habitat and hatchery components of an HCP continue.

B. Other Issues

1. Hanford Reach
The Hanford Reach of the Columbia River is the 51-mile, undammed, free-flowing stretch of the mainstem that flows through the Hanford Nuclear Reservation between Grant County's Priest Rapids Dam and McNary Dam near the Tri-Cities. The U.S. Department of Energy has controlled most of the land adjacent to the river, preventing development and in many cases, human access to that land. As a consequence, the government preserved an ecological sanctuary along and within the river that has resulted, in part, in the healthiest, self-sustaining population of Chinook salmon anywhere in the Columbia River Basin. The Hanford Reach fall Chinook are an important component of the U.S. and Canadian commercial fishery in the Pacific and provide the bulk of fish harvested by tribal and recreational fishers in the Columbia.

Grant County PUD, along with the other dam operators and BPA, are signatories of the *Vernita Bar Agreement* which provides for stable flows during the chinook spawning season. The result has been a significant increase in successful spawning. However, unstable flows during the spring, when newly hatched juvenile fall Chinook are still in the river, has killed thousands of fish by stranding them in near-shore habitats. Spring, 1998, Grant County PUD took action to minimize stranding and is working with federal, state, tribes and other entities to develop a long term solution.

2. Transportation v. In-river Migration
Juvenile salmon and steelhead migrating out of the Snake and mid-Columbia Rivers reach the estuary below Bonneville Dam in one of three ways: 1) they are collected at some of the dams and placed in barges headed downstream where they are released into the estuary; 2) they are collected and put in trucks that drive them on surface roads to the estuary; or 3) they are allowed to remain in the river, to be flushed through the system via spill at some of the dams. Each of these strategies involves risks to individual fish and to sub-species. The relative impact of these strategies on fish survival is the subject of scientific studies.

The process for analyzing technical hypothesis (PATH) is a group of scientists contracted by NMFS and NPPC to model various juvenile migration scenarios -- from transportation of every collectable juveniles, to no transportation, to breaching the four Lower Snake dams. This scientific work will help inform the NMFS 1999 decision on configuration of the federal Columbia River power system.

According the Northwest Power Planning Council's Independent Scientific Advisory Board (ISAB) the reliance on any one strategy runs the risk of inadvertently selecting certain species with certain life histories and habits. This could be detrimental to life-cycle diversity critical to the ability of salmon and steelhead populations to withstand a variety of environmental conditions.

The ISAB did note that transportation of juveniles in trucks poses great risks to the individuals -- and therefore the species -- being trucked and that this strategy should be stopped. WDFW and the Northwest Power Planning Council are working with NMFS and the federal dam operators to investigate the best alternative strategy for the species that are typically trucked late in the migration season.

There are risks to fish that travel in the river, too. Predation by birds and fish, high temperatures, turbines and even water spilled at the dams to keep them out of the turbines have, when taken together, profound impacts on the fish migrating downstream.

3. Dissolved Gas

Spilling water past, not through, turbines at the dams is a measure called for by the NMFS 1995 biological opinion and supported by the WDFW. But spilling large volumes of water causes the river below the dams to become saturated with dissolved nitrogen, a cause of gas bubble disease (GBD) in juvenile fish that manifests itself in ways similar to the bends in scuba divers. It is believed that in some circumstances GBD is significant enough to kill -- directly or indirectly -- significant numbers of juveniles that spill is intended to aid.

The saturation of water with nitrogen often exceeds state water quality standards. Washington will continue to work with the relevant authorities to reduce the amount of gas saturated water entering Grand Coulee from Canadian reservoirs and improving the performance of Washington dams through installation of devices that limit the amount of nitrogen gas absorbed by the river.

V. Toolbox for Recovery

➢ EDUCATING THE PUBLIC ABOUT THE NEEDS OF SALMON

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

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.

More than 20,000 environmental 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.

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

Goal:
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.
- Inform the public about the condition of salmon, steelhead and trout, 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 Council has increased its attention to strengthen education programs about salmon and watershed health, and is working with Montana State University and other northwestern states and British Columbia to develop a Columbia watershed teaching guide for secondary and adult education.

- 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.)

- Washington Department of Fish and Wildlife (WDFW) is the agency with primary responsibility for fish. WDFW considers salmon education a major priority in its continuing programs.

WDFW provides support to 12 regional fisheries enhancement groups -- volunteers whose major focus is salmonid restoration and propagation. WDFW provides technical assistance and other resources to the groups, which often perform the physical work needed to restore habitat, propagate fish and other related efforts. The 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.

The Department of Fish and Wildlife also maintains a "Salmon in the Classroom" program, which puts refrigerated aquaria and salmon eggs into classrooms. A similar program is offered in the Seattle area through Seattle Public Utilities. More than 500 teachers and their 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 schools frequently work with community members, including the regional fisheries enhancement groups, Trout Unlimited, Washington Trout and other environmental groups. Another school-focused program, Aquatic Wild, will offer 17 teacher workshops on salmon survival issues in 1999, estimated to reach 500 teachers.

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.

The Department of Fish and Wildlife (WDFW) is developing materials and other resources to enable individuals, businesses and institutions to:

- assess and improve their own practices which affect salmon;
- educate recreational fishers about the differences among hatchery, wild, Atlantic and native salmon;
- improve staff methods of placing new volunteers into salmon restoration projects;
- increase focus on wild salmon in teacher workshops and classroom materials;
- develop a slide show and speakers bureau on salmon recovery;
- provide "Salmon Saver Toolboxes" (trunks with educational materials for learners of all ages) to regional offices and other selected users; and
- develop a resource guide. The resource guide will explain the decline of the salmon, what government and civic groups are doing about it, how individuals or groups can become involved, and will have a contact list of those now active in salmon recovery.

Finally, through the Aquatic Lands Enhancement Account, WDFW will continue to make grants available to volunteer organizations for education, restoration and environmental monitoring, for school-based programs conducting habitat enhancements, and for development of outdoor learning labs.

The Department of Ecology is the agency with primary responsibility for water. Ecology supports watershed education for adults in selective 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 teachers training in using Project WET, a nationally acclaimed watershed education program for classrooms; and two other classroom-oriented curricula on wetlands and 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 1998 emphasis was on salmon and water, and this theme is expected to continue in coming years.

The Puget Sound Action Team (PSAT) 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.
- chemical and biological water quality monitoring.
- inventorying wetlands and streams and near-shore 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.

The Puget Sound Action Team (PSAT) will direct a special effort to educate local government officials on the importance of near-shore areas to salmonids and ecosystem health.

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 State 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 the 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 has developed some of the most innovative education for action programs in Washington.

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. DNR works on a continuing basis with students, schools and communities in Hood Canal to map, revegetate and restore riparian areas and streams where wild salmonids still exist, and to monitor those efforts for success. DNR selectively works with volunteers to place large woody debris into streams and do other work of benefit to salmon in the upper Yakima watershed. DNR works with volunteers on the Mountains to Sound Greenway.

Educational components of existing programs includes 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. DOH is a major sponsor of WaterWeeks.

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 near-shore monitoring, and provide education to others in conjunction with local, state and federal agencies and civic groups. The courses are offered in Clallam, Island, Jefferson, King, Kittitas and Pierce counties and in the Yakima watershed.

WSU Cooperative Extension has also established an Email listserver 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. The classes will be offered at the University of Washington campus, and via television at the WSU Cooperative Learning Center at Port Hadlock on the Olympic Peninsula.

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 the Salmon Team, Department of Fish & Wildlife, Puget Sound Action Team, Governor's Council on Environmental Education, Washington Association of Counties, Association of Washington Cities, Northwest Indian Fisheries Commission, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Washington State University Cooperative Extension, local governments and public utilities.

The committee has formed a broader coalition with Washington Sea Grant, Puget Sound Power and Light, local governments, regional fisheries enhancement groups, non-profit groups concerned about salmon and water, the Washington Association of Conservation Districts, the Lower Columbia Fisheries Management Group, watershed councils, A World Institute for Sustainable Humanity (People for Salmon), Adopt A Stream Foundation, 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:

1. 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.
2. Inform the public about the impacts of the Endangered Species-listed salmon, steelhead and trout in their watersheds.
3. Promote, expand and enhance volunteer resources needed to implement recovery efforts.

The coalition's mission, priorities and a needs assessment were developed at a meeting of 60 people representing 80 groups in August 1998. Work immediately began on the top priorities.

The coalition's priorities are:

1. Identify and bring interested groups and organizations together by watershed and region, assess their needs and identify resources; help to build and link education networks throughout the state.
2. Using the needs assessment and other information, complete a statewide education and outreach strategy that includes measuring the effectiveness of the actions.
3. Assist in coordination of information and resource sharing including the support of a clearinghouse(s) and networks managed by coalition members.
4. Identify people to serve as points of contact within watersheds and regions to facilitate communication and information sharing.
5. Develop, as needed, education tools and materials that provide the "basics" on salmon recovery and can be modified to meet area or sector needs.
6. As needed, organize, provide and/or support coalition members in delivering "training of trainers" materials and workshops.
7. Develop and link with local and regional speakers' bureaus.
8. Support, enhance and expand volunteer recruitment, training and placement efforts.

With support from Seattle Public Utilities, the Coalition has established a Puget Sound area information clearinghouse on salmon recovery, with a toll-free phone number and a Web site for the general public. These are currently staffed by King County, and soon will be staffed by the Seattle Aquarium. The toll-free number is 1-877-SALMON9. The Coalition will have access to materials and programs developed by individual members.

It has distributed 1,000 copies of a KCTS program, "Salmon on the Brink," supplied by Seattle Public Utilities.

The coalition is developing other joint and complementary activities and programs in cooperation with the Salmon Team. These include a statewide town hall meeting in early 1999, in cooperation with public broadcasting station KCTS, Washington State University Cooperative Extension, and Seattle Public Utilities. KCTS will produce and broadcast 12 shows on salmon recovery in 1999 and 2000.

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 Government Council on Natural Resources Education and Outreach Committee has recommended a model for measuring program effectiveness. This model would:

1. Establish criteria to evaluate the end result: changes in the factors that impact salmon recovery such as habitat restoration.
2. Identify the audience(s) and document and evaluate responses to the activities of programs provided.
3. 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.

V. Toolbox for Recovery

➢ ENFORCEMENT OF EXISTING LAWS RELATED TO SALMON

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

Background

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 population is occurring for fish stocks 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 Chapter II. Background: Setting the Context).

It is certain that successful recovery and restoration of salmon will hinge upon implementation 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 resources compliance programs (water resources, nonpoint water quality, forest practices, hydraulic permits, harvest, and mineral resources) reflect a broad range of staffing levels and approaches from complaint-based responses to having dedicated staff located throughout the state and providing variable levels of service (education, monitoring, enforcement, etc). (See Table 7)

Recent court decisions in the Pacific Northwest make it clear that voluntary programs and good intentions alone will not be enough to satisfy federal standards for listing 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 Department of Fish and Wildlife

Department of Fish and Wildlife carries out its hydraulics permit issuance by biologists in the field, who also handle first response to problems. Enforcement programs are carried out by the Department's commissioned officers working directly in communities around the state. Currently there are 142 commissioned officers, down from 177 in 1994. These officers are responsible for enforcing all of Department of Fish and Wildlife programs including: Hydraulic Project Approvals, fishing and hunting regulations, habitat protection, and resolving potentially dangerous human and wildlife conflicts. The Departments' enforcement philosophy is to seek voluntary compliance through education, outreach, and technical assistance before using direct enforcement mechanisms available in the law.

Environmental Law Enforcement at Ecology
Ecology is generally organized by programs addressing the primary environmental media (air, water, etc.) Enforcement personnel are located in each program in four regional offices. Enforcement authority is delegated by the Director to individual staff. Enforcement personnel are not commissioned officers, but they do receive training in enforcement policies, procedures and techniques. Staff typically carry out several other responsibilities (write permits, conduct facility inspections) so it is difficult to get more than a general estimate of enforcement resources. Estimates are 1.3 FTE for nonpoint and 1.0 FTE for water resources enforcement. 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 carries out its forest practices compliance program through forest practices field foresters in the seven DNR regions, as well as technical specialists in regions and in Olympia headquarters. Currently there are 106 FTEs in the program, with about half devoted to field compliance. 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 mined 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 and fish passage, screening of water diversion and harvesting of fish. In some 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 - RCW 90.58

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

Water Resources-Surface Water and Ground Water Codes - RCWs 90.03, 90.44 and
Water Resource Act of 1971- RCW 90.54

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

Water Quality- Water Pollution Control Act - RCW 90.48

- Primary responsibility 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 - RCW 76.09
- 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 - RCWs 75.10, and 75.12
- 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.
- Additionally these RCWs authorize, 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.

The intent of this chapter is for state natural resource agencies to lead efforts that achieve a high degree of compliance with environmental and natural resource regulation. 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.

Note: discussion and strategies on enforcement is included in each of the core elements. This chapter supplements those discussions and strategies.

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 on using voluntary compliance and support through comprehensive interaction and problem solving at the community level. However, collaborative problem solving takes time and sometimes is not successful. Therefore immediate 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 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 and where very limited effort is being made to comply with existing laws or where performance measures are not being met after a reasonable period of time.

- Keep 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. Local land use laws need to be better enforced at the local level.

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

Goal:
Enhance compliance with environmental and resources 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 to priority areas and problems first.
- 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 will 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. Some interaction occurs 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.

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 agency unique terminology and application is confusing to the public and does not aid in appropriate response.

Additionally, when agency representatives are questioned regarding jurisdictional issues outside of their respective program field or agency jurisdiction, misguided opinions and interpretations can result. Ultimately, this lack of consistency and certainty leads to further compliance problems.

Pursuant to the Regulatory Reform Act of 1995, agencies must encourage voluntary compliance by providing agency assistance prior to imposition of civil penalties. Impacts of the Act on resource agencies have been to set up programs to provide technical assistance and provide opportunities for violations to be corrected prior to issuing civil penalties. Compliance is usually gained by employing a variety of remedial enforcement tools. The Act does provide a list of exceptions of violation categories that do not require notice or opportunity to correct a violation prior to issuing a civil penalty.

Table 8 represents the various enforcement tools utilized within four environmental statutes administered by the three natural resource agencies. Although a statute may provide specific language that must be adhered to in some cases, it is within the remedial enforcement steps, prior to civil and or criminal penalties, where standardization of enforcement tools could be improved. Enforcement tools could include standardization names, standard form use, and standard application within intended guidelines.

Consistent with mandates to improve compliance, increase agency efficiency, and consistent with future work sharing, the three main natural resource agencies will develop standard enforcement terminology (nomenclature) and protocols to improve public understanding, enhance the ability of agency field representatives to respond, interpret, and react consistently statewide.

This standardization will be the responsibility of the three agencies' enforcement coordinators and will be done in conjunction with efforts to increase coordination of technical assistance and compliance monitoring and work sharing among the agencies (see discussion below).

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 process:

- *Coordinate Salmon-Related activities.* All agencies have broader responsibilities and goals for compliance/enforcement programs. It is not the intent of this proposal to coordinate all the compliance/enforcement work of the three agencies. Only activities related to salmon recovery will be coordinated at this time. 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, WRIA, multi-WRIA, or 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/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.

- *Product.*
    - 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 with enforcement responsibilities related to natural resources.

Work Sharing
Natural resource laws and regulations have typically been monitored and enforced by the agency designated in the authorizing statute. As higher compliance levels with regulations are required to solve natural resource problems, it is important to take a more "global" look at how regulations can best be monitored and enforced. This 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.

- Since 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 is as follows:

(1) Expand the role of WDFW Enforcement Officers in environmental enforcement;
Fish and Wildlife officers are geographically deployed statewide. They are professional, highly trained natural resource oriented law enforcement officers. The WDFW enforcement program operates under a philosophy of striving for voluntary compliance through comprehensive interaction and problem solving by local Fish and Wildlife officers at the community level.

> * 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 Federal listed and proposed to be listed fish species.

WDFW enforcement officers could, for example, conduct systematic and routine field monitoring to determine compliance with regulations and permits, prepare a detailed case report to document violations, and participate with Ecology in a jointly developed strategy to resolve significant violations.

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.

Activities considered for work sharing relate to protecting/restoring habitat under the Statewide Strategy to Recover Salmon. For Ecology these activities are conducted by the Water Quality Program, the Water Resources Program, and the Shorelands and Environmental Assistance Program.

(2) 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 considered related to Ecology's key habitat related statutes. They are as follows:

- *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 be used 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 can include Fish and Wildlife officers directly enforcing habitat-related laws and regulations, if their statutory authority were expanded by the Legislature.

(3) Recommendations for work sharing between Ecology and Fish and Wildlife
Preliminary discussions between WDFW and Ecology have already taken place regarding sharing enforcement work. A pilot project was conducted recently in which Department of Fish and Wildlife officers conducted some compliance monitoring for diversion screens and simultaneously checked whether the water diversions had a water right.

For each environmental law (water quality, water resources, and shoreline) a different level of involvement is proposed based on the unique aspects of the law, the degree of overlap with Fish and Wildlife officers' current duties and the level and effectiveness of the current compliance enforcement program at Ecology.

Statutory changes and additional resources are needed to expand the role of WDFW enforcement officers beyond just providing education (level 1), and general compliance tracking and monitoring activities (level 2). So at this time we are recommending that work sharing be limited to levels 1 and 2.

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

State efforts to enforcement nonpoint will focus in areas targeted by the implementation of the "Agricultural Strategy". The Forestry Module process is focusing on compliance of Forest Practices. The Land Use chapter addresses compliance related to land use decisions. WDFW has developed an "Enforcement Program Strategic Plan" to address violations of HPA, fishing regulations, and other compliance issues/strategies.

The focus in this section is on water resources. This is due to: (1) lack of water availability which is a significant cause for declining salmon habitat and population in many basins (e.g. over-appropriated basins), (2) in most hydrologic settings, instream flows for fish (often already depressed) are taking the brunt of illegal/unauthorized withdrawals, and (3) the absence of any significant enforcement resources to address existing violations and prevent future violations. (See Chapter IV. A. 5. Ensuring Adequate Water in Streams for Fish.)

Ecology has authority to issue a regulatory order to a person violating or about to violate a state water law or regulation. Use of water without a water right is clearly a violation of the water code which requires that any new surface water use initiated after 1917 and any ground water use initiated after 1945 must be under a permit issued by Ecology. The law is also clear that the parameters on a water right relating to quantity, place of use, purpose of use, point of diversion of withdrawal, maximum acreage irrigated, and special conditions specified in the water right are all legal limits on the use of water. Failure to comply with such limits is a violation.

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. A general adjudication of water rights can determine the validity and quantification of all claims in the basin. Until claims are adjudicated, they remain a major uncertainty.

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. Only the Superior Court in a general adjudication of water rights can make such a determination. (Rettkowski v. Ecology) This casts some uncertainty over whether Ecology truly can regulate illegal or excessive uses when those uses are based on a claim (whether legitimate or not) until after those claims have been adjudicated. (See section E on Enhancement of Authorities.)

A major problem for regaining control over illegal and excessive use is also 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. It is recommended elsewhere in this chapter that new resources be provided to allow for coordinated enforcement employing WDFW enforcement officers.

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 listed in Chapter IV. A. 5. Ensuring Adequate Water in Streams for Fish.

Recommendations to Address Lack of Compliance
For each basin with ESA listing or likely listing and with known illegal activities, an action plan will be developed and fully implemented according to the schedule outlined in the chapter on Ensuring Adequate Water in Streams for Fish. This could be part of watershed planning under Chapter 90.80 RCW. These plans will address all or some of the following items. For more details refer to chapter on Ensuring Adequate Water in Stream for Fish, especially the section on baseline actions and immediate actions.

- Requirements for installation of meters, measuring and reporting water use.
- Restriction of 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.
- Enforcement of standards for beneficial use and waste.
- Enforcement actions to be taken by the state to stop any further withdrawal of water.
- 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.
- Public education and involvement 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. It would be a great mistake to suppose the paper documents that will comprise the mode and form of salmon recovery will 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 very well informed both about the regulatory requirements of the program and about on-the-ground practices in their areas. Agencies should find ways to make better use of that citizen expertise in the overall compliance effort.

One model that has been successful on a small scale is the *community ombudsman* initiative in the Forest Practices program. DNR compliance staff trained an already knowledgeable and interested community member on Vashon Island to serve as an intermediary between agency staff and island residents about forest practices issues on the island. This individual now fields many citizen questions and complaints that otherwise would have gone to the agency, and also sends on high quality information that can be acted on by agency staff.

This model is now also being followed on Camano Island. Applicability to islands is favorable because of their limited size, discrete boundaries, and limited population. Broader applicability may be feasible, but over a broad area with a large and mobile population and many forest practices, it may be difficulty for an ombudsman to credibly buffer between the agency and overall population of interested citizens.

In any case, a heavy up-front investment of training time by agency staff is needed, and a good candidate for this citizen role must have good prior knowledge of the program, be highly motivated, and have time available. Natural resource regulatory agencies have also made less formal use of interested and knowledgeable citizens as occasional intermediaries between the agencies and a concerned public. These efforts can continue and be expanded.

The use of 1-800 information hotlines is another tool that will be explored for greater use, especially if levels of access could be established, such that the most knowledgeable citizens with potentially the most useful information have priority access to the attention of agency staff.

Public Involvement in Monitoring and Tracking- "Grassroots efforts"
Agencies need to generate support and commitment to compliance from a wide variety of interests. Also they need to increase public involvement in environmental and resources management and protection activities. A 1996 survey revealed nearly 160 groups with 12,000 monitors, over 8,000 of these tracking water quantity and quality. 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 the communities to solve natural resources 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 heath of a watershed and it is a proven path to natural resource stewardship by groups of citizens.

- Develop local stakeholder groups (as discussed above) within watersheds and salmon recovery units.

Stakeholders Groups
Agencies will need to develop salmon recovery stakeholder groups strategy that will reach broad based and diverse constituency groups that actively participate in decision and implementation processes. 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

There are many advantages that stakeholder groups provide. First, they provide a forum for conflict and cooperation. Participants are able to share perspectives and views, thereby increasing understanding. Through this process, bargaining, negotiation, and exchange occur. In short, buy in and agreed-upon advocacy develops. The various interests groups also find security and continuity in decisions and actions. And, perhaps the most important feature that develops out of stakeholder groups is formal forms of influence on legislative processes and public opinion.

Enhancement of Authorities
Generally, agencies have the authority to enforce natural resources 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 (note: bills have been introduced several times in the past five years on several of the changes needed, but none passed):

1. Authority to enforce among competing water rights (Sinking Creek fix). In the Sinking Creek case (Rettkowski v. Ecology) the Supreme Court ruled that Ecology had no authority to determine the validity and relative priority of competing water rights, absent a general water right adjudication. Water users facing impairment are forced to seek relief on their own, in a Superior Court.

   Changes are needed to clarify Ecology's enforcement authority, authorize Ecology or any water right holder or claimant to bring an action in Superior Court, authorize the Superior Courts to make a tentative determination of the validity and quantification of the rights and claims in dispute, or to enable Ecology to regulate the rights. This is important for fish protection because illegal use under water right claims may impinge on adopted instream flows or trust water rights acquired by the state, or otherwise diminish stream flows.

2. Penalty for violations of the Water Code. Currently Ecology is authorized to levy civil penalties of up to $100 per day for violation 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.

3. Add requirement for performance bonds for shoreline permits and potentially other permits. 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. Changes could be a discretionary requirement for either local or state governments to require permit applicant to post a performance bond to ensure protection and implementation of permit provisions.

4. Expand the appointment of stream patrolmen and water masters. Stream patrolmen and water masters are appointed by Ecology to divide, regulate and control the use of water and prevent excess use of water or illegal uses. Currently stream patrolman can be used only in adjudicated basins. Water masters can be assigned every where in the state, but their appointment is contingent on availability of state funds. Legislative changes are needed to remove barriers to the appointment of stream patrolman.

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 budget recognizes the importance of enhancing enforcement of existing Natural Resources Laws to salmon protection and recovery and provided modest increase in staff and resources to WDFW, Ecology, and DNR. See "early actions" in the implementation plan for information on where the resources will be deployed.

<u>Water Resources Enforcement:</u>

Prior to about 1980, the Department of Ecology employed water masters assigned to various locations around the state to regulate water rights. Gradually, these positions were eliminated or brought into the four regional offices located in Spokane, Yakima, Bellevue and Olympia. Only the Walla Walla water master position remains today and it is only partially devoted to enforcement. A consequence of this retrenchment into the regional offices is a remoteness and isolation from the communities where water is used.

Several years after establishment of instream flows for three WRIAs in Ecology's Central Region the water resources program developed an innovative instream flow compliance program. In each basin, a main stem gauging station was equipped with real time monitoring and reporting hardware. This allowed the regional office to remotely determine the status of stream flows in each basin (above or below the adopted flows, increasing or declining, etc.). In addition, the regional office began using stream flow forecasts available each spring to predict whether instream flows were likely to be met or not, and the severity of any predicted shortages.

The regional office established a toll free number for persons with conditioned water rights to call daily to determine whether they were authorized to divert water or not. When a short water season was predicted the office mailed out orders to holders of conditioned rights warning of a probable need to regulate conditioned diversions and requiring them to call into the toll free information number. Field checking was done to determine and assure compliance. This process was successful in protecting instream flows.

In 1992, Ecology received funding for six new water resources enforcement positions. One position was designated the state enforcement coordinator. The positions were assigned to investigate the extent of illegal water use within five areas of the state. However, severe budget reductions in 1994 resulted in elimination of nearly all dedicated enforcement positions in order that Ecology retain a modicum of capability to do permitting. Two enforcement positions were retained. Consequently, the program returned to a low effort compliance-based approach. Even this has now dwindled to the equivalence of perhaps one person spread among several staff.

The program identified a significant need for increased compliance and enforcement including enforcement of metering, flow monitoring and regulation, and implementation of basin immediate and default compliance actions.

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

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/agreements, and number of recurring violations,

- 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/entities reached through compliance tools, and

- Effective coordination and building capacity such as number of agreement, or delegations order signed, and number of cross agencies training programs.

Table 7 - Compliance Programs Relating to Salmon Recovery

Compliance/ Enforcement	Water Resources	Water Quality Nonpoint	Forest Practices	Surface Mining	Hydraulic Permits, Fish Passage/Screen & Fish Harvest
Actions	S Enforce to Protect IF. S Enforce against illegal / unauthorized use. S Enforce against wasteful practices.	S Enforce to protect water quality standards. S Enforce against water quality damage.	S Enforce forest practices permits and take action to prevent damage to public resources and recover cost of damage.	S Enforce surface mining permits and reclamation plans.	S Enforce hydraulic projects and other work, fish passage and screens & illegal take related to harvest
Authorities	S Several broad authorities. S Very low penalty $100/ day per violation. S RCW: 90.03, 90.54, 90.22, 43.21A	S Broad authority prohibiting certain activities to protect water quality standards. S Penalties up to $10,000 per day, jail up to 1 year. S Several nonpoint sources are regulated by local and other agencies. S RCW 90.48, 90.64 S CWA	S Statutory authority generally adequate. S Penalties 10,000 for violations. S RCW 76.09	S Generally adequate civil penalties. S RCW 78.44	S Generally adequate. Violations are misdemeanor or gross misdemeanor (90 day / 1 year - $1000/5000). Violations under certain conditions could become felony with 20 years jail and $20,000 S RCW 75 & 77
Effectiveness	S Very low effort, some complaints response. No enforcement actions. S Widespread violations . S Severe staff resources limitation - less than 2 FTE. S No broad support	S Capability is limited by key barriers; defuse sources, difficult to discover violations. S Resources limited 1.3 FTE=s. S Size of problem is enormous (e.g. over 30,000 farms). S Limited local governments enforcement. S Some complaint response.	S Statutory time limits lead to more office work than field contacts. S 9432 apps, & renewals - 1997. S 106 FTE for program with 40/60 field/office ratio. S Progressive enforcement process with graduated. structure - repeated offenses subject to maximum penalty.	S Total current permits 1250 (100 in flood plain). S Field / office ratio about 2/1. S Reclamation plan required to address riparian issues. S Less than 5% actions requiring enforcement. S Could be more effective if local governments. designate upland mineral sources.	S HPA issued in 1997 - 6,539 with 1,826 field checked. Remainder are spot checked S 12605 citations were issued (205 relate to HPA and screens & illegal harvest) S 142 FTE with 98% field deployed around the state S Limited role in env. habitat protection S Need broad funding base and new

			S Effectiveness could be improved with more field presence.		resources to address ESA take issues.

Table 8 - Enforcement / Compliance Tools

Water Resources Dept. Of Ecology	**Technical Advisory Visit** Site visits requested or accepted - Notice and opportunity must be provided to correct and to retain option of civil penalty	**Verbal/written Warnings** - Informal - Request action be taken to prevent or correct violation	**Notice of Correction** - Informal action although public record - Used to indicate a complaint has been observed during an inspection	**Administrative Order** - Formal order requiring correction to prevent or correct violation - Require specific actions or solutions - Certified Mail - Appealable to PCHB	**Notice of Penalty** - A monetary fine for a document violation - Appealable to PCHB	**Civil Penalties** Authorized civil penalties for violations of any provision of RCW 90.03 and 90.44, any regulations or administrative orders - Appealable to PCHB	**Relinquishments of Rights** - Non-Beneficial use of water - Water Right reverts to state - Appealable to PCHB	**Criminal Penalties** - Violations of the Water code or Well Construction Act - misdemeanors
Water Quality Dept. Of Ecology **Some violations categorized - act as thresholds for determination of enforcement response*	**Technical Advisory Visit** -Site visits requested - Notice and opportunity must be provided to correct - Must be utilized to retain option of civil penalty	**Verbal/Written Warnings** - Informal - Request action be taken to prevent or correct violation	**Notice of Violation (NOV)** Formal notice that a specific violation occurred or is about to occur and request of violator (typically within 30 days) steps being taken to correct violation.	**Administrative Order** -Formal order requiring correction and prevention of violation - Require specific actions or solutions - Certified Mail - Appealable to PCHB	**Civil Penalties** Authorized civil penalties for violations of any provision of RCW 90.48 and provision of regulations or administrative orders - Appealable to PCHB	**Resource Damage Assessments** Pollution incident that results in quantifiable damages to natural resources - Appealable to PCHB	**Cost Recovery** Action taken to recover cost incurred by Ecology to investigate and clean up oil spill	**Court Action** Formal referral to AG=s office for court action when administrative actions have failed
Hydraulic Permits Fish Passage/ Screens	**Technical Advisory Visit** - Informal - Initiated by non-enforcement technical staff	**Verbal/Written Warnings** - Informal - Request action be taken to prevent or mitigate done by non-enforcement technical staff	**Verbal Warning** - Informal - Initiated by Fish and Wildlife Officer requested by technical staff	**Written Warning** - Formal enforcement document - Initiated by Fish and Wildlife Officer - May be instrument for innovative settlement/	**Civil Penalties** - Used infrequently	**Criminal Penalties** - Used for flagrant violation, repeat offenders, extensive resource damage - May seize and forfeit		

Table 8 - Enforcement / Compliance Tools								
Dept. of Fish and Wildlife				mitigation - May be issued as time-line requirement or criminal citation issued		equipment - misdemeanors, or gross misdemeanor felony/ jail		
Forest Practices Dept. of Natural Resources	**Informal Conference Notes (ICN)** Informal Discussions Prevent Compliance Problems	**Technical Advisory Visit (TAV)** Landowner/operator request-documented on ICN	**Technical Assistance Visit Compliance Notice (TAVCN)** Formal enforcement document when violation is discovered during TAV – When stop work order is not necessary - Not final order of Department and not appealable to FPAB	**Notice of Correction (NOC)** - Not final order of DNR and not subject to review by FPAB - Used when a violation is discovered and other enforcement documents cannot be served. A SWO is not necessary and ICN or TAV failed to produce desired results	**Notice to Comply (NTC)** Formal enforcement Document - Final order of Department - Subject to review by FPAB Financial assurances repaired.	**Stop Work Order (SWO)** Formal notice to operator to shut down - Final order of Department and subject to judicial review by FPAB or courts	**Civil Penalties** Fines Imposed when other enforcement measures have not been effective -Subject to review by Supervisor of DNR then FPAB	**Criminal Citations** Used when: intentional, reckless act; repeat offender; monetary gain; severe public resource damage

* Table does reflect major enforcement tools utilized by each program. Table is not inclusive nor does it intend to depict all enforcement tools available to each program.

V. Toolbox for Recovery

➢ PERMIT STREAMLINING

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

Background
Land development, transportation and many other types of projects that involve work in or near streams, estuaries, or nearshore marine waters create inherent risks to salmon habitat. Projects that are 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 are well-coordinated and provide a consistent level of protection to prevent or mitigate the potential impacts of permitted projects on salmon habitat. Effective and efficient permit programs also benefit project sponsors, including sponsors of habitat protection and restoration projects.

Salmon habitat has already been degraded or is threatened with degradation in many areas of the state. 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 that are related to permitting and are part of protecting and restoring salmon habitat within the context of the Statewide Salmon Recovery Strategy. These strategies are: 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 that are beneficial for habitat. These two strategies are strongly linked because efficient, effective review and approval of projects is dependent upon successfully streamlining permit procedures while developing and implementing good guidelines for project design. They also have a broader purpose of protecting habitat from the impacts of projects that are for purposes other than habitat protection or restoration. Success in these efforts is also a part of the state's ESA response strategy, which will enable state permit programs and permitted projects to be in compliance with the ESA.

Current Applicable Policies and Programs

This chapter does not attempt to describe the organizational and procedural details of the many programs related to habitat protection and restoration. There are many federal, state, tribal and local programs that have roles in the funding, authorization and implementation of habitat protection and restoration projects.

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

- State Environmental Policy Act (SEPA) – SEPA checklist, project reviews, assessments and impact statements, and use of substantive authority.
- Hydraulic Project Approvals (HPA) –Washington Department of Fish and Wildlife administered permits and conditions for projects that propose to use, obstruct, divert or change stream beds or flows.
- 401 Water Quality and Coastal Zone Management Consistency Certifications – Department of Ecology review and certification of project compliance with state water quality standards and state coastal zone management policies for federal projects or projects requiring federal permits.
- Forest Practices Permits – Department of Natural Resources (DNR) permits for timber harvest and other practices involved in forestry operations.
- National Pollutant Discharge Elimination System (NPDES) Permits – Federally authorized permit program delegated to Department of Ecology for various types of permits to discharge wastewater or stormwater to surface waters.
- Pesticide Application and Management – Department of Agriculture permit program for applying or supervising the use of pesticides for commercial agriculture.
- Surface and Ground Water Withdrawals – Department of Ecology administered program for use surface or ground water.

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 logical, pragmatic 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 protection and restoration projects within a region (i.e. one or more Water Resource Inventory Areas); designating local 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) has established authorized approaches to streamline state and local permit requirements for certain 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. Goal and Objectives: *Where do we want to be?*

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

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

Permit Process Streamlining

1. Past Work
An Interagency Permit Streamlining Workgroup (IPSW), which includes staff from the Departments of Ecology (Ecology), Fish and Wildlife (WDFW), and Transportation (WSDOT), local governments, and federal regulatory and resource agencies, have been working for more than two years. The IPSW has made a number of contributions to permit streamlining to identify problems and solutions that would streamline all permits (including emergency permits) that affect waters of the state. Examples of contributions include:

1) Memorandum of Understanding between WDFW, Association of County Engineers and Public Works Directors, Ecology and WSDOT to streamline permit process during emergencies.

2) Implementation and training on flood hazard reduction strategies and permit streamlining for watershed restoration projects under SB5442, passed in 1997 session.

3) Definition and identification of "imminent threat" and an expedited (i.e.15 day) HPA process in such circumstances, immediate oral approval for HPAs during emergencies, plus authorization for 5 year HPAs for maintenance projects, when they are consistent with approved county flood plans.

2. Overview of 2SHB 2879 – An Act Facilitating the Review and Approval of Fish Enhancement Projects

The legislature passed 2SHB 2879 (Chapter 249, Laws of 1998), providing 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
- Provide instream structures that benefit naturally reproducing fish stocks.

Projects must be approved in one of the following ways:

- By WDFW, under the Regional Salmon Enhancement Program, or the Volunteer Cooperative Fish and Wildlife Enhancement Program; or
- By the sponsor of a watershed restoration plan, as provided by law; or
- By the WDFW as a department-sponsored fish habitat enhancement or restoration project; or
- Through the review and approval process for the Jobs for the Environment Program; or
- Through the review and approval process for conservation district-sponsored projects; or
- Through a formal grant program established by the legislature or the WDFW for fish habitat enhancement or restoration; or
- Through other formal review and approval processes established by the legislature.

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 (e. g. section 404 permit) or local permit (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, or 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.

3. Emergency Permitting

Criteria and procedures for use of 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, 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. This can encourage people or agencies to wait until the damage has occurred, to work during or after the flooding event when damage to fish and habitat is greater, and to fail in addressing the cause of the problem and preventing its reoccurrence.

In addition, projects that include design or structure revisions to address flood hazard reduction or future flood avoidance are automatically penalized with a reduction in the funds available. Federal, state and local agencies have been discussing changes needed to address emergency permitting without causing any further harm to salmon habitat.

4. Joint Aquatic Resource Permit Application (JARPA)

The Departments of Ecology, Fish and Wildlife, and Natural Resources worked with cities, counties, and federal agencies to develop a single permit application form to keep what was originally seven to nine different application forms and over ten different permit actions. With passage of the legislation on fish enhancement projects (2SHB 2879), use of JARPA is now mandatory for certain types of recovery projects. The JARPA "cover sheet" information has been revised to reflect the eligibility requirements of the new legislation. A few other improvements for enhanced usability were also incorporated.

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.

5. Further Work

The Joint Cabinet will provide ongoing resources and support for the efforts of the Interagency Permit Streamlining Workgroup (IPSW). The ISPW has been reorganized and renamed as the Permit Streamlining Oversight/Advisory Committee. The new structure includes five technical sub-committees - Interagency Stream Corridor Workgroup; Mitigation Workgroup; Fish Habitat Improvement Subcommittee; JARPA workgroup; and Flood Hazard Reduction sub-committee. These workgroups and related subcommittees have developed a formal working relationship, through the umbrella of the Permit Streamlining Oversight/Advisory Committee.

The Permit Streamlining Oversight/Advisory Committee's goal is to gain consensus among all participating agencies on changes to laws, rules and programs that will help improve and broaden streamlined permitting and funding opportunities for habitat enhancement, restoration, and protection activities.

The work of the Permit Streamlining Oversight/Advisory Committee will include:

- coordinating the implementation of 2SHB 2879 and seeking consensus among local, state, tribal and federal agencies as to acceptable habitat protection and restoration project applicants, project types, and project sizes and scales that protect public safety;
- elevating issues and recommendations, particularly for changes in federal requirements, as needed to the Joint Cabinet;
- identifying and seeking the funding needed to implement permit streamlining activities for habitat enhancement and restoration required but not funded by 2SHB 2879.

The Permit Streamlining Oversight/Advisory Committee should continue the efforts outlined in Table 9 illustrating committee structures for 2 years, or until June 30, 2002. At that time, the Joint Cabinet will evaluate the progress being made and the need to continue this work.

Table 9 – Permit Streamlining Organizational Structure

Mitigation Workgroup (2SHB 2496)	Interagency Stream Corridor Workgroup	Fish Habitat Improvements Committee (2SHB 2879)	Joint Aquatic Resource Permit Application (JARPA) Subcommittee	Flood Hazard Reduction Subcommittees
♦ Develop Acceptable Interagency Strategies for Mitigation and Criteria for Use ♦ Work with stakeholders, WSPI, and other existing workgroups ♦ Implement Strategies in watershed plans ♦ Provide training ♦ Complete pilot tests of new preservation policies for Nationwide Permits ♦ Create interagency agreement for use	♦ Develop Integrated Stream Corridor Management Guidelines ♦ Develop guiding principles and users manual ♦ Provide training ♦ Identify permit streamlining incentives for using guidelines ♦ Create interagency agreement for use ♦ Develop guidelines on restoration and mitigation	♦ Suggest revisions to 2SHB 2879 for increased habitat improvements ♦ Training on 2879 requirements to local governments, WDFW, and applicants ♦ Develop Corps and Ecology general permit ♦ Develop criteria for habitat improvements ♦ Report to legislature	♦ Make annual revisions ♦ Suggest legislative revisions ♦ Provide updates and training to local govts. And JARPA agencies ♦ Increase us of and effectiveness of form ♦ Develop and implement JARPA phase II - single state permit	♦ **3110 Subcommittee** ♦ Implement HB3110 and draft 1998 legislation ♦ Implement flood hazard reduction initiatives ♦ **Levee Vegetation Workgroup** ♦ Revise Federal Levee Vegetation requirements ♦ Emergency Permit Subcommittee ♦ Revise federal funding requirements that drive poor project planning and construction ♦ Develop "imminent threat" exemptions/general permit ♦ Criteria for mitigation

While streamlining the permit process is an important endeavor, adequate staffing for implementation of state permits is still a prime concern. Improperly designed "restoration" projects can cause considerable damage to the ecosystem. Projects intended for fish restoration can damage other parts of the ecosystem; for example, wetlands. State guidance is needed to direct local reviewers in dealing with ESA issues and coordinating with the Federal government.

In addition, a necessary ingredient for permit streamlining is the availability and use of consistent guidelines for designing, reviewing and approving projects in stream corridors.

Development and Application of Integrated Stream Corridor Management Guidelines

1. 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 these relate to salmon habitat recovery. This characterization is an essential step because it will help watershed communities direct limited 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. Using a watershed characterization, areas that – if restored – would best address known habitat deficiencies for the respective stock, such as limited winter rearing habitat, providing base flow support to streams, or alleviating flood impacts can be identified and then targeted for project sponsorship and funding. Thus, an early emphasis on watershed characterization can save time and expense.

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 on the ground. These protection and restoration actions cover a range of habitat elements and processes, including such areas as headwater spawning beds, stream corridors, wetlands, shorelines, etc. 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 good understanding of the physical and biological dynamics of stream corridors to successfully recover salmon stocks, to avoid inadvertent damage to existing riparian and fish habitat, and to avoid causing undesirable new flooding impacts elsewhere on the stream. A common understanding of stream science, and a statewide consensus on appropriate techniques and treatments for habitat rehabilitation will optimize funds spent on salmon recovery efforts. A technical consensus will also facilitate streamlining of permitting and improve efficiency and effectiveness of regulatory programs.

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.

2. 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 nuts and bolts technical details that people can apply in the field to restore or rehabilitate habitat or stream corridor function or minimize future damage. Table 10 is a preliminary list of habitat elements and related guidelines for habitat restoration that are currently needed (only a few of which are under development or are available) and identifies gaps in those guidelines.

The table includes several elements beyond detail design guidelines; such as, watershed assessment and monitoring and evaluation. These three restoration elements, i.e. characterization and assessment, remedial action, and feedback, must be developed concurrently so they can relate and interact. Characterization and 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.

The habitat element in Table 10 describes specific physical habitats or processes required as part of restoration efforts. The "Need" column lists documents that describe this element as a habitat need.

A guideline addresses a level of quality to be designed to or a process through which a design or assessment is developed. The desired level of quality must be understood in order to develop an appropriate guideline. The guidelines for habitat restoration are based on optimum habitat conditions and goals. The "Desired Conditions" column lists known documents that describe optimum conditions for each habitat element.

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. The "Goal" column in Table 10 lists known documents that recognize habitat condition goals.

The "Guideline" column lists known documents that contain on-the-ground nuts and bolts procedure used by a practitioner to achieve the desired condition or goal. It is the actual "what to do" or "how to do it" to achieve a stated rehabilitation goal. Items listed in the guidelines column may provide a comprehensive or partial standard for the specific element.

Table 10 is very preliminary; there are certainly additional habitat elements and documents that can be added. It is included here only to generally show the extent of information available as a first step in development of habitat restoration guidelines. It shows us the guidelines that are currently available, and those that are not. Blank cells in the table may represent information gaps for habitat recovery. It is not expected that specific guidelines will necessarily be required for every habitat element. Many elements within the table will be combined as guidelines are developed. Items listed in Table 10 are not necessarily officially adopted or accepted by state of Washington resource agencies.

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

Table 10. Habitat Elements and Habitat Restoration Guidelines

Habitat element	Need(s)	Desired Condition	Goal	Guideline(s)
Ecosystem Scale				
Watershed assessment	NMFS, WSP			WDOE, CF&G
Monitoring, Evaluation	NMFS, WSP	TFW		CF&G
Frequency, magnitude, and duration of disturbances	NMFS, WSP	NMFS, WSP		
Nutrient cycling	WSP			
Flushing flows		NMFS		
Reach Scale				
Channel complexity	WSP	TFW, NMFS		
Channel condition (w:d)	NMFS	NMFS, HB1309		ISPG
Channel condition: pool/riffle		TFW, HB1309		
Channel condition (form)	ISPG	TFW, HB1309		ISPG
Sediment quality and transport	WSP	WSP, TFW		
Sediment control measures	WSP, WDFW (WAC)			
Streambed stability		TFW		
Riparian area dimensions	NMFS, WSP	NMFS, WSP	SWC	SWC
Riparian structure	WSP, TFW, WDFW (Rip)	TFW, WDFW (Rip), SWC, HB1309		SWC, CF&G
Refugia	NMFS, ISPG	NMFS		
Wetlands	WSP			
Hyporheic connectivity				
Floodplain connectivity	NMFS	NMFS		
Side channel connectivity	ISPG	ISPG		ISPG
Estuary tidal, water quality restoration	WSP			
Near shore marine habitat	WSP			
Near shore migration corridor	WDFW (WAC)			
Microhabitat Scale				
`Spawning gravel quality	WSP, NMFS	NMFS, HB1309		
Spawning gravel sources	WSP			
Spawning gravel supplementation	WSP			
Spawning gravel sorting		NMFS		CF&G, BCME
Summer rearing habitats; debris, pools	WSP, NMFS	NMFS, SWC, HB1309		CF&G, BCME
Winter rearing habitats; side channel habitats	NMFS	NMFS		
Large woody debris		HB1309, TFW, NMFS		
Streambank	NMFS, WDFW (WAC)	NMFS, ISPG		ISPG, CF&G

Note 1. Table 10 is representative, not inclusive.
Note 2. For abbreviations see next page.

Abbreviations:

BCME:	British Columbia Ministry of Environment watershed restoration manual
CF&G:	California Dep't of Fish & Game restoration manual
HB1309:	Ecosystem Standards for State-owned Agriculture and Grazing Land
NMFS:	National Marine Fisheries Service draft Essential Fish Habitat
ISPG:	Wash. Dep't of Fish & Wildlife Integrated Streambank Protection Guidelines
SWC:	Skagit Watershed Council
TFW:	Timber Fish and Wildlife/Forest Practices Rules
WDFW (Rip)	Wash. Dep't of Fis h & Wildlife draft Riparian document
WDFW (WAC)	Wash. Dep't of Fish & Wildlife WACs
WDOE:	Wash. Dep't of Ecology Watershed Characterization Process
WSP:	Washington Wild Salmonid Policy

3. Strategy for Integrated Stream Corridor Guidelines

There are numerous stream habitat elements for which habitat restoration guidelines are needed as shown in Table 10. The eventual product will be an "*Integrated Stream Corridor Management Guidebook*."

- The Guidebook will consist of a series of specific documents that provide detailed restoration and protection 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 activities that will need to be meshed and coordinated with guidebook development include:
    - Review and amendment of federal standards such as Natural Resource Conservation Service (NRCS) Field Office Technical Guides (FOTGs); (See Chapter IV. A. 1. Agricultural Strategy to Improve Fish Habitat)
    - Habitat Conservation Plan developed by Department of Fish and Wildlife for its Hydraulic Project Approval permitting program;
    - Design and approval process for projects under permit streamlining of fish enhancement projects authorized under 2SHB 2879;
    - Rule changes as necessary under the Shoreline Management Act, Floodplain Management Act and the Hydraulics Code;
    - Project selection and funding for habitat restoration.

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

The proposed solution includes the completion and implementation of the ISPG as a model for additional guidelines to be developed and as an important element of the Integrated Stream Corridor Management Guidebook. It will also serve as a starting point to develop the scope of the entire Integrated Stream Corridor Management Guidebook.

Support for ISPG implementation, particularly for outreach and training needs, will be important. The ISPG can also serve as a foundation, at least in part, for the collaborative process for review and amendment of Natural Resource Conservation Service (NRCS) Field Office Technical Guides (FOTGs) that is underway and for the Habitat Conservation Plan being developed by the Department of Fish and Wildlife for its Hydraulic Project Approval permitting program.

The Integrated Stream Corridor Management Guidelines will be implemented through a variety of means: as “best available science” for interpretation of permit conditions and mitigation under the Shoreline Management Act and the Hydraulics Code; as minimum standards for permit streamlining; and as the basis for state-federal agreements on interpretation of the Natural Resource Conservation Service’s (NRCS) Field Office Technical Guides (FOTG).

4. 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 the Departments of Fish and Wildlife, Ecology, Transportation, 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.

Some funding was provided by the 1999 legislature to the Department of Transportation. The ISCW is also obtaining funding through the Salmon Recovery Funding Board for the activities listed in Table 11.

Twelve general project types have tentatively been identified as needing technical guidelines (see Table 11). Specific guidelines will be identified through a technical scoping process and technical 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 we learn from restoration monitoring activities.

Users of the guidelines will include local government public works and community development departments; local conservation districts; quasi-governmental and private watershed and salmon restoration groups; state and federal agency resource managers; resource management consultants; and others with specific interest in salmon habitat protection and restoration and a need for detailed information.

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.

At present, the complete guidebook is contemplated to include eleven guideline volumes in addition to the Integrated Streambank Stabilization Guidelines that have already been drafted. Each volume will include a variety of specific products including hardcopy, CD-ROM, and internet publications; technical, regulatory, planning, and landowner workshops; and other information publications.

TABLE 11. INTEGRATED STREAM CORRIDOR MANAGEMENT GUIDEBOOK
Proposed Components of Habitat Protection and Restoration Guidelines

Sequence	Component	Habitat issues addressed	Application of Guidelines
1.	*Integrated Streambank Protection Guidelines* (in preparation)	spawning, rearing habitat, lost opportunity mitigation	HPA, SMA, FOTG, ESA compliance, FEMA DSR's, Corps 404/10, Flood hazard management plans, PL 84-99
2.	Channel Design Guidelines	channel relocation, channel condition, channel complexity	HPA, SMA, FOTG, ESA compliance, Corps 404/10
3.	Fish Passage Design Guidelines (in preparation)	adult and juvenile salmonid migration barriers, anadromous and resident species	HPA, SMA, FOTG, FERC, ESA compliance
4.	Macro-Habitat Restoration Techniques	Instream structures, gravel restoration, refugia	HPA, FEMA DSR's
5.	Sand and Gravel Removal Guidelines	Sediment, channel complexity, spawning quality and stability	HPA, SMA, FOTG, ESA compliance, Corps 404/10, Flood hazard management plans
6.	Floodplain / Riparian Corridor	Riparian structure and dimensions, refugia, floodplain-channel surface and sub-surface hydraulics, sediment storage, water quality, lost opportunity mitigation	HPA, SMA, FOTG, ESA compliance, GMA, Flood hazard management plans, Surface Mining Reclamation Permit
7.	Estuary Restoration Guidelines	tidal wetlands, rearing habitat, tidal surge sediment management, estuary productivity	HPA, SMA, Corps 404/10
8.	Design of Fish Protection Screens at Water Diversions	fish protection at water diversion screens	HPA, FOTG, FERC, ESA compliance
9.	Siting and Design of Off-Channel Rearing Habitat	off-channel rearing	HPA, SMA, GMA, Flood hazard management plans
10.	Shoreline Salmonid Habitat Restoration Guidelines	Migration corridor, primary food production	HPA, SMA
11.	Marine Shoreline and Near-Shore Activities	Migration corridor, sediment sources, primary food production, beach hydrology, predation, shading, water and sediment quality	HPA, SMA, Corps 404/10, DNR aquatic land leases
12.	Other instream activities (pipeline crossings, blasting)		HPA, SMA, FOTG, ESA compliance, Corps 404/10, DNR aquatic land leases

The applications listed here are examples of potential applications; this is not intended to be a complete list. Other existing and proposed guidance efforts will complement this proposal (e.g. *Stormwater Management Manual for the Puget Sound Basin*, WSDOT bridge scour analysis work, *Comprehensive Planning for Flood Hazard Management Guidebook, Ecosystem Standards for State-Owned Agricultural and Grazing Land*, *Management Recommendations for Washington's Priority Habitats*)

Acronyms:

Corps 404/10	Army Corps of Engineers permits
ESA compliance:	Endangered Species Act compliance under Sections 7 and/or 10.
FEMA:	Federal Emergency Management Agency; DSR: Damage Survey Report
PL 84-99	Army Corps of Engineers levee vegetation standards
FERC	Federal Energy Regulatory Commission hydroelectric plant licensing
FOTG:	Field Operating Technical Guide; National Resource Conservation Service
GMA:	Growth Management Act
HPA:	Hydraulic Project Approval; Washington Fish and Wildlife
SMA:	Shoreline Management Act master plans and/or guidance

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

The general success of project permitting, permit streamlining and integrated stream corridor guidelines in contributing to habitat protection for all projects affecting waters of the state will generally be measured by monitoring positive or negative changes in habitat conditions as part of the overall strategy for adaptive management and monitoring in the Statewide Strategy to Recover Salmon.

The specific success of project permitting, permit streamlining and integrated stream corridor guidelines can be monitored through a coordinated tracking and reporting system for projects. A tracking and reporting system for habitat protection and restoration projects is now being developed by the Interagency Committee for Outdoor Recreation working with the Governor's Salmon Recovery Office.

ESA Compliance Strategy

Comprehensive and integrated design guidelines for various types of projects that are accepted by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service as protective of salmon are the keys to ESA compliance for state permit programs. These design guidelines would eventually cover the range of habitat issues and project types outlined in Table 11 above, including protocols and methods for the watershed characterization that is needed to assess projects in a watershed context. These guidelines would be applied to all relevant projects potentially affecting salmon habitat, including habitat projection and restoration projects. Project sponsors and designers would be encouraged and assisted to use these guidelines during the preparation of project designs and permit applications.

In addition to developing and using accepted guidelines for projects, several ESA compliance mechanisms outlined in the Core Elements (Chapter IV.) may be relevant to specific permit programs. Examples of permit programs where these mechanisms are relevant include the following:

- Forest Practices Permits are likely to be recognized in Section 4(d) rules and a programmatic Section 10 permit may also be pursued.
- Section 7 consultation between the U.S. EPA and NMFS and USFWS on the state's water quality standards is an essential step for NPDES permit recognition under ESA.
- Section 7 consultation by the Corps of Engineers on its permit programs may provide an avenue for ESA coverage of state 401 CWA and Coastal Zone Management certifications.
- WDFW is pursuing a negotiated Habitat Conservation Plan and a Section 10 Incidental Take Permit for its Hydraulic Project Approvals.

VI. Adaptive Management and Monitoring:

➢ ADAPTIVE MANAGEMENT AND MONITORING: HOW WILL WE RECOGNIZE SUCCESS?

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

Background
The stated goal of the Statewide Strategy to Recovery Salmon is to: *Restore salmon, steelhead, and trout populations to healthy and harvestable levels and improve habitats on which fish rely.”* (See Chapter III. A Road Map to Recovery.)

The strategy is based on a number of guiding principles, one of which states

> *The strategy must be credible, based on best available science and must set priorities and be adaptive. It must also include ongoing data collection, monitoring, and review.@*

This principle is consistent with criteria used by the National Marine Fisheries Service to evaluate conservation plans, which include:

> Establish a comprehensive monitoring and reporting program, including methods that measure whether objectives are being met and detect subpopulation declines and increases in each ESU.

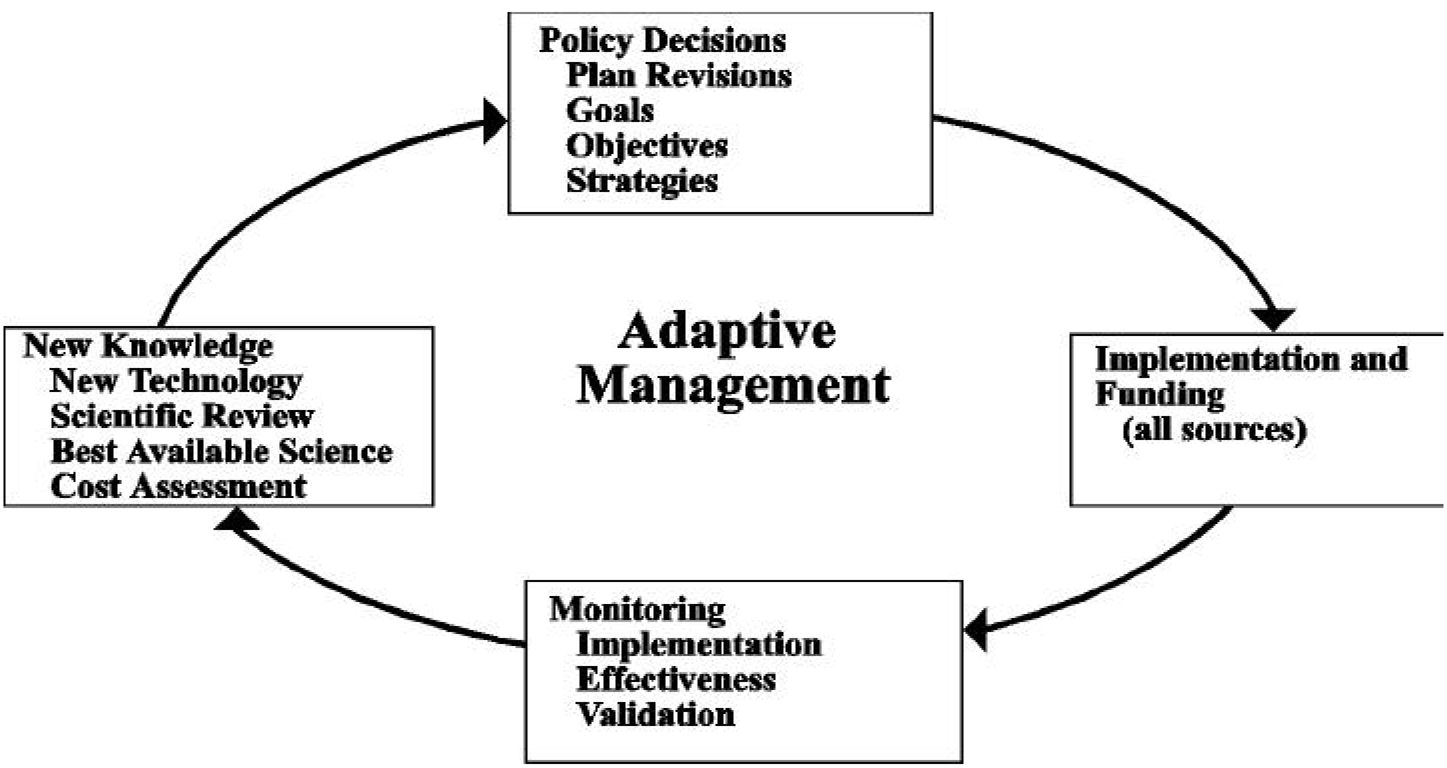
Further, NMFS guidance (See References) encourages conservation plans to utilize an adaptive management approach that actively shapes management actions to generate needed information.

The development of the Statewide Strategy to Recover Salmon has focused on addressing conservation strategies associated with the four Hs (hatcheries, harvest, habitat, and hydropower). There is much we do not understand about fish and how they interact with their ecosystems, and how well our conservation actions will produce the intended effect, both individually and collectively, in each watershed and region. Ecosystems, regions, and watersheds express much variation within and between them that can extend over very short or long time frames. These variations complicate our understanding of how these systems work and how we might improve the probability that our actions on behalf of salmon will not only avoid extinction, but will recover them to healthy levels. Therefore, the strategy commits to adaptive management, a science-based approach to address how well strategy elements are working and to make changes in the face of uncertainty, based on new information.

What is Adaptive Management?
Adaptive management is a science-based management approach that enables a critical review of how well our actions achieve their objectives and, based on results of monitoring and evaluation efforts, suggests what steps are necessary to increase the chances for successful recovery.

Adaptive management is not simply a matter acting and waiting to see what happens; instead, it requires that activities be taken and purposefully monitored and scientifically evaluated so that management, policy, and actions are more effective in the recovery of salmon. In this manner our understanding of what works and what doesn't is increased.

The guiding principles of the Statewide Strategy to Recover Salmon reflect that it is an adaptive management strategy. Over time this will require administrative structures using continuous management cycles involving establishing management strategies and objectives, monitoring of management actions linked to objectives, evaluating management actions, and affirming or changing management actions in response to the results of monitoring and analysis - leading to overall improvement in the quality and efficacy of management decisions and actions. The figure below illustrates the adaptive management cycle.



Why Monitor?

Monitoring is a critical component of adaptive management. Monitoring involves deliberate and systematic observation, detection, and recording of conditions, resources, and environmental effects of human and management programs and actions. It allows us to determine trends in fish populations, to determine how well the elements of the strategy are working, and to test key assumptions and resolve important questions. 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.

Where Are We Now?

Adaptive management and monitoring have often been low priorities in natural resource management. When attempted they frequently suffer from poorly focused objectives or questions; biological, temporal, and spatial scales that are often too narrow or ill-defined; poor integration due to institutional barriers; incomplete, inconsistent, and/or poor quality information; and inadequate commitment to time scales sufficiently long to produce reliable results. Investment in monitoring is often limited by preferences to commit resources to actions that directly produce more fish or improve habitat. Monitoring may also expose what are perceived as failures, whereas the public and decision-makers desire successes.

Monitoring is currently performed by agencies and others, but it is typically not well coordinated and integrated among involved parties, nor is it well 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.

Salmon population and habitat monitoring efforts are typically not organized at regional or ESU spatial scales that take into consideration not just basic needs of fish populations but also the integrity of the watersheds and broader freshwater and marine ecosystems of which they are a part.

The benefits of successful monitoring in an adaptive management context can be substantial. Since more is typically unknown than is known about cause-and-effect relationships, monitoring in an adaptive management context is the most efficient way to take action in the face of uncertainty. Monitoring in this context represents a commitment to accountability and action, while pursuing effectiveness and efficiencies with the biological and fiscal resources available. Adaptive management represents a commitment to change conservation approaches and redirect fiscal resources as warranted by new information, even if such change is difficult or unpopular.

The purpose of this chapter is to provide an overview of general approaches, relationships, and issues related to development of the comprehensive adaptive management and monitoring component of the Statewide Strategy to Recover Salmon. Most components of the statewide strategy focus on individual conservation elements (e.g., instream flow, agriculture, fishery management, forest practices). However, development of the adaptive management and monitoring components needs to support and integrate monitoring elements of the strategy.

The 1999 legislature enacted the Salmon Recovery Funding Act, Second Engrossed Second Substitute Senate Bill 5595 (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 in the state. In that legislation the Independent Science Panel (See Science as a Guide) is required to:

- recommend standardized monitoring indicators and data quality guidelines;
- recommend criteria for the systematic and periodic evaluation of monitoring data pertaining to critical questions associated with the effectiveness of salmon recovery efforts; and
- by December 31, 2000, prepare a report of monitoring recommendations to the legislature and the Governor.

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 the monitoring of conservation actions.

Accurately assess the responses of salmon, steelhead, and trout populations and their habitats to specific actions.

Objectives:

- Establish a scientific foundation for the monitoring component of the Statewide Strategy to Recover Salmon.
- Assess and track the status of salmon populations and their habitats.
- Promote the use of and, as necessary, develop appropriate analysis and assessment tools and protocols to support the statewide salmon strategy and related watershed and regional responses.
- Develop means to track conditions leading to changing or modifying restoration actions and for recognizing success.
- Develop and promote complementary, integrated, open, and flexible approaches for the collection, analysis, and sharing of monitoring information (e.g., GIS) within and across sites, watersheds, and regions.
- Provide leadership, coordination, and technical assistance to agencies and other statewide strategy partners.
- Produce a biennial “State of the Salmon” report starting December 31, 2000.

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

Development of the comprehensive adaptive management and monitoring program will be difficult. As stated above, there is much we do not yet understand about how to best recover salmon. There are many differences among salmon species and component stocks, regional/ESU conditions, and watersheds. Monitoring and evaluation technologies themselves may often be limited and/or information from them can be of poor quality. Costs are always a concern.

Scientific Foundation – Understanding what is known and unknown
A strong scientific foundation must underlie the Statewide Strategy to Recover Salmon to assure conservation strategies and actions have the best chance of achieving the desired outcomes. (See Chapter III. A Road Map to Recovery, section on Science as a Guide.) The scientific foundation helps clarify what is known and not known about ecosystem/watershed dynamics and their relationships to salmonid conservation. It provides a way to view needs and issues in a more holistic ecosystem orientation rather than in piecemeal fashion. The scientific foundation provides the platform for adaptive management and monitoring that links conservation strategies, critical uncertainties and related objectives, and risks, to key questions that can be addressed.

Several comprehensive scientific reviews of salmon and their ecosystems (National Research Council 1996: Upstream: Salmon and Society in the Pacific Northwest; Northwest Power Planning Council 1996: Return to the River; and Washington's 1997 Wild Salmonid Policy) have recently been completed that together, provide a strong base of scientific information for the Statewide Strategy to Recover Salmon. (See Chapter VII. C. References.)

More specific scientifically-based principles have been drafted for protection and restoration of ecosystems in the Puget Sound region these include:

$ *Maintain and restore the freedom of rivers and streams to move and change, especially during floods.*
The ability of rivers to move and change is an essential process for forming habitat. Areas where rivers still have the potential to move in their flood plains often provide the most productive habitats for fish and wildlife. Whenever possible, the ability of streams and rivers to roam should be protected and restored. This allows them to create braided channels for spawning, as well as oxbow lakes and wetlands for rearing, and provides places to store their floodwaters.

$ *Allow time for natural regenerative processes to occur and provide recovery of river and stream integrity.*
Once riverine habitat has been damaged it can take several decades to recover, if it can recover at all. Too often we try to recover natural habitat functions by demanding an

immediate fix and not allowing the natural regenerative process to work. This can lead to conflicts with the natural dynamics of the river or stream. Restoration actions must be designed to work with natural processes, providing some immediate benefits but also with consideration of how they will change and improve over time.

$ *Protect the natural diversity of species and restore the natural diversity of habitats within river channels and riparian zones.*
River systems and salmon are like human communities: their richness increases with diversity. The habitat diversity of rivers needs to be protected and restored whenever possible. We must understand what diversity in species and habitat was historically supported by each river system, then work to protect and restore that historic diversity.

$ *Support and foster the interaction and connections between the diverse parts of the aquatic ecosystem, including estuaries, rivers, streams, and uplands.*
It is not enough to preserve only some parts of a system; all of the components need to interact and connect. Replacing culverts or other barriers to passage are obvious reconnections that can improve habitat. In addition, improvements to water quality and drainage from developed areas can increase system integrity.

$ *Tailor actions locally and to the whole watershed in the proper sequence of time and place. Match the system's potential and long term human commitment to stewardship of the system.*
Many restoration efforts have been unsuccessful because they focused on a local part of a river or stream without understanding how it is affected by processes that may be occurring upstream or upland. For example, logs and other habitat structures have been placed in streams to improve habitat, only to be covered by sediment caused by unstable areas in upstream areas of watersheds. It will be critical to take actions in a manner that is consistent with the upstream and upland processes of the whole watershed. Also, successful actions will require an ongoing commitment to stewardship and monitoring. The more intensive the restoration and changes to the natural character of a watershed, the more commitment will be required.

$ *Integrate the needs of human communities with the long-term dynamics of rivers and streams.*
Human actions have a dominant effect on the character and function of rivers and streams in the state, and rivers are essential to human needs. In protecting rivers and streams, we protect ourselves; we will not be successful if we just try to make the remaining best habitat into nature preserves and lock people out. We need to find ways to allow people to enjoy healthy habitats without damaging them. We also need to restore damaged rivers and streams to provide human and ecosystem benefits in cities and towns where people live.

The principles outlined above recognize that the biological communities in which salmon, steelhead, and trout live have evolved in highly complex and dynamic environments, that natural processes are key in shaping variation in salmonid populations and their ecosystems, that human activities can influence ecosystems, and that there is much uncertainty in human understanding of salmonids and their ecosystems. These features point to the need to use an adaptive and experimental approach, while emphasizing the need for recovery actions in the face of this acknowledged uncertainty.

Principles such as those listed above will help guide a wide range of monitoring planning needs and decisions. 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, and will guide the selection of appropriate methodological and analytical approaches.

Adaptive Management/Monitoring Development Process

Before an effective and efficient monitoring program can be fully established it will be necessary to clarify what is known and not known and to develop specific management objectives and benchmarks associated with each component of the strategy. A review of risks and uncertainties associated with strategies and objectives will lead to specific, answerable questions. Answerable questions can then be reviewed and prioritized (e.g., by species, regions, watersheds, habitats, strategy components, human activities). Questions can then be reviewed in the context of available funding to ensure that the highest priority questions are sufficiently addressed. Finally, detailed monitoring plans outlining what, where, when, how, and who can be developed and implemented, and coordinated and integrated information management systems can be developed. Questions that are not technically or economically feasible to answer will be reviewed to assess acceptable levels of risk and/or alternative courses of action.

In summary, steps in development of the monitoring program should be:

1. Understand what is known and unknown (scientific foundation),
2. Identify strategies/key actions for implementation (conservation actions),
3. Develop measurable objectives associated with the elements of the Strategy,
4. Identify key questions (technical/policy) and risks associated with measurable objectives,
5. Review and prioritize the key questions,
6. Match priorities to level of available funding,
7 Develop detailed monitoring plans to answer priority questions consistent with funding availability.

The adaptive management approach for the statewide strategy will require an ongoing commitment to review and possibly redirect objectives and actions for the core elements as information on critical questions becomes available. Key checkpoints and triggers for adaptive management decisions will be developed. Monitoring activities themselves will be expected to change over time as conservation strategies and related objectives and questions change.

The statewide strategy commits the state to collaborative processes involving state, federal, and local governments, tribes, and other parties. These processes will also lead to increased coordination and efficiencies with respect to the adaptive management and monitoring component.

In general, a two-tiered model could be used to evaluate how well elements of the strategy work over time. The first tier would involve evaluation of conservation measures with respect to meeting the measurable resource objectives that are tied to management issues. The second tier would involve looking at the resulting trend in resource condition. Quantifiable targets are needed to evaluate and communicate the expected performance outcomes. The following depicts an approach related to monitoring of outcomes and responses anticipated under adaptive management:

Outcome A: *The target has been reached and a positive resource trend has been realized.*

Response: The plan is working as designed.

Outcome B: *The target has been reached and a positive resource trend has not been realized.*

Response: Determine why the trend has not been realized. Is it the conservation measure? Past influences (e.g., sediment from pre-plan mass failures)? Natural conditions? If conservation measure, then re-assess target and look for ways to reduce impacts from conservation measure.

Outcome C: *The target has not been reached and a positive resource trend has been realized.*

Response: Determine the role of conservation measure in development of the positive trend. Is the positive trend primarily due to re-equilibration from disturbance prior to plan management (natural or past influences)? If current management is slowing the recovery of resource then look for ways of meeting the target. If the positive trend is primarily due to the implementation of conservation measure, review why the target has not been met. Was the target set too high? Re-adjust target.

Outcome D: *The target has not been reached and a positive resource trend has not been realized.*

Response: Determine why the positive resource trend has not been met and the role of conservation measure in failure to develop a positive trend. Re-adjust measure to achieve outcomes A, B, or C.

Types of Monitoring

Monitoring associated with protection and restoration activities is commonly broken down into several categories, each of which is essential to an effective comprehensive adaptive management approach.

Implementation monitoring addresses the extent to which conservation measures have been taken as planned and target has been reached**.** It should be a part of every conservation element. The earlier it is started in the recovery process the better, since often mid-course corrections will be necessary as design specifications are improved. This type of monitoring provides a basis for quality assurance and accounting for recovery measures.

Strategy effectiveness monitoring addresses how well completed actions or programs are effective in meeting explicit objectives, criteria, or desired future conditions. This is a very complex type of monitoring because it requires an understanding of the multiple factors that influence aquatic ecosystems at various spatial and temporal scales.

Trend monitoring involves tracking changes in fish populations and habitat conditions over time. Trend monitoring should encompass all aspects of the ecosystem, including those conditions over which we have no direct influence (e.g. ocean conditions). Trend monitoring is critical to the interpretation of effectiveness and validation monitoring activities at project, program, watershed, and regional scales.

Validation monitoring involves specialized activities to evaluate the appropriateness of assumptions that are critical to conservation components of the strategy itself. This type of monitoring is usually associated with research efforts focused on key priority questions linking relationships between strategy components and fish populations, or the relationships between changes in habitat/ecosystem parameters and fish populations. It is usually the best approach to use to assess cause-and-effect relationships. Effectiveness and validation monitoring are key steps to assess adaptive management activities.

Key Monitoring Questions

An effective adaptive management approach to the Statewide Strategy to Recover Salmon will require a comprehensive monitoring program that focuses on key questions associated with the objectives of actions undertaken. However, regardless of the specific strategy component, a fundamental objective of the monitoring program will be to detect changes and trends in basic characteristics of fish populations, such fish size/age structure, stock abundance and distribution in time and space, life history variation, and survival. Information on fish populations was used to make listing determinations and this same type of information will have a strong influence on salmon recovery and delisting decisions in the future.

The comprehensive monitoring framework should address the following central question:

Are the actions and processes represented by the Statewide Strategy to Recover Salmon effectively protecting and restoring naturally reproducing salmonid populations across suitable ranges of abundance, spatial and temporal scales, and diversity of habitats and life history types, to ensure persistence in dynamic and unpredictable environments?

The central question can be further partitioned into the following sub-questions:

1. What are the trends in fish population abundance and habitat conditions (including ocean conditions) over time? (**Baseline/trend monitoring**),
2. Are strategy elements being implemented correctly? (**Implementation monitoring**),
3. Are the strategy elements, actions, and programs achieving their objectives? (**Effectiveness monitoring**), and
4. How sound are key assumptions underlying conservation actions and strategies, and what are the cause-and-effect relationships? (**Validation monitoring**).

Elements of the Comprehensive Adaptive Management and Monitoring Strategy

Development of the comprehensive adaptive management and monitoring strategy that sufficiently accommodates all types of monitoring will be an extremely complex endeavor.

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 to *effectiveness* and *validation* monitoring will be developed to direct available funding and cooperative partnerships. At the 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. (See Early Action Plan and Performance Measures – referred to as "Balanced Scorecard")

Although the monitoring strategy continues to undergo active refinement and will benefit from recommendations provided by the Independent Science Panel and others as required in the 1999 Salmon Recovery Funding Act (2E2SSB 5595), several basic needs have been identified in support of the comprehensive monitoring program, with particular emphasis on effectiveness monitoring. These include:

- *Trends in escapement and overall abundance of fish populations at the stock and ESU level must be tracked over time.*

  Wild salmonid populations must be regularly monitored in order to measure their health and to determine whether protection and restoration effects are having their desired outcomes. It is not enough to simply collect fish population information; monitoring and assessment data must be effectively summarized and communicated to managers and public so that performance of protection and restoration efforts can be analyzed. Subsequent refinements and modifications to resource management priorities, strategies, and activities can then be made that accurately reflect the changing condition of salmon populations.

Monitoring the status of fish stocks over time is the responsibility of the Department of Fish and Wildlife (WDFW) and tribal fishery co-managers. Information is obtained from ongoing and new juvenile and adult monitoring activities. A statewide Salmon and Steelhead Stock Inventory (SASSI) was prepared by the Department and western Washington treaty tribes in 1993. In 1997, this effort was expanded to include bull trout and Dolly Varden char and re-titled Salmonid Stock Inventory (SaSI), reflecting the intention to include all salmonids. A SaSI appendix is in preparation for coastal cutthroat trout and a status review for westslope cutthroat trout that will form a basis for an appendix on this species was recently completed. These efforts will continue to form a foundation of information for stock status assessments.

- *A system of "index" watersheds or areas (including associated estuarine/nearshore marine areas) should be developed where comprehensive and integrated effectiveness and validation monitoring efforts can be accommodated (includes integration of juvenile and adult fish population data with habitat information).*

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 implementation of strategy elements at watershed scales will be difficult because of the complexity of simultaneous interacting factors, and the long assessment time frames required to separate effects of strategy implementation from background levels of 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 within which coordinated and integrated long term monitoring and evaluation activities would be performed to address critical strategy effectiveness questions and assumptions (validation monitoring). An approach to identification of these systems will first seek locations where quality fish and/or habitat databases already exist, that could be enhanced to increase efficiencies and effectiveness. 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.

This intensive monitoring program will be designed to evaluate the cumulative effectiveness of salmon recovery strategies and projects on salmon populations and indicators of salmon habitat, land use, water quality/quantity, and stream health. Specific aspects of this program will include: smolt/adult population monitoring, instream habitat monitoring, landscape features monitoring, and water quality/quantity monitoring.

- *Priority "indicators" will be identified and monitored to track trends in ambient conditions over time and at appropriate spatial scales.*

  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 ambient habitat quality and quantity for salmon at the appropriate spatial scales. Where applicable, protocols will be identified or developed to help ensure that monitoring of these indicators is of sufficient quality and reliability for use at project, watershed, and regional scales. As mentioned previously, the Salmon Recovery Funding Act, passed in 1999, directed the Independent Science Panel to develop recommendations for monitoring indicators and related data quality guidelines.

- *Coordinated data and information management systems must support a diversity of adaptive management and monitoring efforts at various scales (e.g., site, watershed, region, 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 of the strategy will be to identify, coordinate, and develop information management and sharing systems focused on information needs for the statewide strategy, regional responses, watershed, and project-level efforts.

  To at least partially address this challenge, the 1999 Salmon Recovery Funding Act (2E2SSB 5595), addressed the need for a coordinated and integrated monitoring process by stipulating 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 cooperatively implemented by the western Washington Tribes, WDFW, and other partners. The objective of SSHIAP is to assess and document current conditions and trends of salmon habitat in WRIAs 1-23, and to incorporate these data into a GIS-based information management system.

  In addition, the Salmon Recovery Funding Act stipulated that information pertaining to habitat preservation projects funded through the Washington Wildlife and Recreation program, the Conservation Reserve Enhancement Program, and other conservancy programs related to salmon habitat shall be included in the SSHIAP database.

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

A means of encouraging communication and cooperative planning is proposed to facilitate coordination of monitoring among agencies and partners. A monitoring steering committee would guide statewide monitoring policy planning, in collaboration with scientific and technical assistance would identify key management questions, and identify statewide monitoring priorities for the salmon strategy. A technical committee would provide technical support and coordination for implementation of the monitoring strategy; seek resolution of issues, and coordinate with monitoring steering committee on unresolved issues. A data/GIS support services committee would provide guidance and support for distributed integrated information systems development and implementation; facilitate interagency/partner standardization, data sharing, 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.

Initial Guidance on Monitoring Indicators and Protocols

Development of indicators and protocols for monitoring the implementation and effectiveness of salmon recovery activities will need to be developed to meet multiple needs. These needs will exist to support watershed planning forums, volunteer groups, government agencies and tribes, and many others. The development of standardized indicators and protocols, and their use, will allow information to be collected and shared among multiple levels, to address multiple monitoring and evaluation needs. As mentioned previously, the 1999 legislature requested the Independent Science Panel to assist with this task.

What follows below is an initial overview of rationale and information about monitoring indicators and related protocols.

Salmon and the ecosystems on which they depend are extremely complex and diverse. It will not be practical to monitor all aspects of these ecosystems for each species of concern, or in every area. Nor will it be practical to monitor the effectiveness of each and every protection and restoration strategy to the same extent. This requires that a set of surrogates for key features, termed *indicators*, must be chosen and measured. Concepts, issues, and details associated with identification of appropriate indicators are still being refined; as additional details are available they will be included in the salmon strategy and related implementation plans.

Efforts to protect and restore healthy wild salmon populations and their ecosystems will require new indicators of salmon performance. Traditional indicators typically emphasize relatively straightforward harvest and economic measures. These will still be needed, but alone will be insufficient. Restoring wild salmon populations and healthy watersheds will require measures that more fully depict ecosystem variables, processes, and dynamics of not only individual populations or stocks, but groups of populations (e.g., metapopulations).

Traditional indicators used to assess salmon in the context of consumptive uses include:

Catch/harvest
Angler days
Economic value of catch
Licenses sold
Pounds of fish released from hatcheries
Number of habitat projects completed
Spawner escapement
Stock status

In general, indicators related to ecosystem health from which measures could be identified include:

Condition of riparian zones, flood plains, and nearshore habitats
Habitat complexity and connectivity
Patterns of variation in stream flows and temperatures
Life history and genetic diversity
Establishment of reference species composition and abundance
Values of environmental integrity (e.g., indices of biotic integrity)
Long-term recruit per spawner ratios for key species
Stock status at metapopulation scales
Marine trophic conditions (e.g., forage fishes, predators)

Indicators of ecosystem health should also be used in the context of the range of habitat and ecosystem components that salmon interact with over their life histories in time and space. For example, the following outlines examples of potential indicators organized by various aspects of the salmon ecosystem continuum.

Headwaters and smaller tributaries
Conditions of flood plains and riparian zones
Habitat complexity, connectivity, and diversity
Patterns of variation in stream flow
Water quality (e.g., temperature, dissolved oxygen)
Biological communities (e.g., predators, prey, competitors, vegetation)
Salmonid distribution, productivity, and mortality

Larger tributaries and mainstems of rivers
Conditions of flood plains and riparian zones
Habitat complexity, connectivity, and diversity
Patterns of variation in stream flow
Water quality
Biological communities

Salmonid distribution, productivity, and mortality

Estuarine deltas, tidal flood plains, and marine shorelines
Conditions of flood plains and riparian zones, and nearshore habitats
Habitat complexity and connectivity
Patterns of variation in estuarine flow and tidal inundation
Water quality (e.g., salinity, dissolved oxygen, toxics)
Biological communities: structure and function
Salmonid distribution, productivity, and mortality

Offshore
Patterns of variation in circulation and marine productivity
Water quality (e.g., salinity, dissolved oxygen, toxics)
Biological communities: structure and function
Salmonid distribution, productivity, and mortality

Indicators and associated measures should be used that are appropriate for relevant goals and objectives. They should address elements of salmon and related ecosystem composition, structure, and function. Identifying appropriate indicators may be fairly straightforward in some cases, and extremely difficult in others. For example, monitoring measures of salmon abundance can be useful indicators to address some objectives and questions; however, abundance is often a poor indicator of broader and more complex objectives or questions. Ecosystem concerns such as disturbance regimes, hydrological or climate cycles, habitat connectivity, or ecosystem health require indicators other than abundance. In addition to their basic relevance to specific goals or objectives, indicators should ideally be:

1. Good measures or surrogates of the element of concern.
2. Able to detect a problem before it is too late to solve it.
3. Amenable to experimental controls (where possible).
4. Aimed at relevant biological scales in time and space (e.g., genetic, population/species, watershed/community, and ecosystem/landscape).

As mentioned above, although more work will be done to refine indicator concepts and approaches, several general categories of indicators have been identified that are related to the frameworks noted above (e.g., salmon ecosystem continuum, scale of organization [population, watershed, landscape]). These general categories are ***fish***, ***physical habitat***, ***water quantity, water quality***, *and* ***land use/cove****r*.

Fish: The category of indicators pertaining to *fish* includes: life history variation and genetic diversity, variation in size and age structure, stock and ESU/metapopulation distribution and abundance, juvenile/smolt production, freshwater survival rates (e.g., spawner to juvenile recruit survival rates), marine survival (e.g., smolt to adult survival rates), and the structure and function of involved biological communities (e.g., non-salmonid fishes, predators, aquatic invertebrates, vegetation). In general, use of these indicators and related monitoring measures over time and space would support a wide range of conservation objectives.

Physical habitat: The category of indicators related to *physical habitat* ranges across the entire salmon ecosystem continuum, including headwaters, mainstems, estuaries, and ocean environments. At this time, this section emphasizes physical instream habitat at the watershed scale; as additional information is available on indicators related to the other components of the continuum, it will be considered in the state performance indicators.

Physical habitat in freshwater develops in response to inputs of wood, water, sediment and solar energy. Land use and management has changed the input rate of these factors. Through restoration, improved land-use, and better overall management, the input rates of these factors should assume a pattern that is closer to the natural disturbance levels, leading to an improving trend in habitat condition.

Different land uses effect input processes in distinctly different ways. For example, forest land management has substantially altered the input rate of large wood and coarse/fine sediment, and to a lessor extent, the input rates for solar energy and water. Agriculture has altered the input rates for wood, fine sediment, and solar energy; and through diking and the use of flood gates has considerably altered flood plain functioning and the movement of water. Urbanizing landscapes have greatly affected the input rates for all of these factors. In addition, these land-uses often occur in different parts of the watershed. The response of channels to a change in the rate of an input is much different in a steep gradient headwater stream compared to a low gradient, low elevation channel.

Similarly, fish tend to use different habitats and channel types for various freshwater life history stages. Their habitat needs change in response to fish growth and environmental conditions. An effective physical habitat monitoring program needs to consider the influence or response of habitat to input processes, land use, lithology and channel morphology in the design of a monitoring program. Selection of physical habitat indicators should also be determined by species distributions and uses of the watershed. It is recommended that a base set of indicators be collected during all habitat surveys.

Additional (optional) indicators should be used in certain channel types, areas of the watershed, for certain life history stages, or to answer monitoring questions related to specific management actions or restoration projects.

Water quantity: The category of indicators pertaining to *water quantity* preliminarily includes instream flow (e.g., percent of stream miles with instream flow meeting seasonal requirements for salmonids) and flow hydrology (e.g., percent of streams with flows that, over time, closely mimic natural conditions). Similar indicators were recommended by a workgroup of salmon habitat specialists from the Pacific Northwest (PNSHIWG 1998) and are being considered for use by the state. The recommended monitoring protocols for instream flow indicators is in Buchanan and Somers (1969).

Water quality: The category of preliminary indicators (from PNSHIWG 1998) and protocol references pertaining to water quality includes temperature (Rashin et al.1994), biological water quality index (Plotnikoff 1994), and chemical water quality index (Ehinger 1995). These indicators are being considered by the state.

In addition, Cusimano (1994) provides a general guidance manual for developing water quality assessment programs, including technical methods for conducting water quality studies. It includes information on survey planning, report writing, and data management activities, as well as assessment techniques for water, biota, and sediment quality.

Land use/cover: The category of indicators pertaining to *land use/cover* may include: land use conversion (e.g., number of acres in a watershed converted from one land use/cover classification to another over time, with emphasis on the flood plain to riparian area); transportation impacts (e.g., miles of road and number of road crossings within one mile of salmon streams, flood plains, or marine shorelines); and impervious surface (e.g., percent of watershed covered by impervious surfaces [roads, roof tops, etc.]). This suite of indicators was recommended by a workgroup of salmon habitat specialists from the Pacific Northwest (PNSHIWG 1998).

A Model for Sustainable Information Management

A wide range of monitoring efforts and databases currently exist or are being planned by a wide range of entities to address various implementation, effectiveness, and validation monitoring issues and priorities associated with salmon, restoration projects, watersheds, regions, and ecosystems. Some of these may be directly relevant to the Statewide Strategy to Recover Salmon whereas others may not. Relatively few monitoring efforts have been designed for the purpose of monitoring conservation strategies and their effectiveness in an adaptive management context. Thus a key challenge of the comprehensive adaptive management and monitoring strategy will be to identify, coordinate, and develop information sharing approaches (e.g., GIS, analyses, modeling) with existing and new efforts at site, watershed, and regional scales. This will lead to creation/use of effective synthesis and reporting processes for the state and other salmon strategy partners.

As discussed earlier, part of the data and information management required for salmon recovery will be provided by entities receiving habitat project funding and will be incorporated into a GIS based information management system (part of SSHIAP)

The type and extent of comprehensive and integrated information management systems will, however, take considerable work to develop and implement. A model information management strategy should address the following considerations:

$ Information management needs to be an integral part of any monitoring or data collection effort. Left as an afterthought, it will not meet the needs or be adequately funded, and ultimately be the reason for needing to collect more data in the future.

$ Information and data are owned by the public and are not the property of any program or agency (a few exceptions do exist).

$ Information should be managed and maintained in one location as close to the point of origin as possible, and by the group having the primary interest. Primary users have a vested interest in the ongoing quality and will do the best job of maintaining their mission critical information.

$ Agencies should be data/information stewards and have a responsibility as stewards to make the information available to the public and any secondary data user. Data stewards have an obligation (and need the resources) to maintain the information they keep. They must have the ability and commitment to make improvements in the quality of the data set as users (primary and secondary) provide value added feedback.

$ Data need to be documented such that a secondary user coming in 20 years later can determine why, how, and where data were collected. Most data sets today are inadequately documented and do not meet the 20-year criterion. Increased documentation will cost more but it is an investment in the future and secondary uses.

$ Data misuse is a concern but the real issue is that misuse will be greatly minimized if documentation is present and the appropriate use can be determined. Misuse will always occur but with documentation it can be discussed on merit.

$ Secondary users should be able to obtain the most current information available to make their decision or do their analysis. When done, the secondary user discards the data knowing that the next time an analysis requires it, they can return to the steward and easily obtain the most current information again.

$ Data collection methods will never be the same within or across agencies, as the primary collector's purpose will always dictate their approach/methods. However documentation standards, (metadata = data about the data) should be consistent.

$ Data quality is a concern with all data sets. It will only improve if the information is made available for many to see and use, and there is a willingness to evaluate and incorporate (as appropriate) the corrections noted by others.

$ Known and consistent standards within a data set are required for sharing information. Standardization for some things is possible given management direction and attention. Consistency and adequate documentation within a historical data set is the first step. In other words, there is a known standard within a data set, and standards between similar data sets will be adopted and migration to a more universal standard would occur over time.

$ The concept and purpose behind old data sets may be very valuable today; however a realistic evaluation needs to be made about the investment required and the resulting value from any older, poorly documented and maintained system/data set.

$ Efforts to agree on standards for the future data collection efforts need to be supported. The cost of uniqueness is too high when future access costs are considered.

Recommended Adaptive Management and Monitoring Approach
The comprehensive adaptive management and monitoring component of the Statewide Strategy to Recover Salmon is briefly summarized below. It is intended to guide further development of implementation approaches to be used by state agencies and other partners. Agencies and other entities routinely perform many appropriate and related monitoring activities that are outside the strict scope of the salmon strategy.

Monitoring programs are expensive and needs are typically greater than resources allow. At the minimum, coordination, integration, and where possible, reprioritization of existing agency monitoring activities will be stressed to meet priority needs. The Joint Natural Resources Cabinet expects implementation monitoring will be the responsibility of each agency/partner, within existing resources (although the 1999 legislature appropriated additional resources for monitoring and data management – See Early Action Plan).

The monitoring program needs to be developed at three geographic scales:
- Project implementation and effectiveness monitoring.
- Watershed-scale effectiveness and validation monitoring.
- Regional-scale effectiveness and validation monitoring.

The recommended approach is to focus on fish and priority habitat, implementation, and effectiveness monitoring. Effectiveness monitoring will be focused on the highest priority components and questions related to the Statewide Strategy to Recover Salmon at the project, watershed, and regional scales. A limited set of the highest priority habitat/ecosystem indicators will be monitored, tailored to priority strategy components across marine systems (nearshore/estuarine), urban, rural, and forested areas. This approach will entail substantial costs. However, it provides for all types of monitoring and creates efficiencies by emphasizing the highest priority issues for effectiveness and validation monitoring. Federal and other funding sources will be pursued to complement state investments in the salmon recovery monitoring program. A phased approach will be developed to direct available funding and cooperative partnerships.

The recommended approach focuses adaptive management on the top priority strategy components, objectives, and questions, as determined by the Joint Natural Resources Cabinet and informed by the best available scientific advice. It seeks efficiencies and attempts to optimize funding and infrastructure needs.

The recommended approach is expected to be more compatible with potential funding availability than more comprehensive options. However, it does not preclude modification or expansion over time to address a broader range of strategy components and objectives as resources allow.

Overview of recommended option:

Activities and outcomes:
- Gather and assemble information on the status of fish populations and their habitats.
- Document changes in fish populations and habitat conditions over time.
- Produce and synthesize information regarding 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 at the appropriate spatial scales on a priority basis.
- Coordinate focused validation monitoring efforts on a priority basis.
- Analyze information on a 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.
- Watershed, regional, and statewide information syntheses.

Design elements:
- Ensure adequate monitoring of fish stock status over time.
- Complement fish status monitoring with monitoring of key habitat indicators at regular intervals.
- Utilize a system of reference and "index" areas/watersheds for focused, multi-disciplinary integrated effectiveness and validation monitoring efforts.
- Coordinate with the Independent Science Panel and other appropriate scientific teams to ensure scientific quality and integrity.
- Implement sector-oriented adaptive management and monitoring systems such as in the Forests and Fish report.
- Submit monitoring data from habitat projects and other recovery activities to the Salmon and Steelhead Inventory and Assessment Project.

Potential implementation structure:

- Monitoring steering committee - guides statewide monitoring policy planning and sets statewide monitoring priorities for the salmon strategy in coordination with the Joint Natural Resources Cabinet; creates and administers the formal adaptive management and monitoring process for the Cabinet.
- Technical monitoring committee - provides technical support and coordination for implementation of the monitoring strategy; seeks resolution of issues, coordinates with monitoring steering committee on unresolved issues.
- Data/GIS support services - provides guidance and support for distributed integrated information systems development and implementation; facilitates interagency/partner standardization, data sharing, retrieval, and long term synthesis.

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

As stated earlier, performance monitoring associated with the Statewide Strategy to Recover Salmon must encompass multiple levels of monitoring (i.e., implementation, fish/habitat trends and strategy effectiveness, validation). A diverse array of monitoring efforts will be associated with different core elements of the strategy, which need to be meaningful and applicable at different scales and levels of effort (e.g., restoration projects, watersheds, regions, statewide).

Each agency partner will be expected to monitor the implementation of its respective conservation actions.

The design and results from monitoring should also be oriented to and interpreted in the context of the salmon ecosystem life cycle continuum (e.g., ocean, estuaries, mainstems of rivers, and small headwater streams). The biological organizational structure of fish populations should be used in developing and coordinating appropriate monitoring programs.

The 1998 Salmon Recovery Planning Act calls for preparation of a biennial State-of-the-Salmon report which will be prepared and submitted to the Legislature by the Governor beginning in December, 2000. The emphasis of this report will be on aspects of implementation monitoring, as noted by the elements drawn from the legislation identified below.

The report will also contain recommendations on monitoring from the Independent Science Panel, including the level of effort needed to sustain monitoring of salmon projects and other recovery efforts. The report should serve as a platform from which to address key salmon population and habitat trend information, and key strategy effectiveness and validation monitoring issues and results. It will help focus on issues and adaptive responses that might be addressed in subsequent biennia. The report may include implementation monitoring information such as:

1. The types and level of funds expended on salmon recovery in response to actual, proposed, or expected listings.
2. A summary of habitat projects, such as barriers removed, restoration efforts, volunteer initiatives, and habitat protection efforts.
3. A summary of collaborative efforts with adjoining states or Canada.
4. A summary of harvest and hatchery management activities affecting salmon recovery.
5. Information on impediments to success of salmon recovery efforts.
6. A summary of the types, extent, and sanctions imposed due to violations of existing laws regarding: (1) water quality, and (2) salmon.
7. Information on estimated carrying capacity created associated with habitat restoration projects.
8. Recommendations that would improve the likelihood of successful salmon recovery, including (1) the need to expand or improve non-regulatory programs and activities, and (2) the need to expand or improve state and local laws and regulations.

The report could also include other strategy effectiveness and validation monitoring information, as well as information on trends in key fish and environmental indicators (e.g., ocean productivity).

More specific implementation, effectiveness, and validation monitoring activities will be performed in conjunction with the Joint Natural Resources Cabinet work on performance indicators/measures being developed – referred to as Salmon Recovery Balanced Scorecard.

Given the central need for credible and reliable monitoring and decision management systems, if a comprehensive monitoring program is not developed 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.

II. Background: Setting the Context

A. 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.

1. Salmon Species in Washington

The life cycles of salmon, steelhead, and trout vary widely. (See Figure 1. Salmon Life Cycle.) 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 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 "evolutionarily 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

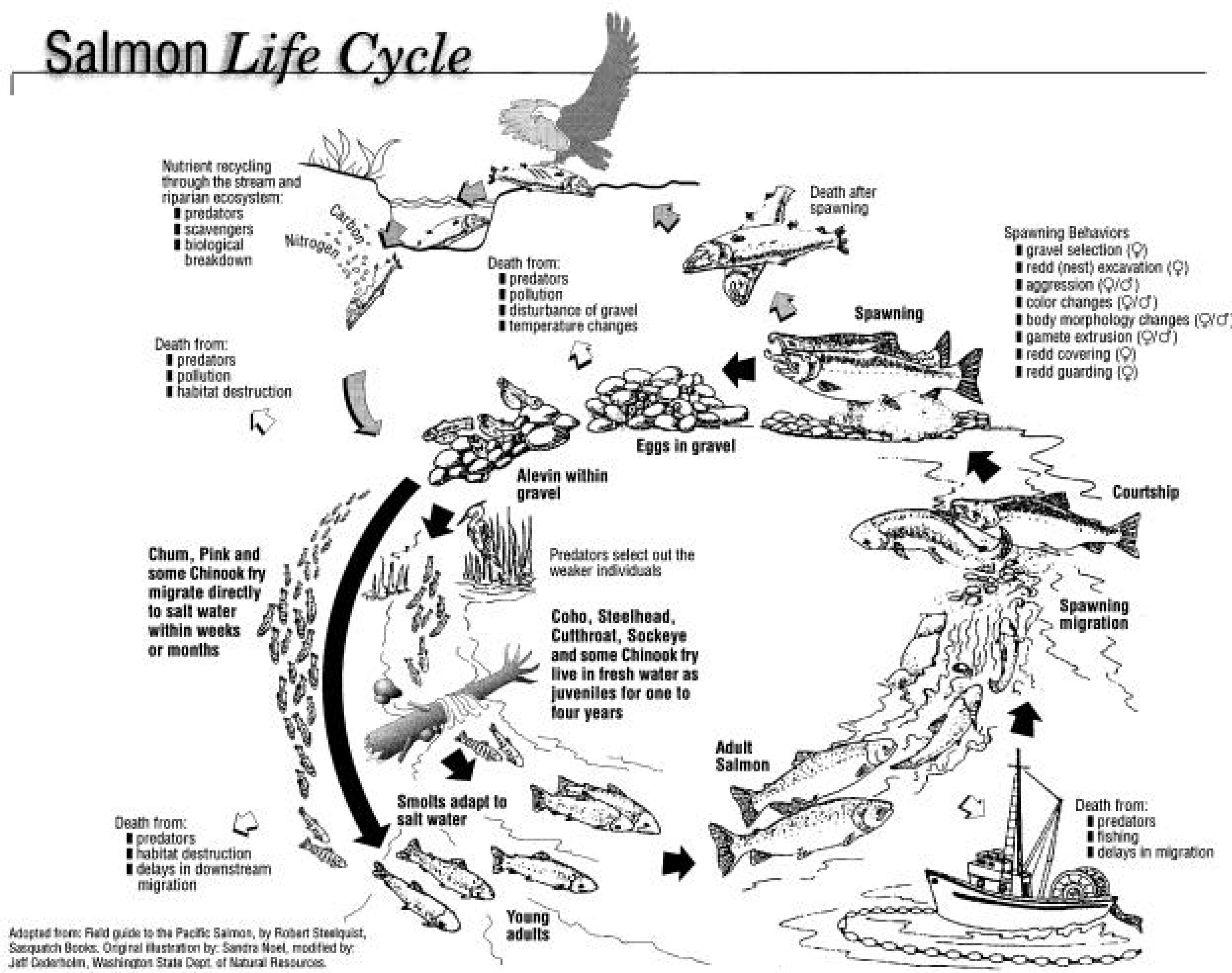
The coastal cutthroat trout, which occur only in western Washington, belong to the same scientific genus as Pacific salmon and steelhead. They have diverse life histories (e.g., resident and anadromous forms), are smaller than other salmon, rarely remain at sea over the winter, and usually don't make 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 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 re-colonize 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.

Figure 1.



2. Critical 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.

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 size
- 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. (See References - NMFS Coastal Salmon Conservation, 1996)

Freshwater Habitat

Freshwater habitat consists of four major components: 1) habitat for spawning and incubation; 2) juvenile rearing habitat; 3) juvenile and adult migration corridors; and 4) 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, salmon 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 input, 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.
- Food - Aquatic plants, organic litter, and insects are the main 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 support 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, reduce flooding by retaining stormwater during high-flow periods, and maintain a natural flow discharge into marine waters because of their capacity to store flood waters and release them slowly over time.

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. In addition, coastal marshes are important for the absorption of toxic compounds, nutrients, and bacteria.

Human activities induced major changes to estuarine and nearshore habitats from shoreline armoring, port development (deepening), over-water structures, passage barriers like docks and dams, and degradation of water quality from adjacent upland uses.

3. 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). More than 75% of the state will likely be affected by ESA listings of salmon. (See Table 1. Chapter I. A Sense of Urgency.)

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. Puget Sound stocks are intermediate between coastal and Columbia River stocks.

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), include spring/summer chinook, coho, sockeye, sea-run cutthroat and steelhead, and non-anadromous species. They 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.

Table 2. is a summary of salmonid stock status. [1]

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[1] **Healthy**- A stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock.

Depressed – A stock of fish whose productions is below expected levels based on available habitat and natural variations in survival rates but above the level where permanent damage to the stock is likely.

Critical – A stock of fish experiencing production levels that are so low that permanent damage to the stock is likely or has already occurred.

Unknown – There is insufficient information to rate stock status.

Extinct – A stock of fish that is no longer present in the original range, or as a distinct stock elsewhere. Individuals of the same species may be observed in very low numbers consistent with straying from other stocks.

Table 2. Regional and statewide summary of salmon and steelhead[2] and Bull trout and Dolly Varden[3] stock status

	HEALTHY		DEPRESSED		CRITICAL		UNKNOWN		EXTINCT[4]	
PUGET SOUND	**Salmon/ Steelhead**	**Bull Trout Dolly Varden**	**Salmon/ Steelhead**	**Bull Trout Dolly Varden**	**Salmon/ Steelhead**	**Bull Trout Dolly Varden**	**Salmon/ Steelhead**	**Bull Trout Dolly Varden**	**Salmon/ Steelhead**	**Bull Trout Dolly Varden**
North Puget Sound	27	2	12	0	4	0	28	7	0	0
South Puget Sound	40	0	7	0	1	0	13	6	1	0
Hood Canal	17	1	11	0	1	0	7	2	0	0
Strait of Juan de Fuca	9	1	14	0	5	0	12	3	0	0
TOTALS	**93**	**4**	**44**	**0**	**11**	**0**	**60**	**18**	**1**	**0**
COASTAL										
North Coast	35	1	4	0	0	0	33	5	0	0
Grays Harbor	21	0	3	0	0	0	4	1	0	0
Willapa Bay	9		1		0		5		0	
TOTALS	**65**	**1**	**8**	**0**	**0**	**0**	**42**	**6**	**0**	**0**
COLUMBIA										
Lower Columbia	18	0	35	1	0	0	7	0	0	0
Upper Columbia	11	9	35	1	1	6	4	34	0	0
TOTALS	**29**	**9**	**70**	**2**	**1**	**6**	**11**	**34**	**0**	**0**
515 TOTAL STOCKS	**187**	**14**	**122**	**2**	**12**	**6**	**113**	**58**	**1**	**0**
% OF TOTALS FOR SALMON AND STEELHEAD	**43%**		**28%**		**3%**		**26%**		**0%**	
% OF TOTALS FOR BULL TROUT AND DOLLY VARDEN	**18%**		**3%**		**8%**		**72%**		**0%**	

[2] Source from 1992 Washington State Salmon and Steelhead Stock Inventory (SASSI)
[3] Source from 1998 Salmonid Stock Inventory (SaSI)-Bull Trout/Dolly Vardon Appendix
[4] The Extinct rating is included here to identify any current and future losses of stocks identified during the annual review and inventory of Washington's wild salomonid stocks.

B. Factors Contributing to Salmon Declines

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

1. 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 human activities that affect salmon, grouped as harvest, hatcheries, habitat, or hydropower. 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, estuarine, and shoreline ecosystems. Salmon recovery planning should be based on an understanding of these natural phenomena, the likelihood and frequency of their occurrence, and their implications for salmon production.

Wild salmon have evolved in conjunction with their natural predators, including marine mammals, birds and fishes. 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. Human actions can also directly affect predation abundance and predation rate on salmon.

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.

Climatic changes can affect 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 seasonal, annual, decadal, and longer time scales. Our ability to predict climate 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. Dr. Robert Francis of the University of Washington puts it this way:

> "I know some people will look at the data (declining salmon runs) and say it's the ocean' fault. I would say that it's clearly not the ocean's fault. Salmon have survived changing ocean conditions for thousands of years, but the big decline in the runs occurred in recent decades. So you have to ask yourself, what's occurred during that time - what's different? And the clear answer is man's impact - dams, habitat destruction, over fishing, hatcheries. We can't use the ocean as an excuse to stop our efforts to improve passage, spawning, and rearing conditions."

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 longer term 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 array of invertebrate life, and support 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, 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 role in limiting the recovery of wild salmonid stocks.

Scientific information indicates that populations of seals and sea lions in the Pacific Northwest 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.

Various efforts have explored seal and sea lion predation on salmonids but quantifiable data on consumption rates are scarce, as noted in a National Marine Fisheries Service (NMFS) report published in 1997. This report summarized the findings of an interagency group working on the issue ("Impacts of California Sea Lions and Pacific Harbor Seals on Salmonids and on the Coastal Ecosystems of Washington, Oregon, and California"). The report suggested that although predation by the seals and sea lions is not the principal factor causing the decline of salmon population, it is a factor that may effect salmon recovery. The NMFS report indicated that concern was warranted where known or potential predation impacts are known to occur, and in areas with depressed or significantly declining salmonid stocks exist.

The National Marine Fisheries Service (NMFS) submitted, as a follow-up to its 1997 report, 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 seal 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 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 relatively high in recent years and they are natural predators on salmon. 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, murres, 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. 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 Caspian Tern Working Group comprised of federal, state, and tribal entities is actively involved in developing a strategy to address predation risks posed by the terns and a relocation program is being prepared for implementation. In the spring of 1999 Department of Fish and Wildlife (WDFW) and local volunteers helped National Marine Fisheries Service and U.S. Army Corps of Engineers erect hundreds of rows of plastic mesh fences across seven acres of Rice Island to discourage terns from nesting. The idea is to move the birds 17 miles downstream to East Sand Island, a natural island in the Columbia River. This will allow the birds to feed off other species such as sculpins and shiner perch because of the closer proximity to the ocean.

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.

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.

2. 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; over-fishing 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.

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, altered stream habitat, 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.

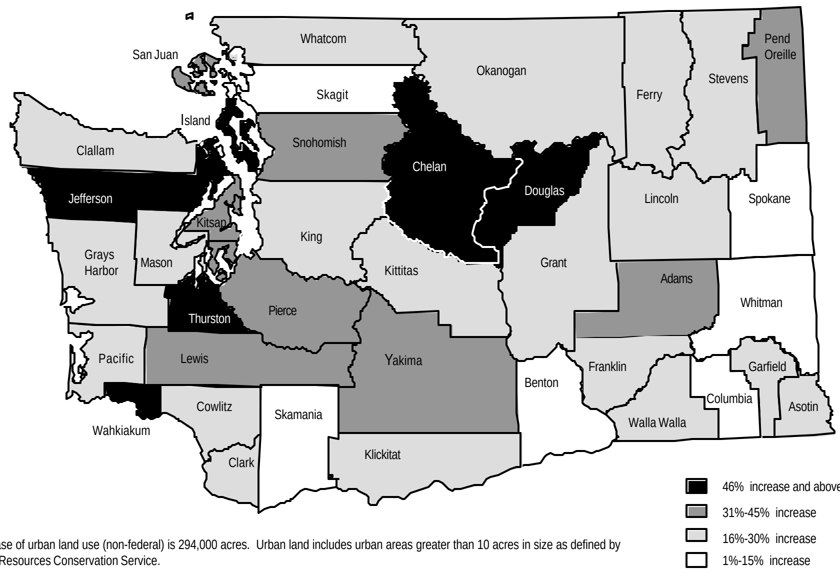
Forest management activities such as road building, timber harvest near streams or on steep or unstable areas, and the application of chemicals have damaged fish habitat and water quality. The most profound impacts include: increased stream temperature, diminished opportunities for large woody debris 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. Map 1 shows the increase in urban land over a ten year period due mostly to the population growth experienced during that period.

Map 1 – Increase in Urban Land*
Percentage Change (1982 – 1992)



*Total increase of urban land use (non-federal) is 294,000 acres. Urban land includes urban areas greater than 10 acres in size as defined by the Natural Resources Conservation Service.

SOURCE: National Resources Inventory, Natural Resources Conservation Service, 1992.

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.

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.

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.

Research conducted by the University of Washington, and experiences recorded by King County on small Puget Sound lowland watersheds and larger watersheds (e.g., Cedar River) have demonstrated that the biological and physical health of stream and wetland systems are degraded by urbanization. The geographic extent and degree of degradation is roughly equivalent to the geographic extent and degree of urbanization that has occurred upstream. The incremental degradation is most rapid in the first stages (up to 10% of total impervious area created) of development within a watershed. The rate of degradation becomes more constant as urbanization progresses. Alteration of the watershed hydrologic regime is the leading cause for the degradation, with increases in the frequency and duration of high and low streamflows the most obvious problems. The loss of adequate riparian zones, chemical and physical water quality degradation, and construction of fish passage barriers are also products of urbanization that contribute to habitat degradation and loss. (*Salmon in The City, May 20 – 21, 1998, Mount Vernon, WA, Abstracts*)

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. Changes in the frequency and duration of both floods and low flows due to land use and water development activities 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. (See map included in Chapter IV. A. 5. Ensuring Adequate Water in Streams for Fish.) 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 not provide sufficient 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 (due to loss of riparian canopy or water withdrawal) and higher concentrations of pollutants (due to land use impacts), 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 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 eleven major hydropower dams on the Columbia River within Washington State now block or impede the progress of fish on their way to and from the Pacific Ocean. Furthermore, thousands of square miles of salmon habitat are inundated or inaccessible due to the reservoirs behind the dams.

Construction and management of hydropower dams have dramatically altered flows and riparian habitat by diverting and impounding rivers and streams throughout Washington State. Dams and hydropower operations modify the level, timing, frequency and duration of stream flows; block fish movement both upstream and downstream; dewater stream segments below dams; cause loss of upstream habitat; and increase predation in reservoirs. Smolts and juvenile fish migrating downstream through the reservoirs encounter slower moving water, which increases the time it takes for them to reach the ocean. These altered migration patterns increase 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 and hydropower operations impact downstream habitat. Channel structure and erosion sedimentation patterns are drastically altered.

Dams reduce water quality by altering water temperature and decreasing oxygen levels. 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. 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.

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 Washington Aquatic Nuisance Species Planning Committee published the1998 Washington State Aquatic Nuisance Species Management Plan, approved by the Governor. The strategies outlined in the plan together with those of the Puget Sound Water Quality Exotic Species Work Group identified ways to reduce the impact of aquatic nuisance species while protecting salmon habitat in the process. The state strategies for prevention and control of invasive species include:

- *Prevention and control action* - Identify 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. Develop an action plan to deal with potential aquatic invasive species before they enter state waters. Work with specific industries and user groups to modify existing practices or to implement new protocols. Evaluate current eradication and control programs (state, federal, local programs) and either maintain or elevate funding when necessary. Control the spread of Spartina and working toward eradicating known infestations. Place potential invasive plants and animals on a quarantine list that prohibits their sale or transport within Washington. Contain large populations of established aquatic nuisance species to reduce their size and expansion. Enforce current laws governing aquatic nuisance species.

- *Monitoring and data collection* – Assemble a task for to design and develop a monitoring and response plan to prevent further aquatic nuisance species invasions. Design and conduct a risk assessment for each invasive species to identify waters that are at risk of infestation by the species. Monitor freshwater non-indigenous plants and animals in lakes and rivers. Develop and maintain lists of non-native species known to occur in Washington. Make baseline survey and distribution data for aquatic nuisance species available to local, state and federal governments and other interested parties.

- *Education* - Develop and provide information on aquatic nuisance species to appropriate resource managers and key decision-makers. Develop and distribute educational information targeted at specific pathways of introductions that involve the public. Develop and provide information on aquatic nuisance species identification and biology to appropriate resource managers. Compile, develop, and coordinate the dissemination of educational materials on aquatic nuisance species to increase public awareness of the aquatic nuisance species problem.

- *Coordination* – Review and enforce current laws governing aquatic nuisance species and salmon in Washington State and identify gaps, overlaps, and contradictions that may exist. Make recommendations to improve the ability to protect Washington waters from the introduction and spread of aquatic nuisance species. Identify all local, state, and federal agencies responsible for the management of aquatic nuisance species in Washington waters and created a forum for these agencies to work together and coordinate resources and efforts.

In addition to the above state actions on February 3, 1999, the President of the United States issued Executive Order 13112 on Invasive Species. The Order supplements federal activities authorized under the 1990 Non-indigenous Aquatic Nuisance Prevention and Control Act and the 1996 National Invasive Species Act. The Order establishes an Invasive Species Council (with members representing Departments of Commerce, Interior, Agriculture, Defense, State, Treasury, and Transportation) to oversee the implementation of the Order and to ensure that activities of federal agencies concerning invasive species are coordinated effective and cost-efficient. The Council has 18 months to issue the National Invasive Species Management Plan to advance methods to prevent the introduction and spread of exotics in order to minimize the impacts of invasive species.

Table 3. summarizes how fresh water habitat alterations discussed above affect salmon. The table is reprinted with the permission of the author, Bisson. It is taken from the article "Degradation and loss of Anadromous Salmonid Habitat in the Pacific Northwest", by Stanley Gregory and Peter Bisson (1997). The last column illustrates activities that are likely to cause alteration and degradation of habitat conditions.

Table 3. Types of habitat alteration and effects on salmonid fishes in the Pacific Northwest. Reproduced with permission of the author, Bisson[5]

Ecosystem feature	Altered component	Effects on salmonid fishes and their ecosystems	Activities Likely to affect salmon and their ecosystems
Channel Structure	Floodplains	Loss of overwintering habitat, loss of refuge from high flows, loss of inputs of organic matter and large wood	Activities that remove and alter riparian vegetation, remove or alter rates of large woody debris, increase sediments, alter shorelines and streambanks, alter the channel and stream beds, divert water, alter or contribute to loss of wetlands and floodplains -Forest practices, agricultural practices, urbanization, road construction, sand and gravel removal, water diversions and flood control are likely to cause the impacts listed in column 3.
	Pools and riffles	Shift in the balance of species, loss of deep water cover and adult holding areas, reduced rearing sites for yearling and older juveniles	
	Large wood	Loss of cover from predators and high flows, reduced sediment and organic matter storage, reduced pool-forming structures, reduced organic substrate for macroinvertebrates, formation of new migration barriers, reduced capacity to trap salmon carcasses	
	Substrate	Reduced survival of eggs and alevins, loss of interstitial spaces used for refuge by fry, reduced macroinvertebrates production, reduced biodiversity	
	Hyporheic zone	Reduced exchange of nutrients between surface and subsurface waters and between aquatic and terrestrial ecosystems, reduced potential for recolonizing disturbed substrates	
Hydrology	Discharge	Altered timing of discharge-related life cycle cues (e.g., migrations) changes in availability of food organisms related to timing of emergence and recovery after disturbance, altered transport of sediment and fine particulate organic matter, reduced biodiversity	Diversion of water for irrigation, municipal and industrial uses, flood control structures, compaction of soils, creation of impervious surfaces, discharge of stormwater, sewer, and runoff, dams and hydropower operation, removal of vegetation, and fish passage barriers- Agricultural irrigation, forest practices, urbanization, dams and hydropower operation, and sand and gravel removal are examples of activities affecting the hydrologic needs of salmon.
	Peak flows	Scour-related mortality of eggs and alevins, reduced primary and secondary productivity, long-term depletion of large wood and organic matter, involuntary downstream movement of juveniles during freshets, accelerated erosion of streambanks	
	Low flows	Crowding and increased competition for foraging sites, reduced primary and secondary productivity, increased vulnerability to predation, increased fine sediment deposition	
	Rapid fluctuations	Altered timing of discharge-related life cycles cues(e.g., migrations), standing, intermittent connections between mainstream and floodplain rearing habitats, reduced primary and secondary productivity	
Sediment	Surface erosion	Reduced survival of eggs and alevins, reduced primary and secondary productivity, interference	Vegetation removal, stormwater discharge, return flows and runoff, streambank and

[5] The first three columns of the table are excerpted from Gregory and Bisson (1997) table1. Contained in the article on "Degradation and Loss of Anadromous Salmonid Habitat In the Pacific Northwest".

	Mass failures and landslides	with feeding, behavioral avoidance and breakdown of social organization, pool filling Reduced survival of eggs and alevins, reduced primary and secondary productivity, behavioral avoidance, formation of upstream migration barriers, pool filling addition of new large structures to channels	shoreline alteration,- forest practices, agricultural practices, shoreline development, urban Stormwater, residential, industrial and commercial development are among the activities causing sedimentation.
Water quality	Temperature Dissolved Oxygen Nutrients	Altered adult migration patterns, accelerated development of eggs and alevins, earlier fry emergence, increased metabolism, behavioral avoidance at high temperatures, increased primary and secondary production, increased susceptibility of both juveniles and adults to certain parasites and diseases, altered competitive interactions between species, mortality at sustained temperatures >23-29ºC, reduced biodiversity Reduced survival of eggs and alevins, smaller size at emergence, increased physiological stress, reduced growth Increased primary and secondary production, possible anoxia during extreme algal blooms, increased eutrophication rate of standing waters, certain nutrients(e.g. non-ionized ammonia some metals) possibly toxic to eggs and juveniles at high concentrations	Removal of riparian vegetation, removal of large woody debris, alteration of streambank and channel, water diversions, hydropower operation, alteration of wetlands, estuaries, and floodplain- Forest practices, agricultural practices, urban stormwater, water diversion, dams, and hydropower are among the activities resulting in increased water temperature, decreased level of oxygen in the water and excess nutrients.
Riparian forest	Production of large wood Production of food organisms and organic matter Shading Vegetative rooting systems and streambank integrity Nutrient modification	Loss of cover from predators and high flows, reduced sediment and organic matter storage, reduced pool-forming structures, reduced organic substrate for macroinvertebrates Reduced heterotrophic production and abundance of certain macroinvertebrates, reduced surface-drifting food items, reduced growth in some seasons Increased water temperature, increased primary and secondary production, reduced overhead cover, altered foraging efficiency Loss of cover along channel margins, decreased channel stability, increased streambank erosion, increased landslides Altered nutrient inputs from terrestrial ecosystems, altered primary and secondary production	Removal of vegetation, mass wasting, sedimentation, removal of large woody debris, and conversion of forest land are key contributors to this effect on salmon.
Exogenous materials	Chemicals Exotic organisms	Reduced survival of eggs and alevins, toxicity to juveniles and adults, increased physiological stress, altered primary and secondary production, reduced biodiversity Increased mortality through predation, increased interspecific competition, introduction of disease, and increased habitat degradation	Increased sediment discharge, use of pesticides and herbicides, urban and industrial stormwater, waste water discharge, mining dredging, road maintenance- Forest and agricultural practices, residential, commercial and industrial developments and human introduction of exotic species are causes of this effect.

C. 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 (including development of recovery plans);
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.

Under the ESA a species is defined to include "any subspecies of fish or wildlife or plants, or any distinct population segment of any species of vertebrate fish and wildlife which interbreeds when mature". The National Marine Fisheries Service (NMFS) has adopted a definition to further clarify the meaning of subspecies and distinct population segment. The definition of species is based on the concept of "evolutionary significant units" or "ESUs" (Waples 1991). The goal of the ESU concept is to ensure viability of the biological species by conserving the genetic diversity of species and the ecosystems that species inhabit, two of the fundamental goals of ESA (Waples 1991). The decision to list is made under section 4 of the ESA, by either the USFWS (for terrestrial species) or by NMFS (for all marine species with few exceptions).

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 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.

Since 1973 private, state, local, tribal and federal actions have increasingly been impacted by the regulatory requirements of ESA and have been subject to many consequences for not complying with those requirements. The followings are pertinent examples of ESA consequences:

- Restrictions on the ability of farmers to use water: Courts have held in California that state water rights do not prevail over the requirements of the ESA when there is a conflict. For example, a court forced an irrigation district with a very senior (1883) water right to change its practices regarding use of a water diversion channel (U.S. v. Glenn Colussa, 1992). In another instance, the National Marine Fisheries Service (NMFS) required an irrigation district to install a fish screen to protect a listed species (Anderson-Cotton Irrigation District, 1991). In other California cases, irrigators lost use of significant allocations of water, despite contracts with the federal Bureau of Reclamation, because of the needs of ESA- listed species (Orange Cove, 1997; O'Neill v. U.S., 1995; Westland Water District, 1993). In an administrative action, NMFS prevented an Oregon agriculture corporation from further exercising its water right by preventing the corporation from installing a pump to withdraw water from the Columbia River.

- Restrictions on dam operations and power generation: Operations of the Snake and Columbia River dams were modified significantly because of listed fish in the Columbia River Basin. As a result, water that would be used for power generation was kept in river to speed the down river migration of listed fish species, costing annually well over a hundred million dollar in foregone revenue from power generation.

- Restrictions on commercial fisheries: In Alaska, the National Oceanic and Atmosphere Administration determined that one of the world's most lucrative fisheries was reducing the availability of food for the Stellar sea lion, a protected species under the ESA. As a result, significant restrictions were placed on the pollack fisherey, costing commercial fishermen millions of dollars in lost revenue.

- Restrictions on private citizens and state and local governments: In a series of court cases around the country, the reach of the ESA extended to the local level. In Massachusetts, state officials were found in violation of the ESA by issuing licenses and permits allowing fishing in a manner which jeopardized the northern right whale, an ESA listed species (Strahan v. Coxe, 1997). In Florida, local government was held liable for failing to regulate actions which harmed threatened sea turtles (Loggerhead Turtle v. Volusia County Counci, 1995). In another Massachusetts case, a court issued a permanent injunction to ban off-road vehicles (ORVs) from using a beach until the local government follows guidelines to protect piping plovers, a listed shorebird (U.S. v. Town of Plymouth, 1998). In a landmark case establishing the clear authority of the ESA over habitat, a court in Hawaii held that the state" practice of allowing goats and sheep in the habitat of the endangered palila bird was a violation under the ESA (Palila v. Hawaii Department of Natural Resources, 1988). In Oregon, a federal judge threw out a state conservation plan to protect coho in an effort to prevent an ESA listing; the court said that Oregon's plan was based on voluntary actions, which provide no certainty that the fish would be protected.

- Restrictions on timber harvest: In the Pacific Northwest, a federal judge issued an injunction resulting in the shutdown of timber harvest on federal forest land until the federal government drew up a timber harvest plan that protected the northern spotted owl, an ESA listed species. Such a plan was drawn up for the federal forest, resulting in significant reductions in timber harvests with corresponding economic impacts on timber companies, loggers and rural communities. The ESA requirements for the spotted owl also resulted major reductions in harvest from millions of acres of private and state forest land in the Pacific Northwest.

D. Summary

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

- First, 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.
- Second, 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.

AGREEMENT

BETWEEN

THE U.S. DEPARTMENT OF AGRICULTURE COMMODITY CREDIT CORPORATION

AND

THE STATE OF WASHINGTON CONCERNING THE IMPLEMENTATION OF A CONSERVATION RESERVE ENHANCEMENT PROGRAM

I. PURPOSE

This Agreement is between the Commodity Credit Corporation (CCC) of the United States Department of Agriculture (USDA) and the State of Washington (State) to implement a Conservation Reserve Enhancement Program (CREP) to assist in the recovery of salmon species that have been listed as threatened or endangered species under the federal Endangered Species Act.

II. GENERAL PROVISIONS

A number of salmonid species native to Washington have been either listed or proposed for listing as threatened or endangered species under the federal Endangered Species Act. Agricultural activities in riparian corridors, along with agriculture-related impacts on water quality, have contributed to habitat loss of these coldwater fish species in Washington. This Agreement for this Washington CREP is designed to help alleviate some of these problems.

It is the intent of USDA, CCC and the State of Washington that this CREP will in address the following objectives:

1. Restoration of 100 percent of the area enrolled for the riparian forest practice to a properly functioning condition in terms of distribution and growth of woody plant species.

2. Reduction of sediment and nutrient pollution from agricultural lands adjacent to the riparian buffers by more than 50 percent.

3. Establishment of adequate vegetation on enrolled riparian areas to stabilize 90 percent of stream banks under normal (non-flood) water conditions.

4. Reduction of the rate of stream water heating to meet State ambient water quality standards by planting adequate vegetation on all riparian buffer lands.

5. Provision of a contributing mechanism for farmers and ranchers to meet the water quality requirements established under federal law and under Washington's water quality laws.

6. Provision of adequate riparian buffers on 2,700 stream miles to permit natural restoration of stream hydraulic and geomorphic characteristics which meet habitat requirements of salmonids.

The intended outcome of this Agreement in particular is to enhance the ability of producers to enroll certain acreage under the Conservation Reserve Program (CRP), where deemed desirable by USDA, CCC, and Washington. This Agreement is not intended to supersede any rules or regulations, which have been, or may be, promulgated by either USDA or CCC.

III. AUTHORITY

The CCC has the authority under provisions of the Food Security Act of 1985, as amended (1985 Act)(16 U.S.C. 3830 et seq.), and the regulations at 7 CFR part 1410 to perform all its activities contemplated by this agreement. In accordance with the 1985 Act, CCC is authorized to enroll land in CRP through December 31, 2002.

Sections 1230, 1234, and 1242 of the 1985 Act authorize the CCC to enter into agreements with States to use the CRP in a cost-effective manner to further specific conservation and environmental objectives of a State and the nation. Other authorities may also apply.

The authority for Washington to enter into this Agreement is RCW 43.06.120, Laws of Washington.

IV. PROGRAM ELEMENTS

USDA, CCC, and Washington agree that:

A. The Washington CREP will consist of a special continuous sign-up CRP component and a State of Washington incentive program. The Washington CREP will seek to enroll up to 100,000 acres located along streams used for spawning by salmonids that were identified in the 1993 Salmon and Steelhead Status Inventory Report prepared by the Washington Department of Fish and Wildlife as being in critical or depressed status. These streams are identified on Exhibit 1.

B. The Riparian Buffer (practice code CP22) is the only CRP practice authorized under this Agreement.

In determining CCC's share of the cost of practice establishment, CCC shall use the appropriate CRP procedures. All approved conservation plans shall be consistent with applicable CRP statutes and regulations. Until the Natural Resources Conservation Service issues a new practice standard for Riparian Buffers in the State of Washington, Riparian Buffers shall be constructed in accord with the Riparian Buffer practice standard (practice code 391A) currently contained in the Field Office Technical Guide, exc ept with respect to the minimum buffer width. The minimum buffer width shall be no less than 75 percent of the site potential tree height which shall be defined for most sites as the average height, at 100 years of growth of the tallest conifer species native to that site. For sites that historically supported black cottonwoods as the largest tree, the site potential tree height is the average height of a 50-year old black cottonwood. For croplands where trees were not historically present, or cannot be re-established, shrubs may be planted and the minimum riparian buffer width shall be 50 feet. However, the maximum buffer width shall not exceed 150 feet. Modifications to these Field Office Technical Guides adopted subsequent to the date of this Agreement will be implemented as appropriate to achieve the overall purposes of this Agreement in a cost-effective manner.

C. The continuous sign-up CRP contracts for acres enrolled in this CREP must be a minimum of 10 years but may not exceed a maximum of 15 years.

D. Eligible producers will not be denied the opportunity to offer eligible acreage for enrollment during general or continuous CRP enrollment periods.

E. CRP contracts executed under this Agreement will be administered in accordance with, and subject to, the CRP regulations at 7 CFR part 1410, and the provisions of this. Agreement. In the event of a conflict, the CRP regulations will be controlling.

F. The Deputy Administrator for Farm Programs, Farm Service Agency, is delegated authority to carry out this Agreement and with the Governor of Washington or his designee, may further amend this Agreement consistent with the provisions of the 1985 Act and the regulations at 7 CFR part 1410. The provisions of this Agreement may only be modified by written agreement between the parties.

G. This Agreement shall remain in force and effect until terminated by USDA, CCC or Washington. This Agreement may be terminated by either party upon written notice. Such termination will not alter responsibilities regarding existing contractual obligations under the CREP between participants and USDA or CCC, or between participants and Washington.

H. No lands may be enrolled under this program until the USDA's Deputy Administrator for Farm Programs, in consultation with USDA's: Natural Resource Conservation Service, concurs with a detailed Washington Amendment to 2-CRP which will provide a thorough description of this program and applicable practices.

V. FEDERAL COMMITMENTS

USDA and CCC agree to:

A. Cost share with producers for 50 percent of the eligible reimbursable costs of all approved conservation practices.

B. Make an annual rental payment for each eligible enrolled acre. The rental rate in all cases shall be the rate for non-irrigated land and will be calculated as provided for in the existing CRP manual.

C. Make an additional annual incentive payment, as a percentage of the base CRP contract annual rental rate otherwise applicable to the land to be enrolled in the CREP (as calculated under paragraph V.B. without regard to other incentive payments), in the following amounts:

(1) for land to be established as riparian buffers, 50 percent; and
(2) for lands protected under the Growth Management Act (RCW 75.090) as agricultural lands of State significance, 10 percent.

D. Make an annual "maintenance" incentive payment for each enrolled acre in the same manner as with other CRP contracts.

E. Administer contracts for lands approved under the CREP.

G. Develop conservation plans for treatment of a unit of land or water to address identified natural resource problems by devoting eligible land to permanent vegetative cover or other comparable practices, and review conservation plans developed by others for applicants offering to enroll eligible acreage in the CREP.

H. Conduct annual compliance reviews according to Farm Service Agency Handbook 2-CRY to ensure compliance with the CRP contract.

I. Provide information to landowners concerning Washington's CREP program and technical assistance for the CREP program in general.

J. Permit successors-in-interest to enroll under CREP in the same manner as allowed for under any other CRP contract.

K. Share appropriate data, in accord with procedures and restrictions and exemptions established under the federal Freedom of Information Act, federal privacy laws and other applicable laws, with the State of Washington to facilitate State monitoring efforts.

VI. STATE COMMITMENTS

Washington will:

A. Contribute not less than 20 percent of the overall annual program costs.

B. Be responsible for.

(1) making direct cost share payments to approved participants of 37.5 percent of theeligible reimbursable costs for all conservation practices established under this CREP;

(2) paying all costs associated with the annual monitoring program;

(3) providing technical assistance in the development of conservation plans, including installation of forested riparian buffers;

(4) providing conservation planning assistance for the entire farm to enrolled producers on a voluntary basis; and

(5) providing grant funds for removal of fish barriers and installation of other salmonid habitat restoration practices.

C. Establish an Enhancement Program Steering Committee, which will include representatives from the State Technical Committee, National Marine Fisheries Service, U.S.-Fish and Wildlife Service, Washington Department of Agriculture, Washington Department of Natural Resources, Washington Department of Fish and Wildlife, Extension Service, agriculture groups, conservation groups, local governments and Tribal government. This group will advise the Governor's Joint Natural Resources Cabinet on the implementation of the CREP.

D. Seek applicants willing to offer eligible and appropriate land for enrollment in the CREP.

E. Facilitate the provision of technical assistance from the local conservation districts, and other cooperators to develop conservation plans, in cooperation with the Natural Resource Conservation Service and Washington State Conservation Commission for applicants offering to enroll eligible acreage in the CREP.

F. Implement a broad campaign for continuous public information and education regarding the CREP.

G. Ensure that the CREP is coordinated with other agricultural and natural resource conservation programs at the State and Federal level.

H. Within 90 days of the end of each Federal fiscal year, the Conservation Commission shall provide a report to FSA summarizing the status of enrollments under this CREP and progress on fulfilling the other commitments of this program. The annual report to FSA shall include: level of program participation; the results of the annual monitoring program; a summary of non-federal CREP program expenditures; and, recommendations to improve the program. The report shall include a comparison of salmon habitat characteristics and population trends in streams where there is significant enrollment in this program with similar streams where program participation is not significant.

I. Within 90 days of the end of the Federal fiscal year, State will submit information summarizing its overall costs for the program. In the event that the State has not obligated 20 percent of the overall costs for a relevant Federal fiscal year, the State will fulfill its obligations within 90 days by paying the shortfall to CCC, or by providing some other mutually agreed-upon remedy.

VII MISCELLANEOUS PROVISIONS

A. All commitments by USDA and the State are subject to the availability of funds. In the event either party is subject to a funding limitation, it will. notify the other party expeditiously and any necessary modifications will be made to this Agreement.

B. All CRP contracts under this CREP shall be subject to all limitations set forth in the regulations at 7 CFR Part 1410, including, but not limited to, such matters as economic use, transferability, violations and contract modifications. Agreements between owners or operators and the State may impose additional conditions not in conflict with those under the CRP regulations, but only if approved by CCC.

C. Neither the State nor USDA shall assign or transfer any rights or obligations under this Agreement without the prior written approval of the other party.

D. The State and USDA agree that each party will 11 be responsible for its own acts and results to the extent authorized by law and shall not be responsible for the acts of any others and the results thereof.

IT IS SO AGREED:

FOR THE U.S. DEPARTMENT OF AGRICULTURE AND THE COMMODITY CREDIT CORPORATION

DAN GLICKMAN
Secretary
U.S. Department of Agriculture and
Chairman of the Board
Commodity Credit Corporation

Date

FOR THE STATE OF WASHINGTON

GARY LOCKE
Governor
State of Washington

Date

Amendment Number 1
to
Conservation Reserve Enhancement Program Agreement Between the U.S. Department of Agriculture, Commodity Credit Corporation and the State of Washington

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The Conservation Reserve Enhancement Program Agreement between the U.S. Department of Agriculture, Commodity Credit Corporation, and the State of Washington Executed on October 19, 1998, is hereby amended as follows:

1. Section IV.B. of the Agreement is amended to read as follows:

B. The Riparian Buffer (practice code CP22) is the only CRP practice authorized under this Agreement.

In determining CCC's share of the cost of practice establishment, CCC shall use the appropriate CRP procedures. All approved conservation plans shall be consistent with applicable CRP statutes and regulations. Until the Natural Resources Conservation Service issues a new practice standard for Riparian Buffers in the State of Washington, Riparian Buffers shall be constructed in accord with the Riparian Buffer practice standard (practice code 391A) currently contained in the Field Office Technical Guide, except with respect to the minimum buffer width. The minimum buffer width shall be no less than 75 percent of the site potential tree height which shall be defined for most sites as the average height, at 100 years of growth of the tallest conifer species native to that site. For sites that historically supported black cottonwoods as the largest tree, the site potential tree height is the average height of a 50-year old black cottonwood. For croplands where trees were not historically present, or cannot be re-established, shrubs may be planted and the minimum riparian buffer width shall be 50 feet. However, the maximum buffer width shall not exceed 150 feet. Modifications to these Field Office Technical Guides adopted subsequent to the date of this Agreement will be implemented as appropriate to achieve the overall purposes of this Agreement in a cost-effective manner.

So agreed:

A. On behalf of the United States Department of Agriculture and the Commodity Credit Corporation

Deputy Administrator for Farm Programs Farm Service Agency and Deputy Vice President Commodity Credit Corporation	Date

B. For the State of Washington

Executive Director Conservation Commission	Date

MEMORANDUM OF UNDERSTANDING
Between
THE STATE OF WASHINGTON (STATE)
NATURAL RESOURCES CONSERVATION SERVICE (NRCS)
NATIONAL MARINE FISHERIES SERVICE (NMFS)
FISH AND WILDLIFE SERVICE (FWS)
ENVIRONMENTAL PROTECTION AGENCY (EPA)
WASHINGTON FISH AND WILDLIFE COMMISSION

SECTION 1. PURPOSE

This Memorandum of Understanding (MOU) will streamline the process for non-Federal landowners to comply with the Endangered Species Act (ESA) and contribute to the conservation of species of concern[1] and their habitats. It will do so by facilitating our cooperation with local Conservation Districts (CDs), watershed groups, Tribes, and non-Federal landowners through a voluntary, watershed-based, locally driven approach to proactively address implementation of the ESA on non-Federal lands in Washington.

The FWS and NMFS share regulatory authority under the ESA. While the NRCS has no regulatory function under ESA, their unique programs and ties to private non-Federal landowners provide an opportunity to assist those landowners in complying with ESA regulatory requirements. This MOU will also provide a mechanism by which funds from a variety of sources may be made available for implementing appropriate management systems on non-Federal lands and provide an initial framework that will contribute to more cooperative efforts between Federal, State and local agencies, and Tribes.

To protect and restore fish and wildlife resources, ecosystem and watershed health, properly functioning habitat and comport with Federal trust obligation to Tribes, the contribution of management action to benefit species of concern on non-federal lands will be necessary.

[1]/ State Listed and sensitive species, and Federal candidate, proposed and listed species.

SECTION 2. OBJECTIVES

A. Accelerate the implementation of voluntary changes in resource management on non-Federal lands that will protect salmon and other species of concern, protect and restore habitat, and improve water quality.

B. Make NRCS and other Federal, State, and local funds available to those -who desire to implement management systems under the discretion of NRCS that are appropriate for species of concern on non-Federal lands in Washington.

C. By developing technical standards that protect and restore salmon and other species of concern, the signatories will provide interested non-Federal landowners with a way to achieve increased regulatory certainty under Federal and State endangered species laws, and help to preclude future listings of species under those laws.

D. Create a process through which signatory Federal agencies and appropriate State agencies provide fully coordinated and consistent technical assistance to local watershed planning and implementation efforts, a single point of contact for required reviews or consultations, and consistent and timely responses to requests for assistance and consultation under the ESA.

SECTION 3. BACKGROUND

A. The Pacific Northwest faces significant and extensive land and water management challenges to meet society's need for sustainable resources while maintaining ecosystem functions and healthy populations of fish and wildlife, especially for species of concern. A number of species occurring in Washington are currently listed or proposed for listing under State and Federal endangered species laws. In addition, 666 stream segments have recently been designated in Washington as water quality limited under the Federal Clean Water Act (CWA) because, in most cases, they do not support the beneficial uses associated with aquatic habitats.

B. The NMFS and the FWS each have significant responsibilities for ecosystem protection on non-Federal lands, and recognize a common purpose in reducing environmental degradation and preserving and restoring habitat needed to maintain viable populations of native species. With existing and impending ESA listings, these agencies must act in a manner that protects ecosystem and watershed health, maintains the full range of natural resource values, comports with Federal trust obligation to Tribes, and complies with ESA requirements, while providing increased predictability to non-Federal landowners as they carry out management activities. Watershed management plans developed under the terms of this MOU may apply the provisions of section 7(a)(2) of the ESA when using NRCS financial assistance for implementation of the plan.

Actions carried out without NRCS financial assistance may use section 10(a)(1)(B) unless section 7(a)(2) is triggered by another Federal action. The signatories recognize that a conservation program for any species that occurs to a large extent on non-Federal land cannot be successful without the cooperation and active participation of non-Federal landowners.

C. The NRCS delivers technical services and programs to private non-Federal landowners and Tribes, upon request, through cooperative agreements with CDs (which are sub-units of State government), with elected directors that provide local leadership in resource management on non-Federal lands. Through cooperative agreements with the NRCS and Washington State at the State level, and with the Secretary of Agriculture at the national level, CDs provide local non-Federal landowners access to NRCS technical assistance and various programs authorized under the Farm Bill. NRCS has a traditional role in providing assistance to non-Federal landowners who voluntarily plan and apply appropriate conservation measures to maintain or enhance the health of their watershed. NRCS has the flexibility to extend this role to include consideration of species of concern.

D. EPA has either direct or oversight responsibilities for a number of regulatory programs which may affect critical habitats, air, and water quality. In recent years, EPA has begun emphasizing geographic approaches which integrate local involvement with various levels of government to holistically address environmental protection. This emphasis has resulted in both organizational changes and an effort to utilize geographic prioritization of coordinated available funding sources with resources directed at programmatic activities. One of the key elements of EPA's geographic approach is to assist in the development of the capacity of residents, non-governmental organizations, and tribal and local governments to more effectively address environmental resource protection. The ESA also requires that EPA consult with NMFS and FWS while conducting various regulatory activities.

E. The State of Washington is developing a comprehensive, integrated system for the restoration and protection of fish and wildlife habitat. The State is committed to a watershed-based approach to resource management and the restoration of healthy and harvestable fish and wildlife populations. Several programs are currently being used by State agencies in partnership with private landowners, corporations, and other interested parties. These programs and activities include watershed approaches to water quantity and water quality management, landscape planning, a Timber Fish and Wildlife process, watershed analysis, comprehensive plan review under the Growth Management Act, Coordinated Resources Management Planning, and the development of habitat conservation plans (HCP) for both State and private lands. The long term goal of these State actions is the implementation of an effective, sustainable resource management system that benefits all citizens of the State.

F. Indian Tribes in Washington hold treaty-reserved rights to manage and harvest fish produced throughout the Northwest Activities conducted pursuant to this MOU must be consistent with these treaty rights and related trust obligations to the Tribes of the the United States. The signatories to this MOU recognize the importance of involving Indian Tribes in all phases of the implementation of tasks outlined in this MOU in order to avoid disputes regarding the effectiveness of actions taken and, therefore, the effect of the actions on the resources subject to the treaty right

G. It is recognized that numerous outstanding watershed planning activities, outside the scope of this MOU, are already underway and will continue to occur, which will result in improving habitat for sensitive species. Local watershed groups and efforts such as Coordinated Resource Management Plans play a key role in public outreach, provide opportunities for local stakeholders to take an active role in the planning process, and leverage opportunities for funding planned conservation measures. NRCS can bring significant technical and funding resources to bear where it is desired by the local watershed planning group and requested by CDs.

SECTION 4. ROLES AND RESPONSIBILITIES

A. The signatories will work together to:

1. Implement this MOU based on the availability of appropriated funds.
2. Seek out and support tribal participation in all activities undertaken by this MOU in order to further its purposes and objectives in a manner which is consistent with trust obligations to the Tribes and their treaty-reserved rights.
3. Provide a timely review of all applicable State and Federal standards, including NRCS FOTGs, and make enhancements necessary to ensure the conservation of species of concern; this review will be completed prior to the expenditure of any funds provided to specifically implement this MOU. Although NRCS retains final approval over all modifications to the FOTGs, NRCS will fully consider recommendations from signatory parties and Tribes. The FOTG will meet or exceed all local, state and federal regulations. If the NRCS does not incorporate FWS/NMFS recommendations into the FOTG, ESA certainty for those activities will not apply.

4. Establish, within 120 days of funding appropriation, interagency teams to review FOTGs. Every effort will be made to complete FOTG review and modification, as appropriate to conserve species of concern, within 180 days of the establishment of teams.
5. Identify watershed(s) in which the collective financial and technical resources of the signatories should be focused and work together to establish funding priorities.
6. Participate in public outreach to inform and seek input from local non-Federal landowners, residents, and organizations regarding the status of species of concern, agency responsibilities, and locally based alternatives available to address ESA requirements.
7. Actively seek means to support demonstration and restoration projects and other on the ground actions that are needed to restore watershed health, eliminate or minimize and mitigate the impacts of "take" (as defined under the ESA), and conserve species of concern while watershed plans are being developed.
8. Provide adequate guidance, technical assistance and incentives necessary to actively support development and implementation of watershed plans at the local level to protect and restore fish and wildlife resources, ecosystem and watershed health, comport with Federal trust obligation to Tribes, and conserve species of concern.
9. Provide interagency coordination on those components of a watershed action plan involving the range of activities over which NRCS has discretion.
10. Recognize the importance of property rights and stewardship responsibilities of non-Federal landowners and the key role-they will play in the success of this undertaking, and acknowledge the important role that production of food and fiber on non-Federal land plays in Washington's economic sustainability while also recognizing the importance of fish and wildlife and water quality for economic stability, human health, cultural resources, and compliance with trust obligations to treaty Tribes.
11. Develop and implement a comprehensive process to ensure the tracking of all projects implemented under this MOU, the monitoring of projects to ensure that they are implemented in accordance with agreed upon technical standards, such as provided in FOTGs, and modification or suspension of projects found not to be in conformance with agreed upon technical standards.
12. Cooperate with non-Federal landowners to ensure the monitoring and evaluation of the long-term effectiveness of watershed plans, based on data collected as a result of a jointly developed monitoring plan.
13. In addressing species of concern in the implementation of this MOU, give priority consideration to those activities which are integrated with other watershed conservation efforts.
14. Coordinate and make all watershed analysis procedures compatible across all land uses
15. Implement adaptive management responses based on observed outcomes of projects and plans implemented under this MOU.

B. The NRCS will:

1. Seek the technical assistance of FWS and NMFS to enhance FOTGs as necessary, in accordance with agency policy, in order to reflect quality standards needed to conserve species of concern. Such proposed changes must be documented to ensure that practices or systems are effective, economically feasible, and sensitive to social and cultural values.
2. Consult under the ESA on delivery of its programs as required by law. Requests for informal and formal section 7 consultation will be made for activities for which NRCS provides financial assistance or is otherwise able to control actions by private landowners.
3. Coordinate with CDs in accordance with existing cooperative agreements.
4. Upon request from CDs, serving as the Sponsoring Local Organization (SLO), provide technical assistance in the development of watershed plans under the provisions of Public Law 83-566. These watershed plans will be prepared using information on the effects selected management alternatives will have on species of concern. National Environmental Policy Act (NEPA) documentation will be prepared for all plans for *which* NRCS provides assistance.
5. Assist non-Federal landowners in developing individual conservation plans in accordance with the FOTG and watershed plans, where they exist.
6. Provide non-Federal landowners *with* quality standards and technical specifications to guide the appropriate implementation of conservation practices contained in their individual conservation management plan, and assure technical adequacy of practices associated with habitat for species of concern.

C. The NMFS will:

1. Expeditiously draft, review and sign or co-sign, as appropriate, ESA consultation documents that involve fish species under NMFS regulatory authority.
2. Provide information on species for which NMFS is responsible under the ESA for use in planning and consultation processes.
3. Ensure that ESA consultation documents addressing fish species under NMFS regulatory authority conform with NMFS ESA standards.
4. Offer for review their technical standards related to species of concern and work to integrate interagency technical standards to achieve the goals of this MOU.
5. Provide technical assistance in reviewing the NRCS FOTGs and respond, as appropriate, to requests for informal and formal section 7 consultation.

D. The FWS will:

1. Serve as the primary contact with NRCS and State agencies for coordinating decisions on the design, implementation, and monitoring of habitat restoration and enhancement projects to ensure that outcomes achieve biological and habitat objectives.
2. Provide technical assistance in reviewing the NRCS FOTGs and respond to requests for informal and formal section 7 consultation.
3. Provide information on species for which FWS is responsible under the ESA for use in planning and consultation processes.

4. Offer for review their technical standards related to species of concern and work to integrate interagency technical standards to achieve the goals of this MOU.

E. The EPA will:

1. Continue ESA consultations with NMFS and FWS for programs over which EPA has regulatory authority.
2. Use ESA considerations as an important element of EPA's Geographic Priority Setting Process.
3. Participate in and support Washington's salmon recovery efforts.
4. Offer for review their technical standards related to species of concern and work to integrate interagency technical standards to achieve the goals of this MOU.
5. Work with the other signatories and Tribes to develop technical guidelines, improved procedures, and a monitoring program that achieves the goals of the CWA and the ESA.

F. The State of Washington will:

1. Utilize available recovery/restoration funding with consideration for conservation needs both basin-wide and State-wide.
2. Ensure that those State agencies having regulatory and/or resource management responsibilities are actively involved in the development and implementation of interim activities to improve watershed quality.
3. Use State resources to encourage watershed-based planning and action plan development to restore properly functioning stream habitats and water quality.
4. Support locally led efforts as an effective forum for watershed-based planning and implementation.
5. Work with the other signatories and Tribes to ensure water quality standards protect and restore species of concern.

G. The Washington Department of Fish and Wildlife will:

1. Provide information on local resource issues, including species and habitat management objectives, that contribute to habitat restoration and enhancement planning efforts, e.g., resource information data bases as related to species of concem.
2. Participate in the process to review and amend the NRCS FOTGs.
3. Offer for review their technical standards related to species of concern and work to integrate interagency technical standards to achieve the goals of this MOU.

SECTION 5. REGULATORY AGENCY (FWS AND NMFS) ADMINISTRATIVE OPTIONS TO PROVIDE FOR ESA CERTAINTY

A. The signatories of this MOU recognize that depending on the scope and funding sources for the planning effort, watershed plans and other plans developed under the terms of this MOU may utilize the provisions of Section 7(a)(2) or Section I 0(a)(l)(B) of the ESA to meet ESA requirements and obtain regulatory certainty.

B. Section 7 consultation by NRCS with the FWS or NMFS for funded projects would be used for achieving ESA compliance and certainty under the terms of this MOU. The Services agree to perform programmatic consultations on certain conservation practices or resource management systems that may affect fish and wildlife (e.g., upland, instream, or riparian practices) or on activities proposed under a watershed plan or other plan funded by the NRCS. ESA certainty for any Federal action, including the implementation of this MOU and funding of projects under the revised FOTGs, are based on three possible outcomes of interagency cooperation:

1. A "no effect" determination by the action agency for listed species or designated critical habitat;
2. A "not likely to adversely affect" determination by the action agency and written concurrence by the NMFS and/or FWS;
3. A no jeopardy/no destruction or adverse modification of critical habitat finding with an incidental take statement (where appropriate) in a biological opinion issued by the NMFS and/or FWS based on a "may affect" or a "may affect likely to adversely affect" determination.

To the degree that funded projects using revised FOTGs can facilitate outcomes (1) and (2), no further steps are necessary to obtain ESA certainty. To the degree that application of the FOTGs or the effects of a particular action do not meet these outcomes, ESA certainty can be achieved through outcome (3).

C. Section I 0(a)(1)(B) of the ESA allows FWS and NMFS to authorize incidental take of federally listed species of fish and wildlife based on the submission and approval of a HCP. Early involvement of the FWS and NMFS in NRCS watershed planning efforts will help conform NRCS developed watershed plans to section 10 standards and facilitate their approval as HCPs.

Section I 0(aX 1)(B) may be used whenever the management or conservation activities addressed in a watershed plan or farm plan are not funded by NRCS, or when planners or landowners elect to use this section of the ESA to obtain certainty through the "No Surprises" policy[2] assurances, or for other reasons, including the scope of the planning area and the inclusion of unlisted species for which assurances of a long term incidental take permit are desired.

SECTION 6. STRUCTURE

A. The Regional Director, Regional Administrators, State Conservationist, Governor's Office, Tribal representatives, the Washington Department of Fish and Wildlife, and the State Conservation Commission will comprise a Steering Committee to establish standards and guidelines to implement this MOU, including recommending priorities for funding, overseeing the prompt and effective implementation of both watershed planning efforts and individual projects to meet the intent of the agreement establishing and implementing a monitoring and evaluation program, and designing and implementing adaptive management responses to observed outcomes of the efforts supported by this MOU.

B. The Steering Committee, where appropriate, will establish a process to involve other gencies, local government and the public.

C. An interagency technical team, which includes but is not limited to personnel from NRCS, FWS, NMFS and Washington Department of Fish and Wildlife, and other appropriate State agencies and Tribal representatives, will provide assistance to local watershed groups towards ensuring that watershed plans are adequately addressing habitat needs for species of concern.

D. The signatories recognize that in many cases CDs will be applicants under the ESA, participate in the consultation process, and provide local leadership in watershed planning (often supplementing watershed groups and other existing planning groups). The signatories are not bound by any obligation in this MOU or any supplement thereto or other appropriate arrangements that involve the expenditure of funds in excess of the amounts made available to them for a period in excess of that authorized by law.

[2]This policy states, in part that the FWS and NMFS shall not require the commitment of additional land or financial compensation beyond the level of mitigation which was otherwise adequately provided for a species under the terms of a properly functioning HCP.

E. This MOU does not affect or modify existing regulations or agency responsibilities and authorities. It specifically does not commit any agency to activities beyond the scope of its mission and authorities under its organic statutes, trust responsibilities to federally recognized Indian Tribes and the ESA.

SECTION 7. AUTHORITIES

A. The Federal agencies are authorized to enter into this MOU pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C.; 1531-1544) and the Fish and Wildlife . Coordination Act (16 U.S.C.; 661 - 667e). Under the ESA, the Secretary of the Interior through the FWS, and the Secretary of Commerce through the National Oceanic and Atmospheric Administration and NMFS, share the responsibilities for the statute's implementation, including the issuance of biological opinions and incidental take permits. The Services' intent is to coordinate their respective responsibilities under this MOU to achieve maximum administrative efficiencies.

B. The NRCS is authorized under Public Law 74 - 46,16 U.S.C.; 590 (a-f) to plan and carry out a national soil and water conservation program, and provide leadership in conservation, development and productive use of the Nation's (non-Federal) soil, water and related resources.

C. The State of Washington is authorized under Chapter 39.34 RCW to enter into agreements with Federal agencies to plan and implement conservation programs.

SECTION 8. DURATION OF MOU

A. This MOU becomes effective upon signature by all parties and remains in effect until modified by mutual consent or terminated with a 60-day notice by any party, except that each signatory will annually notify the others that it has sufficient funding to participate in this agreement at some level for the upcoming fiscal year. In the absence of such notification, a signatory shall have no obligation under this agreement.

B. In coordination with other appropriate Federal and State agencies and Tribes, the signatories will evaluate in the near future whether this agreement should be amended and expanded to accommodate specific water quality issues. Until that decision is made, this agreement should not be interpreted to provide any decision framework or guarantees related to CWA requirements.

Gary Locke, Governor
State of Washington

Date

Michael J. Spear, Regional Director
U.S. Fish and Wildlife Service

Date

Dr. Bern Shanks, PhD.
Washington Fish and Wildlife Commission

Date

Frank R. Easter
Acting State Conservationist
Natural Resources Conservation Service
Washington State

Date

Chuck Clarke, Regional Administrator
Environmental Protection Agency
Region 10

Date

Will Stelle, Regional Administrator
National Marine Fisheries Service

Date

APPENDIX B

Summary of Instream Flow Conditions
By Water Resources Inventory Areas

October 1999

This summary is based on various sources of information such as watershed assessments conducted by the Department of Ecology in 1995, watershed recovery inventory program conducted by the Department of Fish and Wildlife in 1997, and other information.

WRIA 1 - NOOKSACK

- IFIM studies were done and instream flows set by rules in 1985.
- Flows were set more toward 100 percent habitat protection.
- Significant illegal uses (300 to 500) and significant number of exempt wells make this basin a good case of where Ecology set a protective instream flow but illegal/exempt withdrawals and extensive growth pressure are putting tremendous stress on the water resources in the basin and withdrawing water that would otherwise be available for the fish.
- Ecology has issued in 1995 a report on the "State of Nooksack River Watershed".

Note: Ecology did IFIM studies on North Fork Nooksack River (RM 45), South Fork Nooksack River (RM 5.0), Middle Fork Nooksack River (RM 1.4), Maple Creek (RM 0.8), Kendall Creek (RM 0.2 and 0.7), Terrell Creek (RM 4.9), and Silver Creek (RM 1.9). Ecology, WDFW and the Tribes prioritized these streams in the basin as anadromous streams most threatened by future development and in need of putting water back in stream by protecting the established instream flows. Other streams had much higher fish use (Thompson, Cornell, Gallup, and Deadhorse), but were not in need of instream flow protection since they are on U.S. Forest Service land.

WRIA 2 - SAN JUAN

- Small streams with naturally extreme low flows

WRIAs 3 and 4 - LOWER SKAGIT/SAMISH & UPPER SKAGIT

- In the Upper Skagit no instream flows have been set, upper is mostly on USFS lands and no growth pressure. Only the mouth of the Skagit is on private lands.

- Middle and lower Skagit:

    - No instream flows set. I.F. Studies were done on the tributaries and on the Samish River.
    - I.F. studies were done by the Fish Research Institute, University of Washington, on the middle Skagit. The study was used to set instream flows on the Skagit hydro system.
    - Skagit PUD completed an IF study on the lower Skagit and selected tributaries (Ecology was consulted). The purpose of the study is to set I.F. on the lower Skagit and to

condition the PUD water right change with the I.F. as a requirement to moving the points of diversions from the tributaries to the main stem.

Note: Lower Skagit-Samish: Ecology did IFIM studies on Day, Parker, and Carpenter Creeks and the Samish River. Upper Skagit: The Fisheries Research Institute (University of Washington) did 7 IFIM sites on the Skagit River from RM 67.5 to 92 (Rockport to Newhalem). There are dozens of other streams with IFIM studies, but they are all for hydroelectric projects on National Forest or National Recreation land.

WRIA #5 - STILLAGUAMISH

- Stillaquamish was identified by Ecology and WDFW as number one priority for setting instream flows. There is lots of water and fish. Healthy runs of Chinook and Coho which should be protected in the very near future. Growth is headed there fast, increasing the need for water for future growth.
- Several I.F. studies were done by USGS on the main stem and tributaries. Studies were done without participation of Ecology , WDFW and the Tribes.
- To redo the studies will not be cost effective, will require a large crew and 24 months to complete. Instead the agencies and tribes will need to review the USGS report to determine its accuracy, usefulness and whether additional data or analysis is needed.

Note: USGS did 14 IFIM sites on the Stillaquamish basin lower mainstem, 4 sites on North Fork Stillaquamish, 4 sites on South Fork Stillaquamish, 2 sites on Jim Creek, Pilchuck Creek, Squire Creek, and Canyon Creek.

WRIA 6 - ISLANDS

- Small streams, experiencing natural extreme low flows

WRIA 7 - SNOHOMISH

- The conditions in the Snohomish are similar to the Stilliquamish except that growth pressure is already there.
- Existing instream flows were set by rules in 1979. They were reviewed in 1995 and determined to be adequate, except for 7 tributaries needing flows.
- Subsequently instream flow studies and analysis were done on tributaries, need to develop recommendations from agencies and tribes.
- The highest priority tributaries are Wallace River and Cherry Woods Creek.

Note: Ecology did IFIM studies on Woods Creek, Cherry Creek, and 2 sites on the Wallace River. Dames and Moore consultant did 4 sites on the Snoqualmie River (from the Tolt River confluence up to Snoqualmie Falls), the mainstem Snoqualmie from the Falls up to the three forks, and 3 sites in the North Fork Snoqualmie. Weyerhaeuser also did and IFIM study on the North Fork Snoqualmie. Ecology conducted a watershed assessment in 1995 evaluating the conditions of water resources concluding that instream flow requirements are not wet an average of 121 days per year, especially from mid-May to mid-October.

WRIA 8 - CEDAR-SAMMAMISH

- I.F. were set by rules in 1978. Several tributaries of Lake Washington and the lake itself were closed.
- Subsequent studies were done, reaching same conclusion on flow levels. I.F. set by rules are adequate based on storage availability, but not always met due to withdrawals by Seattle.
- Seattle is a major user with claims (not subject to IF). The city is trying, however to meet the I.F. requirements.
- Tribes and the U.S. Corps of engineers have equally valid claims probably some pre-dating Seattle.
- Negotiation have been completed between the City of Seattle, Departments of Ecology and Fish and Wildlife, the tribes, environmental groups and other interests for higher and more reliable I.F. under an HCP. The draft HCP is being reviewed by NMFS.

Note: Cascade Environmental Service for Seattle did an IFIM study on the Cedar River and used 64 transects to cover the river from the mouth up past Landsburg Dam to Cedar Falls (RM 33.7) and beyond to RM 43.2. Ecology conducted a watershed assessment in 1995 evaluating conditions of water resources, concluding that minimum flows have not been met an average of 81 days per year since 1980, with number of days increasing. Significant declines are registered in gages on Sammamish River and Issaquah Creek due in fact to ground water withdrawal and changes in land use (increase in previous surface).

WRIA 9 DUWAMISH / GREEN

- I.F. were set by rules in 1989, in addition, all tributaries of Green are closed. The flows are inadequate, protecting 95 percent or less of habitat.
- City of Tacoma water right is not affected by I.F. requirements except for pipeline number 5.
- Ecology after 1980 did an IFIM study and issued a report with recommendations for higher instream flow levels.
- Tacoma has negotiated an agreement with the tribes for higher I.F. an HCP is being negotiated.
- Tacoma wants to expand Howard Hanson storage to use for municipal water and some flow augmentation.
- In addition to the large water withdrawals from Tacoma, there are significant number of wells (including exempt wells) in the watershed directly affecting the flows in the river

Note: Ecology did IFIM studies on the Green River at 4 sites from Kent (RM 27.2) up to Tacoma's Diversion below Howard Hanson Reservoir (RM 60.6). Ecology conducted in 1995 a watershed assessment evaluating the water resources. Concluding that the allocation of water has drastically increased from 5 cfs + to 40 cfs + in a 25 year period.

WR 10 - PUYALLUP-WHITE

- I.F. were set in 1980

- I.F. should be reviewed to determine adequacy.

Note: USGS did IFIM studies on 3 sites on the Puyallup River (RM 7, 14, 20), 2 sites on the White River (RM 3 and 5), and the Carbon River (RM 2). Hosey and Associates for Puget Power did IFIM Studies on the White River at 5 sites (RM 4.3, 6, 10, 13.8, and 21.2). Ecology conducted a watershed assessment on 1995. The assessment indicates a decrease in low flows in the past 20 years despite above average precipitation and closures of some streams. The decline is due to ground water withdrawals and land use changes.

WRIAs 11- NISQUALLY, 12- CHAMBER-CLOVER, 13- DESCHUTES, AND 14- KENNEDY-GOLDSBOROUGH

- I.F. were set by rules in 1981 for the Nisqually. Instream Flows have been identified as issue by the local planning unit under 2514 process.
- I.F. were set by rules in 1979 for Chamber Clover. Instream Flows have been identified as issue by the local planning unit under 2514 process.
- I.F. were set by rules in 1980 for Deschutes. Instream Flows have been identified as issue by the local planning unit under 2514 process.
- I.F. were set by rules in 1984 for Kennedy Goldsborough.

Note: Ecology conducted a watershed assessment in 1995 for Chamber-Clover and Deschutes. I.F. are lowest in summer and fall when salmon migrate to spawn. Extensive ground water withdrawals and change in land use are affecting summer flows.

WRIA 15, KITSAP

- Instream flows were set by rules in 1981. Need to be reviewed for adequacy.
- Existing GW withdrawals are extensive, most in continuity with streams. Large number of pending applications due to growth.

WRIA 16 -SKOKOMISH-DOSEWALLIPS

- Ecology completed instream flow studies and recommendations in 1985. The Ecological Commission vetoed in 1985 Ecology's proposed I.F. rules for the basin on the basis that the levels were not protective (90%). The Ecological Commission required 100% habitat protection especially given that the fish stocks were depressed.

Note: Ecology did IFIM studies on the Dosewallips, Duckabush, and Hamma Hamma Rivers; and on the Finch, Eagle, Johns, Jorsted, and Fulton Creeks. U.S. Fish and Wildlife Service did IFIM studies on the North Fork, South Fork, and mainstem Skokomish River. Harza Inc. for Tacoma is presently doing an IFIM study on the lower North Fork of the Skokomish River.

WRIA 17 - QUILCENE

- Instream flow studies are done, recommendations and report in progress.
- Stocks are very critical and depressed.

- Instream flows need to be set – a very high priority basin.

Note: Ecology did IFIM studies on the Little and Big Quilcene Rivers. Additional data has been collected in the summer of 1999 on the Little Quilcene and tributaries. Hosey and Associates did IFIM study on 4 sites on the Big Quilcene River.

WRIA 18 - DUNGENESS

- Stocks are very depressed more than any other basin.
- I.F. studies and recommendations are completed.
- I.F. setting is a very high priority, I.F. rules proposal in progress. Existing efforts to restore flows underway.

Note: U.S. Fish and Wildlife Service did an IFIM study on the Dungeness River at 2 sites (RM 2.3, and 4.2).

WRIA 19 - LYRE-HOKO

- No instream flows set. Very low development.
- Natural low flows at times, overall healthy fish.
- Not an I.F. issue at this time.

Note: CH2M Hill for PUD number 1 of Clallam County did an IFIM study on the Lyre River (RM3.2).

WRIA 20 - SOL DUC

- Same as number 19.

WRIA #21 - QUEETS-QUINAULT

- No instream flows set. Majority of land is protected from development
- Overall good fish runs.

WRIA 22 & 23 - LOWER Chehalis and Upper Chehalis

- Some runs are in trouble, other are fairly healthy.
- I.F. were set by rule in 1976 on the mainstem but not on the tributaries, using old methods.
- ***I.F. levels are very inadequate***.
- Subsequently IFIM studies were done on mainstem and tributaries.
- River and tributaries suffer natural very low flow conditions (recharged mostly by rainfall in low elevation).
- There are large withdrawals for irrigation. The basins experience major water quality problems, especially temperature.

Note: Washington Department of Fisheries (WDF) did IFIM studies on Cloquallum Creek (RM 3) and the Wiskah River (RM 20.5). WDF did IFIM studies on the Chehalis River (RM 90, upstream of South Fork Chehalis confluence), Newaukum River (RM 3.5), South Fork Newaukum (RM 16.5), and North Fork Newaukum (RM 4.5). Ecology conducted a watershed assessment in 1995 evaluating water resources, concluding that water use is steadily increasing; water quality is major problem and base flows are not met many days each year.

WRIA 24 - WILLAPA

- No instream flows set. Ecology has some instream flow studies
- Conditions are similar to Chehalis - low flows, irrigation diversions, however lower development pressure.

Note: Ecology did IFIM studies on the Willapa, S.F. Willapa, North, and Naselle Rivers.

WRIA 25 - GRAYS - ELOCHOMAN

- Studies completed, part of the Lower Columbia Salmon/Steelhead Recovery region.
- Low summer flows, very low development pressure
- Grays River has Chum – priority

Note: Ecology issued a report 1995 on local water issues in southwest Washington.

WRIA 26 COWLITZ

- River controlled by hydropower development.
- Irrigation and development are not significant.
- Fish passage and hatcheries are key problems.
- Studies completed by Tacoma for hydro relicensing. Tacoma is looking at restoring fish for the whole basin.
- Studies completed by Ecology and WDFW as part of the Lower Columbia salmon Recovery region.

Note: Ecology issued a report 1995 communicating local water issues in southwest Washington.

WRIA 27 - LEWIS

- Conditions are similar to the Cowlitz. It is a large river controlled by hydro development with no other development pressure.
- PGE is working on relicensing its hydropower system. The company is doing IF studies basinwide.
- Studies completed by Ecology and WDFW as part of the Lower Columbia region.

Note: An IFIM study was done by Northwest Energy Services Company for Pacific Power and Light on the North Fork Lewis River. Ecology issued report in 1995 on local water issues in southwest Washington.

WRIA 28 - SALMON - WASHOUGAL

- Very high growth pressure especially in the Salmon basin.
- Very low summer flows.
- No instream flow set, studies completed by Ecology and WDFW.

Note: Ecology issued a report 1995 describing the water issues in southwest Washington.

WRIA 29 - WIND-WHITE SALMON

- Overall small development of pressure
- Low summer flows
- No instream flows set. Studies are available for the White, done by Ecology and WDFW.

Note: An IFIM study was done by Entrix, Inc. for Pacific Power and Light on the White Salmon River downstream of Condit Dam.

WRIA 30 – KLICKITAT

- U.S. Fish and Wildlife Service did an IFIM study on main stem of the Klickitat River.
- Ecology did an IFIM studies on Little Klickitat and its tributaries, report is written.
- The little Klickitat is a fully appropriated basin. It was adjudicated and administratively closed (no rules) for over 25 years.
- The main stem of Klickitat River has lots of water. It runs through a canyon with limited development.
- There is threat from future ground water development. The lower part of the basin is being subdivided into 20-acre "ranches" growth spill over from Clark County.

Note: Ecology did IFIM studies at 2 sites on the little Klickitat River, and Spring, Blockhouse, Bloodgood, Mill, and Bowman Creeks. U.S. Fish and wildlife did an IFIM study on the Klickitat River.

WRIA 31 –ROCK-GLADE

- The basin has 3 small creeks.

WRIA 32 –WALLA-WALLA

- Basin plan was adopted by rules in 1977, no instream flows set.
- Oregon water users take most of the flow of the Walla Walla at the border.
- It is an adjudicated basin. Streamflows are totally appropriated during the irrigation season. The Walla Walla is closed from May to November.
- Studies are underway for Mill creek and the Walla Walla, being conducted by Ecology and WDFW.

Note: An IFIM was done on Mill creek. In 1995 Ecology conducted a watershed assessment to evaluate the conditions of the water quantity and quality in the basin.

WRIA 33- LOWER SNAKE

- The main stem of Snake River was withdrawn from any further appropriation in 1995. The withdrawal expires on July 1, 1999.
- In addition there are 2 tiny streams, not certain whether fish exists in them.

WRIA 34- PELOUSE

- Instream flow is not a concern

WRIA 35- ASOTIN- TUCANNON

- No instream flows are set for both rivers. IFIM studies and reports were done for both rivers and tributaries. BPA did a major study of the watershed and Ecology did a water use study as part of its watershed assessment.
- Tucannon river has decent flows, problem is high temperature (caused by removal of riparian vegetation) and sediment due to farming to the edge of the river. Tucannon's problem is a "*Tree problem*". Restoration such as fencing and tree planting is a high priority.
- Asotin on the other hand is a low flow problem. Asotin flows get very low. The river dries out most of the time in the summer due to significant existing irrigation. Very little new development

Note: Ecology completed an IFIM study on the Tucannon river, Asotin Creek, N.F. Asotin Creek, S.F. Asotin Creek, and Charley Creek.

WRIA 36- ESQUATZEL COULEE

- Instream flow is not a concern

WRIA 37, 38, And 39- YAKIMA

- The basin is being adjudicated since 1977.
- The court awarded the tribe an unquantified instream flow right of time immemorial.
- Most of the water is for irrigation under US Bureau of Reclamation contracts.
- Tribes did IFIM studies, 12 tributaries need to be studied yet.
- No surface water rights are being issued; the basin is under court control.
- USBR, the irrigators, the tribes, and the state are working on restoration of flows through conservation and efficiency; transfer of saved water, short-term water leases and reservoirs releases.

Note: The US Fish and Wildlife service and the Yakama Indian tribe did IFIM studies on the Upper and lower Yakima. CH2M Hill did an IFIM study for BPA on the Naches River at Oak Flats.

WRIA 40– ALKALI AND SQUILCHUCK

- Twelve or so very small streams (1 – 2 cfs streams) – tributaries to Columbia used for spawning and rearing by Coho, Steelhead, and Chinook.
- IFIM studies already done on all streams.
- Squilchuck – 500 existing water rights with summer appropriation totaling 10 cfs for 1 cfs streams. 90% of water rights are not used, most are pre-1917 claims.

Note: Ecology did IFIM studies on Squilchuck, Stemilt, Colckum, Hanson, Whiskey Dick,

Tekison Tarpiscan, and Skookumchuck creeks.

WRIA 41- LOWER CRAB

- There are water quality and quantity problems, not a good stream. It is basically an irrigation ditch.
- Sand Hallow flows are mostly irrigation return flows, Chinook get there during high flows.
- Willow Spring had Coho. Better flows than Sand Hallow with cooler temperature.
-

Note: Ecology did an IFIM study on Willow, Sand Hollow and Lynch Creeks.

WRIA 42 GRAND COULEE, WRIA 43 UPPER CRAB- WILSON, and WRIA 44 MOSES COULEE

- Instream flow concerns not known.

WRIA 45 – WENATCHEE

- Instream flows were set by rule in 1983, with minimum flows on main stem and tributaries and closures on several streams. The flows were not set high, they are very inadequate. Low flow conditions are real problems. Instream flows are not frequently met.
- In the past Ecology kept issuing water rights (conditioned with instream flow) even though instream flows were not met.
- Need studies on Icicle, Napequa, White, Little Wenatchee, Chiwancum, Bewist, Chumstick –
- Nassau and Chiwana have studies.
- Instream flows need to be set on tributaries without flows and need to be modified.

Note: An IFIM study was done on the Wenatchee River. Ecology is finishing IFIM studies on the Chiwawa River and Nason Creek. The US Fish and Wildlife Service did an IFIM study on

Icicle Creek for the City of Leavenworth. In 1995 Ecology conducted a watershed assessment to evaluate the conditions of the water quantity and water quality in the basin.

WRIA 46 – ENTIAT

- IFIM Studies and report with recommendations are done, ready to adopt instream flows.
- Very high priority basin for setting instream flows– relatively undeveloped basin upstream with decent flows– 90% of the land is federal land with steep "V" shaped valleys. Development is occurring mostly at the bottom of the basin. And has potential to impact fisheries resources.

Note: Ecology and WDFW completed IFIM study and report on the Entiat River at 2 sites and on the Mad River. A basin assessment was done by Ecology in 1995. A public workshop held as a follow up was very controversial. Ecology did not proceed with the instream flow setting.

WRIA 47- CHELAN

- Instream flow is a concern on the tributaries of Lake Chelan.
- Ecology conducted a watershed assessment in 1995 evaluating the condition of water quality and quantity.
- Instream flow studies (including fish and recreational flows) were completed by the Chelan PUD in 1999.

WRIA 48 – METHOW

- Instream flows were set by regulation in 1976. The flows are very inadequate.
- Subsequently Ecology did IFIM studies on main stem and tributaries. Studies show the need for higher minimum flows.
- As part of the Methow basin planning effort and after consultation with the Tribes and WDFW, Ecology decided not to amend the existing instream flows rules. The reason is that setting higher instream flows in a basin with very low flows does not make more water. Also the debate about the level distracted people from the real issue of how to put water back in the stream.
- Efforts were, instead, expanded on finding ways to restore flows using water efficiency and conservation, metering, and transfers of existing water rights.
- There are seven little streams still open with no instream flows, need studies and instream flows set.

Note: Ecology did an IFIM study on the Methow River at 4 sites, and on the Twisp River, Chiwuch River, and Early Winter Creek. A local water management plan and a groundwater management plan were developed for the Methow basin in 1994 in 1995.

WRIA 49 – OKANOGAN

- Instream flows were set by rules in 1976 for the Okanogan and the Similkameen rivers. There are many closures affecting perennial streams and the Okanogan river.
- Major problem is temperature, which prevent migration during July/August. Naturally it is borderline, however losses of streamside cover due to grazing and releases of warm water from the Canadian reservoirs, and Lake Osoyoos are main causes for hot summer flows in the Okanogan.
- Tributaries dry out.
- Studies and instream flow action are needed on seven tributaries that have no instream flows.
- Similkameen – main tributary – Enloe dam in Washington prevent the fish from migrating beyond that point.

Note: An IFIM was done by US Fish and Wildlife Service on the Similkameen.
Ecology conducted a watershed assessment in 1995 evaluating the water quantity (including instream flows) and water quality conditions.

WRIA 50 -FOSTER

- One creek Foster creek that dries almost all times not used by fish.

WRIA 51- NESPELEM

WRIAs 52-SANPOIL; 53-LOWER LAKE ROOSEVELT; 54- LOWER SPOKANE; 55-LITTLE SPOKANE; 56- HANGMAN; 57- MIDDLE SPOKANE; 58- MIDDLE LAKE ROOSEVELT; 59- COLVILLE; 60 –KETTLE; 61- UPPER LAKE ROOSEVELT; AND 62-POND OREILLE

- Bull Trout listing in June 1998 impacted some of these WRIAs.
- Little Spokane WRIA 55 has instream flows set by rules in 1976.
- Instream flows were set for the Colville River Basin WRIA 59 in1977.
- In 1995 Ecology conducted a watershed assessment on the Little Spokane River evaluating the conditions of the water quality and quantity. Water levels in the Little Spokane River do not meet instream flow requirement 15 % of the time during an average year, due to existing withdrawals not subject to instream flow requirements.
- Ecology conducted in 1995 a watershed assessment evaluating the water quality and quantity in the Kettle and the Pond Oreille basins.

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Glossary

AFFECT/EFFECT--To affect (a verb) is to bring about a change. The effect (usually a noun) is the result.

ANADROMOUS FISH -- Species that are hatched in freshwater, mature in saltwater, and return to freshwater to spawn.

ALEVIN -- Newly hatched juvenile salmonid with visible yolk sac.

APPROPRIATION OF WATER--1) The act of capturing and applying water to a beneficial use within a prescribed time. 2) A water right established under the doctrine of prior appropriation

AQUIFER-Hydraulically interconnected, recognizable or mappable, saturated geological materials (rock or sediment) that are sufficiently conductive to provide a usuable supply of water to a well or spring and that are hydraulically distinctive from surrounding geologic materials. Aquifers are distinguished by a combination of hydraulic properties, geologic character, hydraulic boundries, hydraulic head, and water quality.

BASE FLOW--Streamflow originating entirely from ground water discharging to the stream.

BENEFICIAL USE—Use of water for domestic, stock watering, industrial, commercial, agriculture, irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational and thermal power production, and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state.

BIODIVERSITY -- The variety and abundance of species, their genetic composition, and the natural communities, ecosystem, and landscapes in which they occur.

BIOLOGICAL ASSESSMENT—Information prepared by, or under the direction of, a Federal agency to determine whether a proposed action is likely to: (1) adversely affect listed species or designated critical habitat; (2) jeopardize the continued existence of species that are proposed for listing; or (3) adversely modify proposed critical habitat. Biological assessments must be prepared for “major construction activities.”

BIOLOGICAL OPINION—A written statement provided to the affected federal agency (NMFS or USFWS)that details how the reviewed action affects the species or its critical habitat. If jeopardy or adverse modification of critical habitat is found to be a result of the activity, the opinion will contain suggestions for reasonable and prudent alternatives for that action which would minimize its impacts and allow the activity to proceed.

BROODSTOCK -- Those adult salmonids that are destined to be the parents for a particular stock or smaller group of fish.

BUFFER STRIP—The vegetation along a stream left intact after logging.

CANDIDATE SPECIES—This term refers to a species for which concerns remain regarding their status, but for which more information is needed before they can be proposed for listing.

CANOPY—The branches and leaves that hang over the water.

CARRYING CAPACITY -- The maximum number of individuals or biomass of a given species or complex of species of fishes that a limited and specific aquatic habitat may support during a stated interval of time.

CATCH -- The act of landing a fish at which point the fisher has the option of releasing or retaining it.

CHANNEL—A waterway with obvious banks that contains moving water at least part of the year.

CHANNELIZED -- A portion of a river channel that has been enlarged or deepened, and often has armored banks.

CITIZEN SUIT—A civil suit filed to force the proper implementation of the ESA, CWA or stop the activity of any person, including the United States and any other governmental body or agency, who is alleged to be in violation of any part of the ESA, CWA or a regulation issued under either act.

CRITICAL HABITAT—The ecosystem elements that must be present and properly functioning if the continued existence of the species in question to be assured. The critical habitat is described and designated by the lead federal regulatory agency making a status determination for a species. Critical habitat can be designated in areas that are not being used by the species in question at the time the species is listed if the habitat is necessary for the conservation of the species. Critical habitat designations usually accompany final listing decisions, but may be delayed under certain circumstances.

CRITICAL STOCK -- A stock of fish experiencing production levels that are so low that permanent damage to the stock is likely or has already occurred.

DEGRADATION—The process by which a streambed is lowered in elevation by removal or scouring of sediment. This term is also used to refer to a damaged condition of habitat.

DEPRESSED STOCK -- A stock of fish whose production is below expected levels based on available habitat and natural variations in survival levels, but above the level where permanent damage to the stock is likely.

DISCHARGE—The volume of water that flows past a given place during a certain amount of time. Discharge is often referred to in cubic feet per second (cfs).

DISTINCT POPULATION SEGMENT—"Population" or "distinct population segment," are terms with specific meaning when used for listing, delisting, and reclassification purposes t describe a discrete vertebrate stock that may be added or deleted from the list of endangered and threatened species.

ECOLOGICAL INTERACTION -- The sum total of impacts of one species on another species, or on other members of the same species.

ECOSYSTEM -- A complex of biological communities and environment that forms a functioning, interrelated unit in nature.

EFFECTS OF THE ACTION—The direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action.

ENDANGERED SPECIES—Any species which is in danger of extinction throughout all or a significant portion of its range.

ESTUARY—The area where fresh and salt water mix at the mouth of a river. Estuaries are important areas that are used as rearing habitat by many fish species and other animals.

ESCAPEMENT -- Those fish that have survived all fisheries and will make up a spawning population.

ESCAPEMENT FLOOR -- The lower bound of an escapement range.

ESCAPEMENT GOAL -- A predetermined biologically derived number of salmonids that are not harvested and will be the parent spawners for a wild or hatchery stock of fish.

EVOLUTIONARILY SIGNIFICANT UNIT (ESU)—A population or group of populations of salmon that 1) is substantially reproductively isolated from other populations and 2) contributes substantially to the ecological/genetic diversity of the biological species. This term is used by NMFS in its status determinations for anadromous salmon populations.

EXOTIC SPECIES --Species that were not native to Washington State.

EXTINCTION -- The loss of a stock of fish from its original range, or as a distinct stock elsewhere. Individuals of the same species may be observed in very low numbers, consistent with straying from other stocks

EXTINCT SPECIES-A species no longer present in its original range or as a distinct species elsewhere.

FACTORS FOR DECLINE—Specific land management activities, resource management strategies, or environmental conditions that directly or indirectly affect a salmon stock or its habitat in a manner that reduces its population size.

FISHERY -- The process of attempting to catch fish, which then may be retained or released.

FLOOD PLAINS—The low area along a stream into which water spreads during a flood.

4(d) RULE—This protective rule promulagated by the lead federal agency at the time it makes a final decision to list a species as threatened. This rule is developed only for a threatened species and a single species at a time.

FRESHET—A rapid rise in stream flow due to runoff from rain or snowmelt.

FRY -- Young salmonids that have emerged from the gravel and are up to one month of age or any cultured salmonid from hatching through fourteen days after being ponded.

GEAR LIMITS -- Restrictions placed on sport or commercial fishing gear, which are used to control the take of fish.

GENETIC DIVERSITY -- All of the genetic variation within a group. The genetic diversity of a species includes both genetic differences between individuals in a breeding population (within-stock diversity) and genetic differences among different breeding populations (among-stock diversity).

GENETIC RISK -- The probability of an action or inaction having a negative impact on the genetic character of a population or species.

GLIDE -- A part of a stream that is characterized by a smooth, easy movement of water, usually just upstream of a riffle.

HABITAT -- An area that supplies food, water, shelter, and space necessary for a partic ular animal=s existence.

HABITAT CONSERVATION PLAN—A planning document that is a mandatory component of an Incidental Take Permit application, also known as an "HCP". This plan negotiated by the lead federal agency and the applicant, specifies the activities that will be covered by the Incidental Take Permit and how their effects will be minimized and mitigated. This plan also describes the geographic limits of the covered activities.

HARM—Defined in regulations implementing the ESA as an act "which actually kills or injures" listed wildlife. Harm may include "significant habitat modifications or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering.

HARVEST -- Fish that are caught and retained in a fishery (consumptive harvest).

HARVEST RATE -- The proportion of a returning run or total population of salmonids that is taken by fisheries.

HATCHERY MANAGEMENT UNIT -- A group of fish managed to achieve hatchery salmonid escapement objectives. These areas typically support higher harvest rates (percent of returning fish harvested) than wild stock management areas.

HATCHERY PRODUCTION -- The spawning, incubation, hatching, or rearing of fish in a hatchery or other artificial production facility (e.g., spawning channels, egg incubation boxes, or pens).

HATCHERY STOCK -- A stock that depends upon spawning, incubation, hatching, or rearing in a hatchery or other artificial production facility (synonymous with cultured stock).

HEALTHY STOCK -- A stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock. This does not imply that the habitat itself is necessarily Ahealthy.@

HYDRAULIC CONTINUITY—The natural interconnection of ground water and surface water.

INBREEDING -- The mating of related individuals.

INCIDENTAL HARVEST -- The capture and retention of species other than those a fishery is primarily opened to target/take. It can also refer to marked fish of the same species.

INCIDENTAL TAKE—Take of listed fish or wildlife species that result from, but is not the purpose of, carrying out an otherwise lawful activity conducted by a Federal agency or applicant.

INSTREAM FLOW—The level of flow set by the Department of Ecology by regulation to protect instream resources.

INTEGRATED LANDSCAPE MANAGEMENT -- A management process that integrates the needs of multiple species across a broad landscape.

LARGE WOODY DEBRIS (LWD) -- Conifer or deciduous logs, limbs or root wads twelve inches or larger in diameter.

LIFE CYCLE—The series of changes or stages undergone by an organism from fertilization, birth or hatching to reproduction of the next generation.

LOCALLY ADAPTED POPULATION -- A population of fish that has developed specific traits that increase their survival in a particular habitat or environment.

LOWER COLUMBIA -- That portion of the mainstem Columbia River below Bonneville Dam.

MACROINVERTEBRATES—Animals without backbones that are big enough to see with the naked eye. Examples include most aquatic insects, snails and crayfish.

MAINSTEM—The principle stream or river of a particular basin.

MANAGEMENT UNIT -- A stock or group of stocks which are aggregated for the purposes of achieving a desired spawning escapement objective. See wild and hatchery management unit definitions.

MASS MARKING -- The marking of all individuals in a population of fish so that individuals of that population can be identified in subsequent life history stages.

MAXIMUM SUSTAINED YIELD (MSY) -- The maximum number of fish from a stock or management unit that can be harvested on a sustained basis, measured as the number of fish that would enter freshwater to spawn in the absence of fishing after accounting for natural mortality.

MID-COLUMBIA -- That portion of the mainstem Columbia River between McNary and Bonneville dams.

MINIMUM SIZE LIMIT -- A sport fishery regulation that establishes a minimum size (usually length) for the retention of a fish to protect younger individuals in a fish population, or to protect other species of fish.

MINIMUM VIABLE POPULATION (MVP) -- The size of a population which, with a given probability, will ensure the persistence of the population for a specified period of time.

MIXED-ORIGIN STOCK -- A stock whose individuals originated from commingled native and non-native parents; or a previously native stock that has undergone substantial genetic alteration.

MIXED-STOCK FISHERIES --Any fishery that catches fish from more than one stock.

NATIVE SPECIES -- A species of fish indigenous to Washington State.

NATIVE STOCK -- An indigenous stock of fish that has not been substantially affected by genetic interactions with non-native stocks or by other factors, and is still present in all or part of its original range. In limited cases, a native stock may also exist outside of its original habitat (e.g., captive brood stock programs).

NATURAL SELECTION -- Differential survival and reproduction among members of a population or species in nature, due to variation in the possession of adaptive genetic traits. Natural selection, the major driving force of evolution, is a process leading to greater adaptation of organisms to their environment.

NET PEN --A fish-rearing enclosure used in lakes and marine areas.

NON-NATIVE STOCK -- A native species residing in an area outside its original habitat in Washington State (e.g., Chambers Creek steelhead, Soos Creek chinook).

OFF-CHANNEL HABITAT—Ponds, channels or wetlands that are connected to the main channel of a stream. Juvenile coho salmon often spend at least part of their fresh water lives in off-channel habitat.

ORGANIC—Compounds containing carbon, living or derived from living matter.

POOL -- A relatively deep, still section in a stream.

POPULATION -- Synonymous with the term stock.

PRIMARY MANAGEMENT UNIT -- A stock or group of stocks for which a specific spawning escapement goal is established with the intention of managing all impacting fisheries to meet that goal.

PRODUCTIVITY -- A measure of the capacity of a biological system. The efficiency with which a biological system converts energy into growth and production.

PROPERLY FUNCTIONING CONDITION (PFC)—State of the physical, chemical, and biological aspects of watershed ecosystems which will sustain a healthy salmonid populations. Properly functioning condition generally defines a range of values for several measurable criteria rather than specific, absolute values.

QUOTA --A number of fish allocated for harvest to a particular fishing group or area.

RECOLONIZATION -- The reestablishment of a salmonid stock in a habitat that the species previously occupied.

RECOVERY—The process by which the decline of an endangered or threatened species is arrested or reversed, and threats neutralized so that its survival in the wild can be ensured. The goal of the ESA is for the recovery of listed species to levels where protection under the ESA is no longer necessary.

RECRUITS -- The total numbers of fish of a specific stock available at a particular stage of their life history.

REGIONAL FISHERIES ENHANCEMENT GROUP -- 12 regional fisheries enhancement (volunteer) groups funded under recreational and commercial salmon license fees, allowed to do habitat enhancement projects plus rear and release salmon into state waters under the direction of WDFW.

RELINQUISHMENT—The procedure whereby a right to divert or withdraw water is surrendered to the state. Relinquishment includes the forfeiture or abandonment of a right coupled with recognition by the state that foreiture or abandoment has occurred.

REMOTE SITE INCUBATOR -- A lightweight, dark colored plastic barrel incubator that employs plastic substrate (hatching medium), and can be sized to accommodate 5,000 to 125,000 eggs per incubator. They are used mainly for incubating chum salmon eggs.

RESIDENT SALMONID -- Those members of the family Salmonidae which spend their entire lives in freshwater.

RIFFLE -- A shallow gravel area of a stream that is characterized by increased velocities and gradients, and is the predominate stream area used by salmon for spawning.

RIPARIAN HABITAT --The aquatic and terrestrial habitat adjacent to streams, lakes, estuaries, or other waterways.

RISK ASSESSMENT -- Evaluating the probability of an action having a negative impact that is not within prescribed limits or acceptable bounds.

RIVERINE HABITAT --The aquatic habitat within streams and rivers.

RUN -- The sum of stocks of a single salmonid species which migrates to a particular region, river, or stream of origin at a particular season.

RUNOFF—The part of rain and snowmelt that runs over the ground and into a stream or other water body.

SALMONID -- Any member of the taxonomic family Salmonid, which includes all species of salmon, trout, char, whitefish, and grayling.

SASI—The name of the original inventory "Salmon and Steelhead Stock Inventory" (SASSI), has been changed to "Salmonid Stock Inventory" to reflect the broadened inventory scope encompassing all wild salmonids.

SASSI -- Salmon and Steelhead Stock Inventory. A cooperative program by the Department of Fish and Wildlife and Washington Treaty Indian tribes to inventory and rate the status of salmon and steelhead stocks on a recurring basis.

SCOUR—Removal of sediment from the streambed by flowing water.

SECONDARY MANAGEMENT UNIT -- A stock or group of stocks for which escapement is that which occurs primarily as a result of not being caught in fisheries directed at commingled primary stocks. A group of fish for which an escapement goal may not be established.

SECONDARY PROTECTION -- Management activities that provide protection to stocks or runs of salmon after they have been subjected to harvest in mixed stock areas.

SEDIMENT—The silt, sand, rocks, wood and other solid material that gets washed out from some places and deposited in others.

SELECTIVE BREEDING -- The intentional selection of individual spawners in artificial production programs to produce particular traits in subsequent generations.

SELECTIVE FISHERY -- A fishery that allows the release of non-targeted fish stocks/runs, including unmarked fish of the same species.

SELF-SUSTAINING POPULATION -- A population of salmonids that exists in sufficient numbers to replace itself through time without supplementation with hatchery fish. It does not necessarily produce surplus fish for harvest.

SMOLT -- A juvenile salmonid that is undergoing the physiological change to migrate from fresh to salt water.

SPECIES—Any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.

STOCK -- The fish spawning in a particular lake or stream(s) at a particular season, which to a substantial degree do not interbreed with any group spawning in a different place at the same time, or in the same place at a different time.

STOCK ORIGIN -- The genetic history of a stock.

STOCK STATUS --The current condition of a stock, which may be based on escapement, run size, survival, or fitness level.

STREAMBED—The stream bottom.

STREAMFLOW—The rate at which water passes a given point in a stream or river, usually expressed in cubic feet per second. (cfs)

SUPPLEMENTATION -- The use of artificial propagation to maintain or increase natural production while maintaining the long-term fitness of the target population, and keeping the ecological and genetic impacts to non-target populations within specified biological limits.

TARGETED FISHERY -- A harvest strategy designed to catch a specific group of fish.

TERMINAL FISHING AREA -- A fishing area near the ultimate freshwater destination of a stock where a salmonid stock or run has separated from other stocks/runs.

THREATENED SPECIES—Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TREATY RIGHTS—Rights of Indian tribes that were reserved by the 1855 Stevens Treaties between Indian tribes and the United States government. These reserved rights include the right of “taking fish at all usual and accustomed grounds and stations” as well as the “privilege of hunting, gathering roots and berries and pasturing horses on open and unclaimed lands”. Certain of these rights have been fairly well defined by judicial decisions, such as those pertaining to treaty fishing.

TREATY TRIBES -- Any Indian tribe recognized by the United States government, with usual and accustomed fishing grounds, whose fishing rights were reserved under a treaty and have been affirmed by a federal court.

TRIBUTARY—A stream that feeds into a larger stream. Also called a feeder stream.

TRUST WATER RIGHT—A water right acquired by the state by purchase, lease or receipt of gift of an existing water right, or by creation of conservation water savings resulting from state conservation expenditures.

UNKNOWN STOCK -- This description is applied to stocks where there is insufficient information to identify stock origin or stock status with confidence.

UPPER COLUMBIA -- That portion of the mainstem Columbia/Snake River above McNary Dam.

VIABLE POPULATION -- A population in a state that maintains its vigor and its potential for evolutionary change.

WATER RIGHT—A legal authorization to use a certain amount of public water for specific beneficial use or uses.

WATER RIGHT CERTIFICATE—A legally recorded document issued to the applicant upon a proper showing to the department of ecology that the water development authorized by a permit has been completed and water has been put to beneficial use.

WATER RIGHT CLAIM—A written statement made by a person claiming a right to use water. Claims were required to be filed by legislation passed in 1969 for water uses that were not established under permit system in current law. A claim may represent a valid water right but retains uncertainty until affirmed by a water rights adjudication.

WATER RIGHT PERMIT—A document granting permission to an applicant to develop the facilities necessary to use water and initiate beneficial use.

WATERSHED -- A basin including all water and land areas that drain to a common body of water.

WILD MANAGEMENT UNIT -- A management unit where fisheries are managed to achieve wild salmonid escapement objectives.

WILD STOCK -- A stock that is sustained by natural spawning and rearing in the natural habitat, regardless of parentage (including native).

WILD STOCK INITIATIVE (WSI) -- A cooperative program between the state and western Washington Indian tribes that is intended to maintain and restore healthy salmon and steelhead stocks and habitats.

WITHIN-STOCK DIVERSITY -- The overall genetic variability among individuals of a single population or stock.

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
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
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
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
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
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. Murrary, 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
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
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
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.
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
George Follmer, Citizen
Ed Johnson, Citizen

B. Acronyms

AFW	Agriculture, Fish and Water Forum
AWB	Association of Washington Business
AWC	Association of Washington Cities
BA	Biological Assessment
BAS	Best Available Science
BLM	Bureau of Land Management
BMP	Best Management Practices
BO	Biological Opinion
BPA	Bonneville Power Administration
CAO	Critical Area Ordinances
CCA	Candidate Conservation Agreement
CDs	Conservation Districts
cfs	Cubic feet per second
CFO	Conservation Farm Option
COE	U.S. Army Corps of Engineers
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CWA	Clean Water Act
CWSP	Coordinated Water Supply Plans
CZMP	Coastal Zone Management Program
DCTED	Department of Community Trade and Economic Development
DFW	Department of Fish and Wildlife
DNR	Department of Natural Resources
DOA	Department of Agriculture
DOE	Department of Ecology
DOH	Department of Health
DOT	Department of Transportation
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESHB	Engrossed Substitute House Bill
ESU	Evolutionary Significant Units
FCAAP	Flood Control Assistant Account Program
FEIS	Final Environmental Impact Statement
FEMAT	Forest Ecosystem Management Assessment Team
FERC	Federal Energy Regulatory Commission
FOTG	Field Office Technical Guides
FPB	Forest Practice Board
FSA	Farm Service Agency
FTE	Full Time Equivalent
FWS	Fish and Wildlife Service
FY	Fiscal Year
GCNR	Government Council on Natural Resources

GIS	Geographic Information System
GMA	Growth Management Act
HB	House Bill
HCP	Habitat Conservation Plan
HPA	Hydraulic Project Approval
IAC	Interagency Committee for Outdoor Recreation
IFIM	Instream Flow Incremental Method
IPSW	Interagency Permit Streamlining Workgroup
IRT	Interagency Review Team
ISAT	Interagency Science Advisory Team
ISIS	Integrated Salmonid Information System
ISP	Independent Science Panal
JARPA	Joint Aquatic Resource Permit Application
JFE	Jobs for the Environment
JNRC	Joint Natural Resources Cabinet
LCREP	Lower Columbia River Estuary Program
LCSCI	Lower Columbia Steelhead Conservation Initiative
LWD	Large Woody Debris
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NAS	National Academy of Science
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Services
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NRCS	Natural Resource Conservation Service
NWIFC	Northwest Indian Fisheries Commission
NWPPC	Northwest Power Planning Council
OFM	Office of Financial Management
PFC	Properly Functioning Condition
PFH	Properly Functioning Habitat
PFP	Properly Functioning Population
PHS	Priority Habitat Species
PI	Priority Index
PSAT	Puget Sound Action Team
PSWQAT	Puget Sound Water Quality Action Team
PSWQMP	Puget Sound Water Quality Management Plan
PUD	Public Utility Distric
PWS	Public Water Systems
RCW	Revised Code of Washington
SASSI	Salmon and Steelhead Stock Inventory
SaSI	Salmonid Stock Inventory
SEPA	State Environmental Policy Act
SMA	Shoreline Management Act
SMP	Shoreline Master Program

SOS	Save Our Wild Salmon
SRFB	Salmon Recovery Funding Board
SSB	Substitute Senate Bill
SSHEAR	Salmonid Screening, Habitat Enhancement and Restoration
SSHIAP	Salmon and Steelhead Habitat Information and Assessment Project
SSRS	Statewide Salmon Recovery Strategy
TFW	Timber, Fish, and Wildlife
TMDL	Total Maximum Daily Load
UGA	Urban Growth Areas
USBR	United States Bureau of Reclamation
USCE	United States Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Services
USGS	United States Geological Survey
WA	Washington
WAC	Washington Administrative Code
WACD	Washington Association of Conservation Districts
WAFEF	Washington Agriculture and Forestry Education Foundation
WASHPIRG	Washington Public Interest Research Group
WAU	Watershed Administrative Unit
WCC	Washington Conservation Corps
WDFW	Washington Department of Fish and Wildlife
WHIP	Wildlife Habitat Incentives Program
WRIA	Water Resource Inventory Area
WSAC	Washington State Association of Counties
WSDA	Washington State Department of Agriculture
WSDOT	Washington State Department of Transportation
WSP	Wild Salmonid Policy
WSU	Washington State University