FINAL DRAFT

National Flood Insurance Program (NFIP)

PROGRAMMATIC BIOLOGICAL EVALUATION FOR LISTED ANADROMOUS SALMONIDS IN WASHINGTON STATE



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Prepared for

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EXECUTIVE SUMMARY

The U.S. Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968. The NFIP is a Federal program allowing property owners in participating communities to purchase flood insurance. The NFIP requires participating jurisdictions to implement floodplain management regulations that reduce future flood damage. The NFIP is administered by the Federal Emergency Management Agency (FEMA).

Participation in the NFIP is based on an agreement between communities and the Federal government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the Federal government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods.

Due to the listings of salmonids as threatened and endangered under the Endangered Species Act (ESA), FEMA initiated coordination with NOAA Fisheries regarding the effects of the NFIP to listed salmon and steelhead in Washington. The outcome of the discussions with NOAA Fisheries was that FEMA would prepare a Programmatic Biological Evaluation (PBE) regarding the discretionary aspects of the NFIP and the potential effects to listed fish in Washington.

FEMA has prepared this PBE pursuant to Section 7 of the ESA for the purpose of determining what effects, if any, the NFIP has or could have on threatened or endangered salmon or steelhead and their habitat within the floodplain of rivers throughout Washington State. FEMA has and will continue to coordinate with NOAA Fisheries staff regarding the NFIP.

Due to the prevalence of both marine and inland waterways, many communities in Washington are eligible for the NFIP. Throughout the state, FEMA has mapped flood hazard areas in 323 communities. The large majority of communities of these maps were completed in the late 1970s or 1980s. Of these eligible communities, a total of 252 jurisdictions, or 78 percent, currently participate in the program. All 39 counties in the state are involved in the program, as well as over 200 towns and cities. Two Indian Tribes—the Lower Elwha Klallam Tribe and the Lummi Tribe—also take part in the program.

Fish Listed or Proposed for Protection Under the Endangered Species Act

A number of salmon and steelhead listed under the ESA occur in waters of Washington State. This list also includes one population of salmon and one of steelhead that spawn in Oregon but occur in the Columbia River during migration. The fish under NOAA Fisheries jurisdiction include:

- Six populations of chinook salmon,
- Two populations of chum salmon,

- One population of coho,
- Two populations of sockeye salmon, and
- Five populations of steelhead.

The salmon and steelhead populations are organized in several Evolutionarily Significant Units (ESUs), a distinct group of salmon or steelhead, as designated by NOAA Fisheries. In addition to the protection of the species themselves, the Endangered Species Act requires the designation of critical habitat for a species listed for protection. In compliance with this mandate, on August 12, 2005 NOAA Fisheries issued final critical habitat designations for 14 ESUs that occur in Washington. This PBE includes an assessment of the effects to listed fish and their critical habitat in Washington State.

Baseline Conditions

Aquatic systems in Washington are affected by a number of ongoing land uses and non-point source pollution. Reports on the state's Watershed Resource Inventory Areas by the Washington State Conservation Commission indicate that increased runoff, residential and commercial development, road building, and manipulation of riparian habitat and the floodplain are common contributing factors to aquatic degradation. Statewide, there have been some improvements in water quality over the past 5 years, but the number of polluted water segments on the Clean Water Act (CWA) 303(d) List has increased as more water bodies have been tested. Regional efforts to reduce effects to water quality as part of the ESA 4(d) Rule compliance and through efforts such as the Regional Road Maintenance Guidelines and numerous State, regional, and County salmon recovery efforts are aiding in the protection of salmonid habitat.

In addition to the environmental factors considered in the existing environment, it is also necessary to review the array of overlapping regulatory programs that protect floodplains in Washington State to understand the relative contribution that the NFIP may have in affecting species through development in floodplains.

Requirements at the Federal, State, and local level guide activities within Washington's floodplains. These requirements create a complex regulatory tapestry that determines the type and intensity of development within and around the State's waterways. Any proposed development in the floodplain must adhere to regulations aimed at shoreline management, threatened and endangered species conservation, dredged and fill material disposal, waterway maintenance, growth management, and numerous other criteria. These many directives represent the critical determinants of the NFIP-covered properties. NFIP minimum standards require that communities ensure that "all necessary permits have been received from those governmental agencies from which approval is required by Federal or State law…" (44 CFR § 60.3 (a)(2)).

Given the multi-tiered regulatory environment within which the NFIP exists, it is important to understand the function of these various regulations, how they individually and collectively interact to influence development within the floodplain, and the role each plays

in relation to the NFIP. These related programs are discussed with their relevance to the NFIP.

National Flood Insurance Program Discretionary Actions

As described in Chapter 2 of this PBE, ESA Section 7 should focus on actions where "there is discretionary Federal involvement or control." Consequently, the impact analysis presented in this document focuses on those actions where FEMA has discretionary authority over implementation. In the NFIP, there are three particular areas where FEMA has some level of discretion and can exert direct control over program implementation:

(1) Mapping;
(2) Minimum floodplain criteria; and
(3) The Community Rating System (CRS).

- **Mapping**. Congress initially mandated that FEMA identify and publish information for all floodplains containing Special Flood Hazard Areas (SFHAs) in the first 5 years of the program. "Flood-risk zones," or the quantification of the flood risk for each property within the community's SFHA, were to be determined within the first 15 years of the program. Although the process of mapping these flood-risk zones took longer than expected, these investigations eventually provided valuable data for floodplain management programs and became the foundation for actuarially rating new construction for flood insurance. FEMA is responsible for updating floodplain mapping as data are submitted from participating jurisdictions. In addition, FEMA is currently undertaking a map modernization project to improve the precision of its data.

- **Minimum Criteria**. A second category of discretionary actions that may affect listed species in Washington is the NFIP minimum floodplain criteria. As a part of the 1968 Act, Congress forbade FEMA from issuing flood insurance to property owners within a community that has not adopted and implemented at least the minimum floodplain management criteria established within the Act. If a local floodplain ordinance is not in place, or if that ordinance does not meet these established conditions, a community cannot be made eligible for the NFIP. Similarly, if a community fails to maintain a floodplain ordinance or adopts an ordinance that does not meet established guidelines, that community is suspended from the program. A participating community in the NFIP must also require permits for all development in the SFHA, including, but not limited to, filling, grading, paving, and dredging. To assist local communities in the development of floodplain management programs, FEMA provides a model floodplain ordinance as a baseline template and reviews community compliance with the minimum regulations

- **Community Rating System**. The final discretionary element in the NFIP that may affect listed salmon and steelhead species is the Community Rating System (CRS). Building upon the minimum eligibility requirements within the 1968 Act, FEMA established the CRS in 1990 (fully codified in 1994). This system provides reduced insurance premiums to communities that adopt floodplain management ordinances that exceed NFIP minimum requirements or undertake other floodplain management activities to reduce flood damages. Reductions in insurance premiums are based on the extent to which

communities exceed the minimum requirements. In general, the goals of the CRS are as follows:

- Reduce flood losses (i.e., protect public health & safety, reduce damage to property, prevent increases in flood damage from new construction, reduce the risk of erosion damage, and protect natural and beneficial floodplain functions);
- Facilitate accurate insurance rating; and
- Promote awareness of flood insurance.

Effects of Discretionary Actions

Under the ESA, the "Action Area" is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." NOAA Fisheries guidelines indicate that the baseline of the area potentially affected by the proposed action should be used in making jeopardy determinations (NMFS 1999). The extent of the Action Area for this PBE includes those areas in Washington State that have a Flood Insurance Rate Map (FIRM) under the NFIP. The analysis of the potential effects of the NFIP to listed salmonids (salmon, steelhead) was completed in the context of conditions and the regulatory framework.

The NFIP is a voluntary program that provides flood insurance in any community that adopts floodplain management regulations that meet minimum national requirements, but does not exercise any direct land use authority or play a role in local decision-making. Participating communities are spread widely throughout the state. For these reasons, the analysis approach is not specific to any particular region or listed fish species. Rather, the analysis provides a broad-scale, programmatic description of potential effects as they relate to the discretionary aspects of the program and potential effects to listed salmon and steelhead throughout the state.

To assess the potential effects to salmon and steelhead in Washington from implementation of the NFIP, this PBE follows the guidelines outlined by NOAA Fisheries in the following documents:

- Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale (NMFS 1996);

- The Habitat Approach: Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids (NMFS 1999); and

- NOAA Fisheries Habitat Conservation Division Programmatic Consultation Guidance (NOAA Fisheries 2003a).

FEMA does not authorize any land use decisions, and has no regulatory authority regarding land use decisions; any actions that occur on the County or local level are not directly

controlled by the NFIP. Therefore, the potential effects of the NFIP are more appropriately discussed under indirect effects. There are no direct effects associated with the NFIP.

The NFIP may contribute to floodplain development in limited circumstances, but it is difficult to discern the NFIP's contribution to this indirect effect among the State and local land use regulatory framework. A review of literature indicates that, in general, the NFIP has reduced the amount of development in floodplains that would have otherwise occurred and that most studies that attribute adverse effects to the NFIP provide no data. The literature suggests that effects to floodplains often attributed to the NFIP should more precisely be attributed to general development in floodplains. The impacts section of the PBE provides an analysis of the NFIP's role in development in the context of related land use regulations in Washington State and relates this to potential effects to listed fish and critical habitat.

Conclusions

The NFIP in Washington State interacts with, and is often overshadowed by, more stringent regulations on floodplain use on the County or City level. Nevertheless, the three components of the NFIP – mapping, minimum criteria, and the CRS – appear to have a mix of adverse and beneficial effects to listed salmonids. The implementation of the Conservation Measures listed in Chapter 5, including recent changes to some NFIP provisions, will ensure that effects to aquatic systems are minimized. Given these elements and the analysis provided in Chapter 6, FEMA concludes that the NFIP in Washington State *May Affect, but is Not Likely to Adversely Affect* listed salmon, steelhead, and their Critical Habitat. Table ES-1 summarizes the conclusions.

Table ES-1. Summary of Effects of NFIP Components in Washington State.		
Program Elements	**Applicable Conservation Measures**	**Effect**
Mapping		
Level of Floodplain Analysis	No Conservation Measures necessary.	Less populous jurisdictions may have less precise mapping that could allow more floodplain development. Often associated with level of development pressure and available resources on local level. Minor adverse effect.
1% Annual Chance Flood	FEMA following Congressional mandates, not discretionary.	Has generally reduced development in the floodplain in most hazardous areas, and those areas closest to aquatic habitat. Beneficial effect.
Map Modernization	No Conservation Measures necessary; incorporate those under Map Changes.	Increases the amount and accuracy of data available for mapping which will increase floodplain protection. Beneficial effect.
Map Changes	FEMA has strengthened existing process for review of map changes to ensure that communities are complying with Federal and State environmental laws and permits, including the ESA. Element added to CAV checklist.	FEMA has no control over local land use issues. FEMA is charged with accurate mapping of any changes. Number of LOMR-Fs over past 30 years in Washington is negligible. No effect.
Minimum Floodplain Criteria		
Ordinance Requirements	No Conservation Measures necessary.	Significantly reduced development Post-FIRM in SFHAs throughout the state. Evidence that NFIP has dampened floodplain development. Beneficial indirect effect.
Federal and State Permit Provision	Monitoring of floodplain development permits to ensure compliance with Section 9, ESA. Element added to CAV checklist.	Requirement to acquire all Federal and State permits. Beneficial indirect effect.
Planning Considerations	No Conservation Measures necessary but now emphasize the importance of coordination on ESA issues.	Overlaps with previous requirement. Negligible beneficial indirect effect.
Cumulative Rise	No Conservation Measures necessary.	Prevents development in floodway prior to formal designation of a floodway. Beneficial indirect effect; negligible adverse indirect effect.
Regulatory Floodway Standards	No Conservation Measures necessary.	Prevents development in floodway unless no increase in flood stages (>1-foot rise). Prevents more substantial development but could allow minor structures. Beneficial indirect effect; negligible adverse indirect effect.
Building Performance	No Conservation Measures necessary.	Pertains to engineering of building. No effect.

Table ES-1. Summary of Effects of NFIP Components in Washington State.		
Program Elements	**Applicable Conservation Measures**	**Effect**
CRS		
Introduction	States that CRS only credits those activities that are consistent with ESA and other environmental regulations.	Requires participating community to demonstrate compliance with environmental regulations.
Open Space Preservation (420)	Changes in provision to remove credit for parking lots and added provisions for protection of water quality.	Recent changes made to exclude parking lots, encourage green open space. Beneficial indirect effect.
Higher Regulatory Standards (430)	No Conservation Measures necessary.	Encourage a variety of measures that limit development in floodplains and promotes consideration of ecological functions leading to reduced development. Beneficial indirect effect.
Stormwater Management (450)	No Conservation Measures necessary.	Increases effectiveness of stormwater management. Beneficial indirect effect.
Floodplain Management Plan (510)	Credit for Habitat Conservation Plans.	Requires comprehensive coordinating planning approach. Beneficial indirect effect.
Acquisition and Relocation (520)	No Conservation Measures necessary.	Beneficial indirect effect from community removal of structures within the floodplain.
Flood Protection (530)	Modifications in language to include a third environmental requirement to comply with ESA, Section 7 or 10	Ensures that credited projects comply with ESA. Minor indirect beneficial effect.
Drainage System Maintenance (540)	Clarifies that woody debris removal from natural channels is not necessary for CRS credit.	Increases effectiveness of stormwater management plans and programs in controlling water quality and quantity. Beneficial indirect effect.
Levee Safety (620)	No Conservation Measures necessary.	Encourages maintenance of small levees, built before 1991. Minor indirect adverse effects.

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ACRONYMS AND ABBREVIATIONS

ASFPM	Association of State Floodplain Managers
BCEGS	Building Code Effectiveness Grading Schedule
BA	Biological Assessment
BE	Biological Evaluation
BFE	Base Flood Elevation
BPA	Bonneville Power Administration
CAC	Community Assistance Contacts
CAO	Critical Areas Ordinance
CAV	Community Assistance Visits
CBFWA	Columbia Basin Fish and Wildlife Authority
CBRA	Coastal Barrier Resource Area
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CLOMA	Conditional Letter of Map Amendment
CLOMR	Conditional Letter of Map Revision
CLOMR-F	Conditional Letter of Map Revision Based on Fill
Corps	U.S. Army Corps of Engineers
CRS	Community Rating System
CTP	Cooperating Technical Partners
CWA	Clean Water Act
DEM	Division of Emergency Management
DPS	Distinct Population Segment
E	Endangered
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FAR	floor area ratios
FBFM	Flood Boundary Floodway Map
FC	Federal Candidate
FCAAP	Flood Control Assistance Account Program
FCZ	Flood Control Zones
FE	Federal Endangered
FEMA	Federal Emergency Management Agency
FHBM	Flood Hazard Boundary Map
FIMA	Federal Insurance and Mitigation Administration
FIRM	Flood Insurance Rate Maps
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FR	Federal Register
FT	Federal Threatened

ACRONYMS AND ABBREVIATIONS (continued)

GMA	Growth Management Act
HPA	Hydraulic Project Approval
HUD	U.S. Department of Housing and Urban Development
IDFG	Idaho Department of Fish and Game
LOMA	Letter of Map Amendment
LOMR	Letter of Map Revision
LOMR-F	Letter of Map Revision Based on Fill
LWM	Large woody material
MHHW	Mean Higher High Water Mark
MOA	Memorandum of Agreement
NAVD	North American Vertical Datum
NFIP	National Flood Insurance Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NORFMA	Northwest Regional Floodplain Managers Association
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWF	National Wildlife Federation
ODFW	Oregon Department of Fish and Wildlife
OHWM	Ordinary High Water Mark
PBE	Programmatic Biological Evaluation
PEER	Public Employees for Environmental Responsibility
PFMC	Pacific Fishery Management Council
PL	Public Law
RCW	Revised Code of Washington
SASSI	Salmon and Steelhead Stock Inventory
SC	State Candidate
SDP	Substantial Development Permits
SFHA	Special Flood Hazard Area
SMA	Shoreline Management Act
SMP	Shoreline Master Plan
T	Threatened
TMDL	Total Maximum Daily Load
TVA	Tennessee Valley Authority
U.S.C.	United States Code
UGA	Urban Growth Area
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WRIA	Watershed Resource Inventory Area
WSDOT	Washington State Department of Transportation
WWTIT	Western Washington Treaty Indian Tribes

1.0 INTRODUCTION

The U.S. Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968. The NFIP is a Federal program allowing participating communities to enable property owners to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. The NFIP is administered by the Federal Emergency Management Agency (FEMA). The original program was voluntary, and there were not many communities that participated until passage of the Flood Disaster Protection Act of 1973. This Act contained two key provisions that were critical to the future growth of the NFIP. The first prohibited Federal agencies from providing financial assistance for the acquisition or construction of buildings in the designated floodplains of non-participating communities. Federal assistance initially included loans from Federally insured or regulated lenders. Although the NFIP remained a voluntary program, the prohibition on Federal financial assistance made it difficult for a community not to participate, and most joined the NFIP over the next few years (around 15,000 communities joined within the first 4 years). The second key provision required NFIP flood insurance as a condition of receiving Federal financial assistance in designated flood hazard areas of participating communities. This is referred to as the mandatory flood insurance purchase requirement and resulted in rapid growth in flood insurance policies from around 300,000 policies at the end of 1973 to approximately 1.2 million by the end of 1977. To implement the two requirements, the NFIP was directed to identify flood hazard areas of non-participating communities within 6 months (participating communities already had been mapped).

Participation in the NFIP is based on an agreement between communities and the Federal government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the Federal government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods.

A recent court case on the NFIP in Washington State prompted discussion between FEMA and the National Oceanic and Atmospheric Administration (NOAA) Fisheries, the Federal agency that oversees salmon and steelhead listed under the Endangered Species Act of 1973 (ESA). In the court case (U.S. District Court, Western District of Washington, Seattle, Order No.C03-2824Z), the National Wildlife Federation (NWF) and Public Employees for Environmental Responsibility (PEER) asserted that FEMA was not in compliance with the consultation requirements of the ESA because of potential effects to floodplain habitat and listed fish from implementation of the NFIP. At the direction of the court, FEMA initiated coordination with NOAA Fisheries regarding the effects of the NFIP to listed salmon and steelhead in Washington. The outcome of the discussions with NOAA Fisheries was that FEMA would prepare a Programmatic Biological Evaluation (PBE) regarding the discretionary aspects of the NFIP and the potential effects to listed fish in Washington.

The PBE will be submitted to NOAA Fisheries for their review under Section 7 of the ESA. FEMA has worked closely with NOAA Fisheries in developing this document.

1.1 PURPOSE

FEMA has prepared this PBE pursuant to Section 7 of the ESA for the purpose of determining what effects, if any, the NFIP has or could have on threatened or endangered salmon or steelhead and their habitat within the floodplain of rivers throughout Washington State.

For purposes of this assessment, the defined floodplain of these rivers is that area designated on FEMA's flood maps, referred to as Flood Insurance Rate Maps (FIRMs), as the Special Flood Hazard Area (SFHA). The SFHA is defined as that land within the floodplain of a community subject to a 1 percent or greater chance of flooding in any given year, referred to as the 100-year floodplain. The 1 percent annual chance flood represents a magnitude and frequency with a statistical probability of being equaled or exceeded annually. An additional measure used within this document, the 500-year floodplain, represents the area characterized by a 0.2 percent annual chance of flooding. The probability of flooding in these areas is considered to be extremely low.

1.2 ENDANGERED SPECIES ACT CONSULTATION

All Federal agencies are required to consult with NOAA Fisheries and the U.S. Fish and Wildlife (USFWS) in accordance with Section 7(a)(2) of the Endangered Species Act regarding potential effects to Federally listed or proposed species. The Federal agency that is initiating or funding the "action" in question must ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of a Federally listed threatened or endangered species, or a species proposed to be listed, or result in the destruction or adverse modification of designated or proposed critical habitat. For FEMA, the "action" evaluated in this PBE is implementation of the NFIP program in Washington State. This PBE covers listed or proposed salmon and steelhead species throughout the state. Candidate aquatic species are covered under this PBE in the event that they are listed at some future date.

While FEMA has coordinated with NOAA Fisheries on numerous site-specific projects in Washington State and prepared a Categorical Biological Assessment (BA) concerning small-scale projects throughout the state (FEMA 2005a), no previous coordination has been completed regarding the NFIP in Washington State. FEMA has coordinated with Federal agencies regarding the implementation of the NFIP in other states.

Over the past several years, FEMA has had extensive coordination with NOAA Fisheries to develop a Protocol Agreement for Section 7 consultation (Appendix A). The agreement sets up a framework for the Section 7 consultation process between FEMA and NOAA Fisheries, stipulates timelines for submittal and review of information, specifies the responsibilities of each agency, establishes procedures for project reviews, and sets out monitoring requirements.

The Protocol Agreement also outlines three categories of FEMA projects:

- **Level 1:** Actions for which there is adequate information for FEMA to determine, and for NOAA Fisheries to concur at the categorical level, that the actions will have no effect on listed or proposed species or their designated or proposed critical habitat, and no further consultation is required.

- **Level 2**: Actions for which there is adequate information for FEMA to conclude and NOAA Fisheries to concur that the proposed category of action may affect, but is not likely to adversely affect, listed or proposed species or their designated or proposed critical habitat.

- **Level 3**: Actions that may affect, and are likely to adversely affect, listed or proposed species or their designated or proposed critical habitat and require formal consultation.

This PBE provides information to categorize the NFIP in Washington according to the above levels and any necessary steps regarding further consultation with NOAA Fisheries.

1.3 PROGRAMMATIC SCOPE

In the case of the NFIP, this PBE analyzes the potential effects of an ongoing state-wide program in a wide range of counties, cities, and towns. NOAA Fisheries defines programmatic consultation as "..informal and formal consultation on two or more actions that are not necessarily joined by interrelatedness or interdependence, and so might have been consulted on separately" (NOAA Fisheries 2003a).

The NFIP program is complex and interrelated to a number of Federal, State, and local floodplain programs. Thus, analyzing site-specific effects of such a complex program is not practical. Rather, the program is analyzed on a wide, or programmatic, scale that takes into account those portions of the program that are applicable to floodplain development, effects on listed fish, and the level of FEMA discretion in program implementation. This PBE includes the following chapters:

The **Background** chapter provides an overview of the NFIP, the primary elements of the program, and a discussion of the NFIP in Washington State. This chapter also provides a narrative on the Action Area, or the geographic range covered by the analysis.

The **Existing Conditions** chapter provides a description of the biological and physical setting regarding listed fish in Washington, and the floodplain regulatory framework. The chapter is divided into three sections.

- The **Salmon and Steelhead section** briefly describes the distribution and biology of the listed species in Washington;

- The **Environmental Baseline Conditions section** describes the overall habitat conditions and limiting factors by major watershed groups and provides information on water quality; and

- The **Floodplain Related Programs section** describes the regulatory and floodplain management programs in Federal, State, and local jurisdictions.

The **NFIP Discretional Action** chapter provides background and a descriptive narrative for those sections of the NFIP that FEMA has some discretion in implementation. The primary discretionary elements of the NFIP analyzed in this PBE are:

- Mapping,
- The Minimum Floodplain Criteria, and
- The Community Rating System.

These elements are described in detail in Chapter 4. Examples are provided as to how different-sized jurisdictions implement the NFIP in Washington State. Three jurisdictions on the west side of the Cascade Mountains and three examples of jurisdictions on the east side of the Cascades are discussed.

The **Conservation Measures** chapter describes the specific steps that FEMA will take or has taken to eliminate or minimize potential effects to listed salmon and steelhead from ongoing implementation of the NFIP. These measures are incorporated into the effects analysis.

The **Analysis of Effects** chapter reviews the direct, indirect, interrelated and interdependent, and cumulative effects of the NFIP in Washington State to listed salmon and steelhead. This chapter includes:

- A description of the analysis methods;
- The assumptions used in the analysis;
- A brief overview of related NFIP environmental effects analysis; and
- A determination of effect, in accordance with ESA standards.

The **Essential Fish Habitat** chapter describes the environmental setting and the potential programmatic effects regarding Essential Fish Habitat, as required under the Magnuson-Stevens Fishery Conservation and Management Act (PL 104-267). This analysis includes anadromous fish, groundfish, and coastal pelagic fish in Washington waters.

The **Conclusions** chapter summarizes the effect determination for each species and for proposed or designated Critical Habitat, and provides the outcome of NOAA Fisheries review.

2.0 BACKGROUND

2.1 OVERVIEW OF THE NFIP

This chapter provides a brief description of the NFIP and its implementation. Since its original establishment in 1968, the NFIP has been modified through a number of important amendments. These amendments have generally expanded the breadth of the NFIP. The effects of these Amendments to the NFIP are summarized in Section 2.1.1. Although the development of the NFIP over the last 40 years functions as useful background information, determining the impacts of the program on fish species depends on its implementation. Therefore, Section 2.1.2 provides a general synopsis of the NFIP and its implementation. (For a more detailed description of the discretionary components of the NFIP, please see Chapter 4.) Finally, Section 2.2 presents information related to the NFIP in the state of Washington. This section specifically provides data on the number of communities that participate in the program, as well as the number of contracts and policies currently active in the state. Collectively, these sections describe the fundamentals of the program while also addressing the site-specific nuances of the program in Washington.

2.1.1 Evolution of the NFIP

In 1968, the United States Congress passed, and the President signed into law, the National Flood Insurance Act (42 U.S.C. 4001 et seq.), which created the NFIP. The primary purposes of the 1968 Act creating the NFIP were to:

- Better indemnify individuals for flood losses through insurance;
- Reduce future flood damages through state and community floodplain management regulations; and
- Reduce Federal expenditures for disaster assistance and flood control.

To achieve these goals, the 1968 Act mandated a number of things. Most importantly, Section 1315 of the Act required that communities adopt and enforce floodplain management regulations that exceed NFIP minimum criteria to be eligible for flood insurance from FEMA. The 1968 Act also directed FEMA to identify and map the nation's floodplains so that more informed decisions related to development in the floodplain could be made. Prior to creation of the NFIP, floodplain management as a practice was not well established. Recognizing that existing development may not meet the NFIP minimum criteria, the Act established a system for categorizing and managing development constructed prior to and after the mapping of a community's floodplain. Developments undertaken prior to mapping would not be required to comply with the NFIP minimum floodplain management criteria. These property owners also received subsidized insurance rates. All new development, on the other hand, would be required to meet the minimum criteria and would be charged full actuarial rates reflecting their complete flood risk.

During the mapping process, FEMA must designate Special Flood Hazard Areas (SFHAs) and the degree of risk in those areas. The SFHA in each community is identified on a Flood Hazard Boundary Map (FHBM) or Flood Insurance Rate Map (FIRM) prepared by FEMA.

The limits of the SFHA are based on the area inundated during the Base Flood (a flood having a 1 percent chance of being equaled or exceeded in any given year; also referred to as a 100-year flood). Commonly accepted computer models that estimate both hydrologic and hydraulic conditions are used by FEMA to determine the Base Flood Elevation (BFE).

The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 (42 U.S.C. 4002). This Act required property owners to purchase flood insurance as a condition of receiving any federal or Federal-related financial assistance for the acquisition or improvement of land or structures in SFHAs. Federal officers or agencies were also prohibited from approving financial assistance for acquisition or construction purposes in areas identified as having special flood hazards, unless the structure is covered by flood insurance (42 U.S.C. 4012a). This is referred to as the Mandatory Flood Insurance Purchase Requirement, which is not a FEMA action.

Furthermore, Section 202(a) of the 1973 Act prohibited Federal officers or agencies from approving any form of loan, grant, guarantee, insurance, payment, rebate, subsidy, disaster assistance loan, or grant for acquisition or construction purposes within the Special Flood Hazard Areas of non-participating communities (42 U.S.C. 4106). For example, this would prohibit mortgage loans guaranteed by the Department of Veterans Affairs, insured by the Federal Housing Administration, or secured by the Rural Economic and Community Development Services. In the case of disaster assistance under the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, as amended, this prohibition only applies to assistance for buildings in the SFHA damaged by flooding.

The NFIP was further modified by the National Flood Insurance Reform Act of 1994, signed into law on September 24, 1994. This law provides tools to increase the effectiveness of the NFIP in achieving its goals of reducing the risk of flood damage and reducing Federal expenditures for uninsured properties that are damaged by flood. The law includes provisions for increasing lender compliance, increasing flood insurance coverage limits, providing Increased Cost of Compliance coverage that provides up to $30,000 for additional costs to bring substantially damaged or repetitively damaged buildings into compliance with the minimum NFIP requirements, and establishing a Flood Mitigation Assistance (FMA) program for mitigation projects and planning. The FMA program provides funding up to $20 million a year with a 75/25 cost share to accomplish flood mitigation planning and implement measures to reduce future flood damages to structures, such as acquiring structures or elevating flood damaged buildings.

In 1990, FEMA established the Community Rating System (CRS) as an incentive program that provides flood insurance premium reductions to communities that go beyond the minimum requirements of the NFIP. The CRS was codified in the 1994 Act. If communities take additional actions to reduce flood losses and promote awareness of flood insurance, insurance rates for property owners can be reduced through the CRS. Through CRS, communities can receive credit for activities such as:

- Protecting natural floodplain functions, such as providing flood storage, reducing erosion, improving water quality, and providing habitat for diverse species of flora and fauna;

- Advising people about flood hazards, ways to reduce flood damage, and availability of flood insurance;
- Mapping additional flood hazard areas;
- Preserving open space;
- Enforcing higher regulatory requirements;
- Addressing repetitive losses through relocations or retrofitting flood-prone structures; and
- Maintaining drainage systems.

From its creation and through subsequent amendments, the NFIP has included a mix of direct mandates, which must be implemented administratively by FEMA (providing little or no flexibility), and discretionary actions, which involve some interpretation by FEMA. Under the ESA Section 7(a)(2), Federal agencies are required to consult only if "there is discretionary Federal involvement or control." "…where the federal agency lacks the discretion to influence the private action, consultation would be a meaningless exercise; the agency simply does not possess the ability to implement measures that inure to the benefit to the protected species" (50 CFR 402.03). Many elements of the NFIP do not provide FEMA with the necessary discretion to require consultation. Three discretionary components of the NFIP are addressed in this PBE:

- Floodplain mapping,
- Minimum requirements of the NFIP, and
- The Community Rating System.

These three aspects of the program and their discretionary pieces are discussed in more detail in Chapter 4. A general description of the program and its implementation is provided in the next section.

2.1.2 The NFIP and its Implementation

Participation in the NFIP is based on a voluntary agreement between local communities and the Federal government. If a community will adopt and enforce a floodplain management ordinance to reduce future flood risks within SFHAs, the Federal government will make flood insurance available to property owners in that community as a financial protection against flood losses. Providing NFIP flood insurance better indemnifies property owners from flood losses and reduces the costs of disaster assistance. NFIP floodplain management requirements reduce future flood damages and, as a result, disaster assistance costs and the need to build costly flood control projects. The NFIP is administered by the Mitigation Division within FEMA.

Before FEMA can issue flood insurance policies in an area, a community must "participate" in the NFIP. A "community" is a governmental body with the statutory authority to enact and enforce zoning, building codes, subdivision, and other land use control measures. The authority of each unit of government varies by state. Eligible communities can include cities, villages, towns, townships, counties, parishes, states, and Indian tribes. When the community chooses to join the NFIP, it must adopt and enforce minimum floodplain management requirements and apply the criteria uniformly to all privately and publicly owned land within the designated SFHA. Additionally, communities are allowed, and

encouraged, to adopt floodplain management criteria that are more restrictive than the NFIP minimum criteria. Some private flood insurance is available particularly for commercial and industrial property. Most flood insurance coverage is provided by the NFIP, however.

Flood insurance coverage is available, by statute, to all owners and occupants of insurable property (a building and/or its contents) in a participating community. Almost every type of walled and roofed building that is principally above ground and not entirely over water may be insured. Flood insurance under the NFIP is available through many private flood insurance companies and independent agents. All companies offer identical coverage and rates as prescribed by the NFIP.

The 1968 Act directed FEMA to map the nation's floodplains. FEMA normally conducts a Flood Insurance Study of each community and issues Flood Insurance Rate Maps (FIRMs) that show the area subject to the 1 percent chance annual flood. These areas are shown on the FIRMs as either V zones or A zones. V zones are high hazard zones in coastal areas that are subject to high velocity wave impacts. A zones include coastal floodplains that are less hazardous than V zones, floodplains along rivers and streams, and areas susceptible to other flooding sources. Mapping of flood hazards provides the data necessary to administer community floodplain management regulations, rate flood insurance policies, and implement the mandatory flood insurance purchase requirement and the prohibition on Federal assistance. The maps also increase awareness of the flood hazards and are used by states and communities for emergency management and land use planning and by Federal agencies in implementation of Executive Order 11988 Floodplain Management.

Floodplain management requirements apply to properties mapped on a community's FHBM or FIRM. These requirements within the SFHA aim to prevent new development from increasing the flood threat and to protect both newer (Post-FIRM) and older (Pre-FIRM) existing buildings from anticipated flood events. All new development within the floodplain must meet FEMA's minimum criteria. It is the responsibility of the community to ensure that all new structures built in the SFHA meet the requirements of the local floodplain management ordinance. Methods and materials designed to minimize future flood damage must be used, while not increasing the flood risk of existing development in the floodplain.

Existing development must meet NFIP minimum requirements only in specific situations. Existing Pre-FIRM buildings must meet NFIP criteria only when the building is "substantially damaged" or "substantially improved," defined as requiring, or in the case of substantial improvement involving, construction valued at more than 50 percent of the property's market value. In these cases, mandatory flood protection measures require bringing the Pre-FIRM building into compliance with the same requirements that apply to new construction. Similarly, when a community's BFE has been adjusted, existing Post-FIRM buildings experiencing substantial damage or undergoing substantial improvements may be required to meet NFIP standards. In most other cases, existing development is not required to comply with NFIP standards for the new BFEs.

Although these NFIP requirements function as a baseline for floodplain management for many communities, the ultimate power to regulate development—including the provision and approval of permits, inspection of property, and citing violations—is granted to

communities by the state's police powers. State and local governments, through their planning and zoning authorities, make the determination of whether or not a property should be developed. Only after all appropriate permits have been received for a project, and a building has actually been constructed, does FEMA provide flood insurance through the NFIP. (Section 4.4 describes the role of the NFIP in floodplain development in six Washington communities.)

2.2 THE NFIP IN WASHINGTON

Due to the prevalence of both marine and inland waterways, many communities in Washington are eligible for the NFIP. Throughout the state, FEMA has mapped flood hazard areas in 323 communities. The large majority of communities of these maps were completed in the late 1970s or 1980s. Of these eligible communities, a total of 252 jurisdictions, or 78 percent, currently participate in the program. All 39 counties in the state are involved in the program, as well as over 200 towns and cities. Two Indian Tribes—the Lower Elwha Klallam Tribe and the Lummi Tribe—also take part in the program. Figure 2.2-1 displays the location of these active NFIP communities.

As stated above, communities voluntarily choose to participate in the NFIP. Active participation in the program is defined as the implementation of a floodplain management policy that meets FEMA minimum criteria. A detailed list of all current NFIP participants in Washington State can be found in Appendix B. Table 2.2-1 generally summarizes, by contract type and jurisdiction type, participation in the NFIP in Washington.

Table 2.2-1. Summary of NFIP Participation in Washington State.

NFIP Community	Pre-FIRM SFHA Contracts	Post-FIRM SFHA Contracts	Total SFHA Contracts
Counties	6,444	3,187	9,622
Cities and Towns	7,639	3,001	10,640
Indian Tribes	67	1	68
Totals	14,141	6,189	20,330

Note: Pre-FIRM contracts cover structures established prior to the completion of a community's FIRM.

The data presented in Table 2.2-1 indicate that roughly 70 percent of the current NFIP contracts in Washington are on buildings built prior to the completion of a community's FIRM. A contract covers a single building; thus, the number of contracts equals the numbers of buildings. Policies apply to individual units within those buildings. Thus, a contract for a multiple family building would include numerous individual policies, corresponding to the number of units. Currently there are 29,766 policies in effect in the state of Washington with about $5 billion in coverage. Since 1975 the NFIP has paid claims on 5,024 losses totaling over $69 million.

Since the establishment of FIRMs across the state, the total number of NFIP contracts has increased by 43 percent (beginning in 1975). During the same 30-year period, the population of Washington State has increased by 73 percent (from almost 3.6 million to over 6 million residents). Thus, the rate of increase in NFIP contracts has been substantially less than the growth of the state's population. This can be attributed to a growing awareness of the risk of

developing in floodplains and the Federal, State, and local floodplain regulations discussed in Chapter 4.

2.3 ACTION AREA

Under the ESA, the "Action Area" is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." NOAA Fisheries guidelines indicate that the baseline of the area potentially affected by the proposed action should be used in making jeopardy determinations (NMFS 1999). The extent of the Action Area for this PBE includes those areas in Washington State that have a FIRM under the NFIP.

All counties in Washington participate in the NFIP. The Action Area for the NFIP Action Area includes all shorelines, streams, rivers, and water bodies accessible to listed, proposed, threatened, or endangered salmon or steelhead throughout Washington State. The Action Area also includes all designated or proposed Critical Habitat for these species. The discussion in the PBE focuses on communities within the NFIP, but FEMA realizes that potential effects may extend outside jurisdictional boundaries and has not limited the effects analysis to such arbitrary limits.

Insert Figure 2.2-1.

Back of Figure 2.2-1.

3.0 EXISTING CONDITIONS

3.1 INTRODUCTION

The sections below describe existing conditions relevant to the application of this PBE. Within the scope of this analysis, existing conditions include all anadromous salmonids listed as threatened, endangered, proposed, or candidate species under the ESA, as well as habitat associated with each species. NOAA Fisheries is responsible for the oversight of protection for listed anadromous salmonid species occurring in Washington State which include: chinook (*Oncorhynchus tshawytscha)*, chum (*O. keta*), sockeye (*O. nerka*), and coho salmon (*O. kisutch*), as well as steelhead (*O. mykiss*). Habitat and environmental regions associated with each listed salmonid species include not only the aquatic habitat (e.g., marine areas, estuaries, lakes, rivers, and streams) where the species directly occur, but also those areas within a given watershed, region, or statewide that contribute to the continued health and maintenance of these aquatic systems.

Although only five separate anadromous salmonid species are afforded protection by NOAA Fisheries in the State of Washington, this chapter addresses 16 separate regional populations identified as distinct entities (“species”) protected under the ESA. This apparent discrepancy is due to the fact that, as amended in 1978, the ESA allows listing of "distinct population segments" of vertebrates as well as named species and subspecies. The ESA, however, provides no specific guidance for determining what constitutes a distinct population segment (DPS), leaving the determination to the discretion of the Federal agency responsible for jurisdictional protection of each species or species group.

To clarify the issue of what constitutes a DPS for anadromous Pacific salmonid species, NOAA Fisheries published a policy document describing how the agency delineates a "species" as defined under the ESA (NMFS 1991). A more detailed justification was subsequently presented in the NOAA Fisheries "Definition of Species" paper (Waples 1991). NOAA Fisheries’ policy stipulates that a salmonid population (or group of populations) will be considered "distinct" for purposes of the ESA if it represents an evolutionarily significant unit (ESU) of the biological species.

An ESU is defined as a population that:

- Is substantially reproductively isolated from conspecific populations; and
- Represents an important component of the evolutionary legacy of the species (Myers et al. 1998).

Thus, anadromous salmonid populations are addressed herein in terms of each listed ESU.

Section 3.2 below describes the biology, associated environmental conditions, and life history requirements for the 14 separate regional populations identified by NOAA Fisheries as distinct ESUs to be protected under the ESA in Washington State (and two Oregon ESUs that uses the lower Columbia River). Section 3.3 summarizes baseline environmental conditions for the waterways and aquatic habitat in which these protected salmonids may occur by general regions within the state. This section also summarizes the regional

environmental limiting factors contributing to the population declines that ultimately resulted in the listing of each designated ESU. Section 3.4 provides background information regarding Federal, State, and local floodplain related programs that contribute to the watershed baseline conditions.

3.2 SALMON AND STEELHEAD SPECIES INFORMATION

NOAA Fisheries has designated 14 ESUs in Washington as Federally endangered or threatened (NOAA Fisheries 2003b). This analysis also includes two Oregon ESUs because these fish use the lower Columbia River as a migration corridor. These species may occur in freshwater bodies, waterways, and/or coastal areas of Washington State. This includes populations of five distinct *Oncorhynchus* species known to spawn in aquatic habitat within the state or to access spawning areas outside of the state through Washington waterways. Listed *Oncorhynchus* ESUs include:

- Six populations of chinook salmon,
- Two populations of chum salmon,
- One population of coho,
- Two populations of sockeye salmon, and
- Five populations of steelhead

Currently, no other anadromous salmonid ESUs are proposed for listing in Washington State. Critical Habitat has been designated in Washington State for all salmon and steelhead covered in this PBE. Table 3.2-1 provides information on the status, listing history, and Critical Habitat for all Washington *Oncorhynchus* salmonids with Federal endangered, threatened, or candidate designations.

Although the five *Oncorhynchus* species with populations designated for Federal protective status share the same genus, each species – and, indeed, even populations and individuals within each species – has a unique biology, natural history, and range of environmental requirements. Section 3.2.1 summarizes the biology of each *Oncorhynchus* species, emphasizing the unique characteristics and distinctive elements of natural history for each ESU holding Federal protective status.

Table 3.2-1. Salmon and Steelhead ESUs Listed as Endangered or Threatened in Washington State.

Species	Scientific Name	Designated ESU	Status		Listing History
			Federal	WA State	
Chinook Salmon	***O. tshawytscha***	Snake River Fall-Run ESU	FT	SC	Fall-run chinook listed as "threatened" April 22, 1992 Critical Habitat designated December 28, 1993
		Snake River Spring/Summer-Run ESU	FT	SC	Spring/Summer-run chinook listed as "threatened" April 22, 1992 Critical Habitat designated December 28, 1993
		Puget Sound ESU	FT	SC	Chinook listed as "threatened" March 24, 1999 Critical Habitat designated August 12, 2005
		Lower Columbia River ESU	FT	SC	Chinook listed as "threatened" March 24, 1999 Critical Habitat designated August 12, 2005
		Upper Columbia River Spring-Run ESU	FE	SC	Spring-run chinook listed as "endangered" March 24, 1999 Critical Habitat designated August 12, 2005
		Upper Willamette River ESU*	FT	none	Chinook listed as "threatened" March 24, 1999 Critical Habitat designated August 12, 2005
Chum Salmon	***O. keta***	Hood Canal Summer-run ESU	FT	SC	Hood Canal summer chum listed as "threatened" March 25, 1999 Critical Habitat designated August 12, 2005
		Columbia River ESU	FT	SC	Chum listed as "threatened" March 25, 1999 Critical Habitat designated August 12, 2005
Sockeye Salmon	***O. nerka***	Snake River ESU	FE	SC	Sockeye listed as "endangered" November 20, 1991 Critical Habitat designated December 28, 1993
		Ozette Lake ESU	FT	SC	Ozette Lake sockeye listed as "threatened" March 25, 1999 Critical Habitat designated August 12, 2005
Steelhead	***O. mykiss***	Upper Columbia River ESU	FT	SC	Steelhead listed as "endangered" August 18, 1997 Critical Habitat designated August 12, 2005 Down-listing to "threatened" January 5, 2006
		Snake River Basin ESU	FT	SC	Steelhead listed as "threatened" August 18, 1997 Critical Habitat designated August 12, 2005
		Lower Columbia River ESU	FT	SC	Steelhead listed as "threatened" March 19, 1998 Critical Habitat designated August 12, 2005
		Middle Columbia River ESU	FT	SC	Steelhead listed as "threatened" March 25, 1999 Critical Habitat designated August 12, 2005

Table 3.2-1. Salmon and Steelhead ESUs Listed as Endangered or Threatened in Washington State.

Species	Scientific Name	Designated ESU	Status		Listing History
			Federal	WA State	
		Upper Willamette River ESU*	FT	none	Steelhead listed as "threatened" March 25, 1999 Critical Habitat designated August 12, 2005
Coho Salmon	***O. kisutch***	Lower Columbia River/Southwest Washington ESU**	FT	none	Coho designated as "threatened" June 28, 2005 for Lower Columbia River. SW Washington under review.

FE: Federal Endangered FT: Federal Threatened FC: SE: State Endangered ST: State Threatened SC: State Candidate
None: No listing status. **Recently split into two ESUs – no maps yet available.

Source: NOAA Fisheries 2003b Website, WDFW Website. *Upper Willamette ESU fish use lower Columbia River for migration

3.2.1 Biology and Natural History

The following sections provide specific information on the biology and natural history of each of the five *Oncorhynchus* species and distinct ESUs for Federally listed or proposed as endangered, threatened, or candidate species. In large part, these sections provide general summaries of information on species biology and ecology from NOAA Fisheries ESA Status Reviews (Myers et al. 1998, Johnson et al. 1997, Gustafson et al. 1997, Busby et al. 1996, Weitkamp et al. 1995). Detailed information on *Oncorhynchus* species and ESU biology, ecology, genetics, movements, and phenology can be accessed through the NOAA Fisheries Website at http://www.nwr.noaa.gov/1salmon/salmesa/specprof.htm.

The distribution of existing populations of *Oncorhynchus* species largely follows the delineated spawning boundaries of each designated ESU. However, ESU boundaries do not account for entrance and egress to and from ESU spawning grounds. Figures 3.2-1 through 3.2-5 show the current distribution and potential for occurrence of each of the five protected species of *Oncorhynchus* salmonids in the State of Washington – including chinook salmon, chum salmon, sockeye salmon, steelhead, and coho salmon. The species ranges shown in these figures include all listed (or listing candidates in the case of coho salmon ESUs) Washington State ESUs, as well as state migration corridors in which listed *Oncorhynchus* species may occur.

Table 3.2-2 provides a list of Washington State counties in which *Oncorhynchus* species from each protected ESU could occur. This comprehensive list includes Washington State counties within or adjacent to each delineated ESU, as well as those counties containing or abutting principal *Oncorhynchus* migration routes (e.g., the Columbia River). Although life history variability within and between *Oncorhynchus* populations precludes definitive delineation of seasonal species occurrence, this table – used in conjunction with Figures 3.2-1 through 3.2-5 and the tables provided in Appendix C – should assist in assessing the general potential for listed species regional occurrence throughout the state.

3.2.1.1 Chinook Salmon

The chinook, also known as king or blackmouth in the Pacific Northwest, is the largest of the Pacific salmon (Netboy 1958). The species' North American distribution historically extended from the Ventura River in California to Point Hope, Alaska, with Asiatic populations ranging throughout these same latitudes (Healey 1991). In general, chinook salmon adhere to life history patterns associated with all Pacific salmon (see below) – including spawning, incubation, hatching, and emergence in freshwater; migration to the ocean; and subsequent maturation and return to freshwater. However, of all Pacific salmonid species, chinook salmon exhibit some of the most diverse and complex life-history strategies between and even among populations (Myers et al. 1998).

Table 3.2-2. Listed *Oncorhynchus* ESUs in Counties of Washington State.

Species	Listed ESU/DPS	Washington Counties
Chinook Salmon ***O. tshawytscha***	Snake River ESU (T - 4/92)	Adams, Asotin, Benton, Clark (Columbia R. only), Columbia, Franklin, Garfield, Klickitat (Columbia R. only), Pacific (Columbia R. only), Skamania (Columbia R. only), Wahkiakum (Columbia R. only), Walla Walla, Whitman
	Puget Sound ESU (T - 3/99)	Chelan, Clallam, Grays Harbor, Island, Jefferson, King, Kitsap, Kittitas, Lewis, Mason, Pierce, San Juan, Skagit, Snohomish, Thurston, Whatcom, Yakima
	Lower Columbia River ESU (T - 3/99)	Clark, Cowlitz, Klickitat, Lewis, Pacific, Skamania, Wahkiakum
	Upper Columbia River Spring-run ESU (E - 3/99)	Chelan, Douglas, King, Kittitas, Okanogan, Skagit, Snohomish, Whatcom
Chum Salmon ***O. keta***	Hood Canal Summer-run ESU (T - 3/99)	Clallam, Grays Harbor, Jefferson, Kitsap, Mason
	Columbia River ESU (T - 3/99)	Clark, Cowlitz, Klickitat, Lewis, Pacific, Skamania, Wahkiakum
Sockeye Salmon ***O. nerka***	Snake River ESU (E - 11/91)	Benton, Clark, Cowlitz, Klickitat, Pacific, Skamania, Wahkiakum (all Columbia R. only); Asotin, Columbia, Garfield, Whitman (all Snake R. only); Franklin, Walla Walla (Columbia and Snake rivers only).
	Ozette Lake ESU (T - 3/99)	Clallam
Steelhead ***O. mykiss***	Upper Columbia River ESU (T – 1/06)	Adams, Benton, Chelan, Douglas, Franklin, Grant, King, Kittitas, Okanogan, Skagit, Snohomish, Whatcom, Yakima
	Snake River Basin ESU (T - 8/97)	Adams, Asotin, Benton, Clark (Columbia R. only), Columbia, Franklin, Garfield, Klickitat (Columbia R. only), Pacific (Columbia R. only), Skamania (Columbia R. only), Wahkiakum (Columbia R. only), Walla Walla, Whitman
	Lower Columbia River ESU (T - 3/98)	Clark, Cowlitz, Klickitat, Lewis, Skamania
	Middle Columbia River ESU (T - 3/99)	Benton, Chelan, Columbia, Franklin, King, Kittitas, Klickitat, Lewis, Pierce, Skamania, Walla Walla, Yakima
Coho Salmon ***O. kisutch***	Lower Columbia River/Southwest WA ESU (T - 6/2005)*	Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pacific, Skamania, Thurston, Wahkiakum

T=Threatened; E=Endangered. Upper Willamette River ESU fish use lower Columbia River for as migration corridor. *ESU recently split into two units – maps not yet available.

Insert Figure 3.2-1. Chinook Salmon ESUs in Washington.

Back of Figure 3.2-1.

Insert Figure 3.2-2. Coho Salmon ESUs in Washington.

Back of Figure 3.2-2.

Insert Figure 3.2-3. Chum Salmon ESUs in Washington.

Back of Figure 3.2-3.

Insert Figure 3.2-4. Sockeye Salmon ESUs in Washington.

Back of Figure 3.2-4.

Insert Figure 3.2-5. Steelhead ESUs in Washington.

Back of Figure 3.2-5.

Up to 16 distinct age categories have been described for chinook salmon, a level of complexity thought to be comparable only to sockeye among Pacific salmonids (Healy 1986, Miller and Brannon 1982, Burgner 1991). Two generalized life-history types were initially described by Gilbert (1912): a "stream-type" that resides in freshwater for 1 year or more following emergence, and an "ocean-type" that migrates to the ocean within the first year. Healey (1982, 1991) advocated expanded definitions for these ocean- and stream-types to describe two distinct races of chinook salmon. This binomial racial approach incorporates life history traits, geographic distribution, and genetic differentiation, and provides a valuable frame of reference that has generally been accepted by NOAA Fisheries scientists as a useful tool for defining chinook populations and continued review of the salmon's protective status (Myers et al. 1998).

Timing and duration of life stages is thought to be related to both genetic and environmental determinants (Ricker 1972, Hartman et al. 1984, Holtby 1987, Healey 1991, Taylor 1991). Juvenile rearing and development in freshwater can be minimal or extended (i.e., ocean- or stream-type), and some male chinook salmon may mature in freshwater, foregoing emigration to the ocean completely (Myers et al. 1998). In addition, high interannual variability within stocks may further complicate generalization across the species. Although chinooks generally require an average of 2-4 years in marine environments to reach maturity, unlike other *Oncorhynchus* species (see below), a single broodyear may return from the ocean over a 5- or 6-year period. As with many anadromous fish species, spawning and temporal patterns of seasonal movements are largely shaped through adaptation to local environmental conditions (e.g., temperature, climate, seasonal passage, flow regimes, etc.) (Miller and Brannon 1982), and chinook populations are known to initiate spawning in the spring, summer, winter, and fall (Myers et al. 1998).

Chinook runs are generally defined by the timing of adult migration (Myers et al. 1998). However, runs may differ in the timing and degree of fish maturation at river entry, characteristics of spawning sites, and the actual time of spawning. Early, spring-run chinook salmon tend to enter freshwater as "bright" or immature fish and migrate long distances upriver to spawn in late summer or early autumn. Late, fall-run chinooks typically are thought to enter freshwater at an advanced stage of maturity and spawn within a few days or weeks of freshwater entry in mainstem or lower tributaries (Fulton 1968, Healey 1991). Summer-run fish show intermediate variability but typically spawn in large- and medium-sized tributaries without the extensive delay in maturation exhibited by spring-run chinooks (Fulton 1968). Winter-run chinook salmon, extant in North America only in the Sacramento River system, begin freshwater migration at an immature stage and travel to the upper portions of the watershed to spawn in the spring (Myers et al. 1998).

Because of the biological variability inherent to the species, it is important to understand the unique biology and natural history of chinook populations and fisheries stocks contained within each listed ESU, while bearing in mind there may, in fact, be variability even between types and individuals within stocks. Six chinook salmon ESU, are designated as Federally threatened or endangered in Washington State (Table 3.2-1). Although general elements of species biology may be similar between ESUs, many aspects of breeding biology, seasonal movements, and aquatic habitat use are unique to distinct ESU stocks. The following sections

describe the unique aspects of biology, natural history, habitat, and occurrence defining each listed ESU.

Snake River Fall-Run ESU

The Snake River Fall-Run ESU includes native chinook stock that spawn in locations throughout the entire Snake River basin and in-flowing tributaries to the Columbia River from The Dalles Dam to the Snake River confluence (Figure 3.2-1). The listed ESU includes all native populations of fall-run chinook salmon in the mainstem Snake River, the Snake River basin, and the following subbasins: Deschutes, John Day, Tucannon, Grand Ronde, Imnaha, Salmon, and Clearwater Rivers. Upon original listing in 1992, this ESU included only fall-run chinook salmon from the Snake River basin (Waples 1991, NMFS 1992), but based on new information presented in the 1997 chinook salmon status review (Myers et al. 1998), the ESU was expanded to include the Columbia River populations listed above. Fish from this ESU generally exhibit an ocean-type life history. Genetic distinctions and differences in patterns of ocean-migration contrast fish from this ESU with those from the Upper Columbia River Fall-Run ESU. Fish in this ESU have been largely influenced by the Grand Coulee Fish Maintenance Project (1939-43), which resulted in the mixing of multiple populations and fisheries stocks into one relatively homogenous group (Myers et al. 1998).

Among the fall-run chinook stocks delineated under this ESU, there is considerable variation in the age of adult maturation (Myers et al. 1998). Age of spawning is often dependent on the specific tributary system associated with each fish stock. Although the majority of spawning adults return at 4 and 5 years of age, this ESU includes a large proportion of 2-year-old spawning jacks, early maturing males that fully develop in freshwater or after short periods in the ocean (Myers et al. 1998). Fall-run fish stocks designated under this ESU typically begin returning to freshwater rivers in August and begin spawning shortly thereafter, with peak spawning in November (Marshall et al. 1995).

Ocean-type fry east of the Cascade Crest begin to emerge as early as February and March and typically rear from 1 to 4 months in freshwater prior to emigrating to the ocean (Chapman et al. 1994, Marshall et al. 1995). However, a small proportion of fall-run fish may remain in freshwater until their second spring and emigrate as yearlings (Chapman et al. 1994, Waknitz et al. 1995).

Snake River Spring/Summer-Run ESU

The Snake River Spring/Summer-Run ESU delineates all natural populations of spring- and summer-run chinook salmon in the mainstem Snake River and the following subbasins: Tucannon, Grand Ronde, Imnaha, and Salmon Rivers (Figure 3.2-1). Although genetic differences between this and other listed ESUs designating stream-type fish stocks (e.g., Upper Columbia River Spring-Run ESU; see below) are moderate, ecological differences in spawning and rearing habitat were deemed substantial enough to warrant delineation of distinct ESUs (Myers et al. 1998). Genetically and behaviorally, fish in this ESU are substantially distinct from the ocean-type fall-run fish in the Snake River basin.

In contrast to Columbia River summer runs, summer-run chinook on the Snake River and its tributaries exhibit a stream-type life history (Myers et al. 1998). Summer-run fish return to freshwater from May through July (slightly earlier than sympatric fall-run populations; Galbreath 1966) and spawn generally in lower tributary reaches than spring-run in the fall. Spring runs, after extensive ocean migrations typical of stream-type fish, migrate up the Columbia from March through May to spawn generally in the upper tributaries of the Snake River basin from early full (September) through mid-fall (October).

Tributaries to the Snake River that support "native" stream-type populations include the Tucannon, Grande Ronde, Imnaha, and Salmon Rivers. A stream-type run also was known to exist in Asotin Creek but is now thought to be extinct (WDFW 1997). Stream-type chinook in the Snake River basin spawn across large geographic areas that encompass several diverse ecosystems. As with most stream-type fish, spring- and summer-run chinook within this ESU remain in freshwater throughout their first year and sometimes second year following emergence (Healey 1991). Few data are available on specific periods of juvenile emigration for this ESU. However, outmigration timing is likely variable and generally corresponds to timing for fall-run Snake River chinook).

Puget Sound ESU

The Puget Sound ESU includes all coastal basins of the eastern portion of the Strait of Juan de Fuca, Hood Canal, and Puget Sound (Myers et al. 1998). This ESU includes all native spring-, summer-, and fall-run chinook stocks from Puget Sound locations including the Elwha River and extending north to the Nooksack River basin and the Canadian border (Figure 3.2-1). Chinook in these Puget Sound locations tend to reach sexual maturity at 3 or 4 years and are not known to reach Alaskan waters to the extent as fish stocks from the outer coast of Washington (Myers et al. 1998). In general, genetic and biological characteristics of Puget Sound ESU fish stocks are notably distinct from coastal chinook fisheries. Elwha River chinook have been found to be somewhat intermediate in distinction between Puget Sound and coastal fish but are included in this ESU (Myers et al. 1998).

Generalization across fisheries within this ESU is complicated by the diversity of stocks found in the Puget Sound basin. Within the region, WDF et al. (1993) recognize 27 distinct stocks of chinook salmon, including 8 spring-run, 4 summer-run, and 15 fall-run fish stocks (Myers et al. 1998). Furthermore, distinction between stocks is obfuscated by recent and historical propagation of fall-run stocks in the region and by the transfer of stocks between watersheds within and outside of the region (Myers et al. 1998). Although spring- and summer-run stocks are found in various isolated rivers and tributaries, fall-run chinook (referred to as fall/summer-run fish by some management agencies) are found in all major river systems throughout the region.

Fall-run chinook generally return to freshwater rivers in Puget Sound beginning in August and spawn from late September through January (WDF et al. 1993). Adult spring-run chinook generally return to freshwater in April and May and spawn in August and September. Summer-run fish begin upriver migration in June and July to spawn in September. Timing of emergence and outmigration typically has evolved to correspond with spring hydrological flow peaks in the Puget Sound basin. Smolts begin migrating downriver

in some locations as early as February, with outmigration potentially continuing through August.

Lower Columbia River ESU

The Lower Columbia River ESU includes all natural fall- and spring-run chinook stocks spawning in the mainstem Columbia and tributaries from the river's mouth up to, but not including, the Klickitat River. This ESU does not include spring-run chinook spawning in the Willamette River basin above Willamette Falls, which are included in a separate, genetically distinct ESU of the upper Willamette River in Oregon (Myers et al. 1998). Chinook salmon in the Lower Columbia River ESU are known to be genetically distinct from all adjacent ESUs and exhibit distinctive life-history traits (e.g., age at maturation) and marine distributions relative to other regional stocks.

Ocean-type fall-run chinook salmon predominate in the region of the lower Columbia River. Fall-run fish in this ESU typically return to freshwater beginning in mid-August and spawn within a few weeks (WDF et al. 1993, Kostow 1995). However, many tributaries to the lower Columbia – notably the Lewis and Sandy Rivers – support later-returning fall-run fish stocks influencing the peak spawning interval for the region, which occurs in November (WDF et al. 1993, Myers et al. 1998). Spring-run (stream-type) chinook stocks in the lower Columbia region, like coastal stocks, enter freshwater in March and April in advance of later spawning in August and September (Myers et al. 1998). Although provincial exceptions are common, most fall-run chinooks in the lower Columbia emigrate to marine environments as subyearlings in the spring (Olsen 1992, WDF et al. 1993). On average, fall-run adults return to the lower Columbia region to spawn at 3 or 4 years of age, and spring-run adults return at 4 to 5 years of age.

Upper Columbia River Spring-Run ESU

This ESU includes chinook spawning in tributaries to the Columbia River upstream from the Yakima River to the Chief Joseph Dam. All chinook within this ESU exhibit a stream-type life history (Myers et al. 1998). This includes native spring-run chinook in the Wenatchee, Entiat, and Methow River basins. Although only slight genetic differences distinguish this ESU from neighboring ESUs with stream-type fish (e.g., Middle Columbia River Spring-Run and Snake River Spring/Summer-Run ESUs), ecological and ethological differences in spawning and rearing habitat clearly delineate fish in this ESU (Myers et al. 1998). The Grand Coulee Fish Maintenance Project of 1939-43 largely influenced the diversity of fish stocks in this ESU. During implementation of this maintenance project, fish returning to spawn in the upper Columbia were trapped at the Rock Island Dam and either released into enclosed sections of the Wenatchee River or spawned in hatcheries (Myers et al. 1998). As a result, this ESU defines a relatively homogenous fisheries group combined from separate historic populations.

East of the Cascade Crest, river systems often support a mix of both ocean- and stream-type chinook salmon (Myers et al. 1998). However, the Upper Columbia River Spring-Run ESU designates only stream-type fish, which remain in freshwater throughout their first and sometimes second year following emergence (Healey 1991). In general, spring-run fish

mature at 4 years and enter the freshwater reaches of the Columbia River from March through May (Myers et al. 1998). These stream-type chinook require considerably longer times to reach upper spawning grounds compared to ocean-type fish, and actual spawning of stocks in this ESU typically commences in the late summer (September) and early fall (October). Juvenile outmigration generally occurs in the spring.

Upper Willamette River ESU

The Upper Willamette River ESU includes only native spring-run populations of chinook salmon that spawn in the Willamette River basin above Willamette Falls (Myers et al. 1998). These fish use the Columbia River as a migratory corridor in Washington and Oregon. Numerous hatchery, farmed, and intrabasin stocks, including fall chinook salmon, have been introduced above Willamette Falls, but these are not considered part of this ESU. Populations in this ESU have an unusual life-history that shares features of both stream- and ocean-type chinooks. Scale analyses of returning fish generally indicate a yearling smolt life-history and maturity at 4 years of age, but these data may be primarily from hatchery fish and may not accurately reflect life history patterns of natural fish. Intrabasin transfers have contributed significantly to homogenization of Willamette River spring-run chinook stocks, yet spring-run chinook of the upper Willamette River remain one of the most genetically distinct groups of chinook salmon in the Columbia River basin (Myers et al. 1998).

Historically, only spring-run fish were able to access the upper Willamette River basin above Willamette Falls due to flow constraints (Fulton 1968). However, fish ladder improvements in the 1950s allowed for the introduction of some 200 million fall-run chinook salmon into this ESU (Myers et al. 1998). However, the upper Willamette River has received relatively few introductions of non-native spring-run fish from outside the ESU. Artificial propagation programs have been developed by a limited number of large facilities (McKenzie, Marion Forks, South Santiam, and Willamette [Dexter] Fish Hatcheries). The result of fish transfers has been the loss of local genetic diversity and the formation of a single breeding unit in the Willamette River basin (Kostow 1995). Large numbers of hatchery strays have been recovered from natural spawning grounds, and an estimated two-thirds of spring-run spawners are likely of hatchery origin. Fall-run chinook salmon are also known to have successfully spawned in the upper Willamette River (Howell et al. 1985). It is unclear whether spring- and fall-run fish hybridize in the upper Willamette basin (Myers et al. 1998).

Historically, native spring-run chinook in the Willamette River spawned between mid-July and late October. However, current populations, both wild and hatchery, spawn at the same time in September (Myers et al. 1998). Therefore, the majority of natural spawners are now thought to be of recent hatchery origin (Cramer et al. 1996). It has been estimated that the rate of straying for adult fish – the rate at which adults return to spawn at locations other than where they were released – returning from releases of trucked juveniles can be as high as 75 percent (Cramer et al. 1996).

3.2.1.2 Chum Salmon

Of the eight Pacific species in the genus *Oncorhynchus,* chum salmon *(O. keta)* are known to have the largest natural geographic distribution, and are thought to have been historically the

most abundant of all salmonids worldwide (Neave 1961). The chum salmon's range is expanded over other salmon species due to the inclusion of portions of the Arctic Ocean (Groot and Margolis 1991). Chums spawn in coastal areas around the Pacific Rim from Monterey Bay in California through the North Pacific to Korea and the Japanese island of Honshu (Johnson et al. 1997). Within the Arctic Ocean, the species' range extends from the Laptev Sea in Russia to the Mackenzie River in Canada (Bakkala 1970, Fredin et al. 1977).

Morphologically, chum salmon are among the largest of Pacific salmon, second only to chinooks in adult size (Salo 1991). The species is perhaps best known for the canine-like fangs and striking body color of spawning males (Johnson et al. 1997). Like many *Oncorhynchus* species, chum salmon are semelparous (i.e., die after breeding) and spawn primarily in freshwater. In contrast to more "plastic" *Oncorhynchus* species (e.g., sockeye salmon and steelhead), chums exhibit obligatory anadromy; there are no known instances of historical or extant landlocked or naturalized freshwater populations (Randall et al. 1987).

Chum salmon spend more of their life history in marine systems than other Pacific salmon (Johnson et al. 1997), with juveniles beginning seaward outmigration almost immediately after emerging (Salo 1991). Consistent with this obligate ocean-type migratory behavior, extant populations of chum salmon typically limit spawning to coastal areas, although historically regional inland migrations may have been more extensive (Nehlsen et al. 1991). Limited exceptions to the species' tendency toward coastal spawning include the Skagit River in Washington where chum salmon are known to migrate more than 100 miles (162 km) inland to spawn (Johnson et al. 1997). However, throughout the species' North American and Asiatic range, chum salmon typically spawn in the lower reaches of rivers, with redds usually dug in the mainstem or side channels of rivers from just above tidal influence to approximately 65 miles (100 km) from the sea. This general tendency toward coastal spawning is thought to be largely influenced by the species' inability to surmount river blockages and instream obstructions (Johnson et al. 1997). In addition, chum salmon redds are commonly located in areas with groundwater upwelling (Bakkala 1970, Salo 1991). In some areas, especially where tidal fluctuation and/or upwelling is extensive (e.g., Alaska), suitable chum salmon spawning habitat includes the shallow estuarial intertidal zone (Helle 1979), and chum salmon eggs have been shown to survive limited exposure to saltwater during embryonic development (Bailey 1964).

Chum salmon run timing generally follows a north-to-south cline of earlier to later returns, with only summer-run salmon in the north Bering Sea and Arctic coast, and predominately fall-run fish occurring south of Vancouver Island (Bakkala 1970, Johnson et al. 1997). Washington State chum salmon are generally classified as fall-run fish and typically return to natal streams from October to November. However, a limited number of distinct summer and winter runs have been identified (Johnson et al. 1997). Washington Department of Fish and Wildlife (WDFW) and Western Washington Treaty Indian Tribes (WWTIT) in the *Salmon and Steelhead Stock Inventory* (SASSI), a report documenting the results of a statewide stock status inventory (WDF et al. 1993), lists return times for 72 separate runs of chum salmon, with 62 classified as fall runs, 2 as winter runs (both in southern Puget Sound), and 8 as summer runs (4 in southern Puget Sound and 4 in Hood Canal/Strait of Juan de Fuca). As with most anadromous fish, seasonal changes in flow and water temperature are perhaps the

most critical factor influencing run timing and the freshwater life history of chum salmon in each specific river system.

Age at maturity also tends to follow a latitudinal gradient in chum salmon, with a greater number of older fish spawning in the northern portion of the species' range (Johnson et al. 1997). Chum salmon typically spawn between 3 and 5 years of age. Although 60 to 90 percent of fish mature at 4 years of age, a higher proportion of 5-year-old fish spawn in the north (north of Vancouver Island), and a relatively large proportion of 3-year-old fish have been found to spawn in southern British Columbia and the coastal United States (Oakley 1966).

In general, the most notable distinction in biology between chum salmon and other Pacific salmonids is that juvenile chum depend less on freshwater conditions than on favorable estuarine conditions (Johnson et al. 1997). As mentioned, chum salmon smolts typically start outmigration immediately after hatching. Unlike some other species –sockeye salmon, for example, which move to deep water after entering an estuary – chum salmon tend to remain in shallow eelgrass beds or other productive areas within the estuary from January to July (Healy 1982). Although chums generally show less biological plasticity than many other Pacific salmon, further specifics on life history, phenology, and micro-habitat use must be reviewed on a case-by-case basis for individual fish stocks included under each listed ESU.

Hood Canal Summer-Run ESU

Although fall-run chum stocks predominate in the Puget Sound region and throughout Washington, the Hood Canal Summer-Run ESU includes only summer-run chum salmon populations in Hood Canal and Discovery and Sequim Bays off the Strait of Juan de Fuca. It also includes remaining summer-run fish in the Dungeness River, although the continued existence of this run is currently uncertain.

Hood Canal summer-run chum salmon are defined in SASSI as fish that spawn from mid-September to mid-October (WDF et al. 1993). Run-timing data from as early as 1913 indicate a distinct temporal separation between summer- and fall-run chum salmon (spawning from November through January) in Hood Canal, although years of local hatchery releases (early fall-run) continue to blur this distinction (Johnson et al. 1997). Genetic data indicate that summer-run populations from Hood Canal and the Strait of Juan de Fuca are part of a much more ancient lineage than summer-run chum salmon found in southern Puget Sound.

No experimental mark-and-release studies have been conducted on natural or fall chum in Hood Canal, including summer-run chum salmon. However, the outmigration of chum was monitored before the release of hatchery fish into Hood Canal, and small peaks of native outmigrants were known to occur in February and March at sites on both the east and west sides of Hood Canal (Bax et al. 1979, 1980; Bax 1982, 1983). Such results indicate that summer-run chum salmon quickly migrate up Hood Canal into the main body of Puget Sound. Preliminary data from ongoing snorkel and beach-seine surveys by the USFWS have revealed the presence of natural chum salmon juveniles in Quilcene Bay, Hood Canal, from mid-January to mid-April (Johnson et al. 1997). These observations would suggest that either

fish emerge from streams over a relatively extended period or that juveniles remain in Quilcene Bay for several weeks.

Columbia River ESU

Historically, the Columbia River contained chum salmon populations that supported annual harvests of hundreds of thousands of fish. Current abundance is probably less than 1 percent of historic levels, and this ESU has undoubtedly lost some (perhaps much) of its original genetic diversity (Johnson et al. 1997). Currently, only three chum salmon populations, all relatively small and all in Washington, are recognized and monitored in the Columbia River (Grays River, and Hardy and Hamilton Creeks). These three extant Columbia River populations – each influenced by historical hatchery releases and introduced stocks – comprise the foundation of the Columbia River ESU for chum salmon (Johnson et al. 1997). Strays and isolated groups have occasionally been reported in the Washougal, Lewis, Kalama, and Cowlitz Rivers in Washington and the Sandy River in Oregon (Salo 1991). Regardless, chum salmon of the Columbia River basin defining this ESU are limited to tributaries below Bonneville Dam, with the large majority of fish spawning on the Washington side of the Columbia River (Johnson et al. 1997).

The SASSI report (WDF et al. 1993) lists only three recognized Washington runs for this ESU: Grays River, Hamilton Creek, and Hardy Creek (Johnson et al. 1997). All of these stocks return to freshwater in late September and early October, with a peak in mid-November – a run timing similar to most coastal Northwest populations (WDF et al. 1993). Grays River fish typically spawn in November and December, while Hamilton and Hardy Creek fish have a more protracted breeding period, spawning from November through mid-January (WDF et al. 1993). It must be emphasized that although the core of this ESU consists of the three extant runs described above, isolated spawning groups with slight variations in run and spawning timing can still be found throughout the lower Columbia (Oregon Department of Fish and Wildlife [ODFW] cites 25 specific locations in Oregon where chum salmon are known to spawn in the lower Columbia River).

3.2.1.3 Sockeye Salmon

Sockeye salmon exhibit arguably a greater variety of distinct life history patterns than chum, coho, chinook, or pink salmon (*Oncorhynchus gorbuscha*) (Gustafson et al. 1997). The majority of sockeye salmon spawn in lacustrine (lake) environments or in inlet or outlet lake tributaries. The offspring of these "lake-type" sockeye salmon utilize the lake environment for juvenile rearing from 1 to 3 years and then migrate to sea, returning to the natal lake system to spawn after 1 to 4 years in marine environments. However, some populations of sockeye salmon spawn in rivers without juvenile lake rearing habitat. The offspring of these "river-type" sockeye salmon utilize the lower, slow-velocity sections of rivers as juvenile rearing habitat for 1 or 2 years, or migrate to sea as subyearlings ("sea-type" sockeye salmon) after only a few months in the natal river system to rear in saltwater (Gilbert 1918, Foerster 1968, Wood 1995).

Further complicating a description of sockeye life-history forms is the existence of con-specific resident populations of *O. nerka*, called kokanee, which remain in lake and slow-

moving freshwater environments throughout their entire life-cycle. Kokanee typically occur in land-locked lakes where ocean access has become difficult or impossible (Gustafson et al. 1997). However, a proportion of offspring from anadromous sockeye salmon populations will often remain in the rearing lake environment throughout their life and will be observed on the spawning grounds together with their anadromous siblings. Ricker (1938) defined the terms "residual sockeye" and "residuals" to identify these resident, non-migratory progeny of anadromous sockeye salmon parents. Residual sockeye remain distinct from sympatric kokanee in terms of genetics and micro-habitat use, though all three life forms may occur in the same lake system (Gustafson et al. 1997).

In accordance with life history requirements for most *O. nerka* life forms, the distribution of sockeye salmon is largely associated with river systems with accessible lakes and lacustrine-type environments in their watersheds (Burgner 1991). In North America, the two dominant areas of sockeye salmon production occur in areas with extensive lake-rearing habitat: the Bristol Bay watershed in Alaska and the Fraser River in British Columbia (Gustafson et al. 1997). However, sockeye salmon occur in North America around the Pacific Rim from the Columbia to the Nome River of Alaska, with Asiatic populations generally found in corresponding latitudes (Atkinson et al. 1967, Foerster 1968, Burgner 1991, Forrester 1987).

As with other *Oncorhynchus* species, there is considerable spatial and temporal variability in river entry, spawning, and outmigration timing for sockeye salmon stocks. Sockeye salmon enter Puget Sound rivers from mid-June through August, while Columbia River populations begin river entry in May, passing Bonneville Dam from very late May to late August. Sockeye salmon spawn in Puget Sound from late September to late December and occasionally into January, and in the Columbia River from late September to early November. Small numbers of spawners are present in the Cedar River into February (WDFW 1996). Sockeye salmon on the western Olympic Peninsula of Washington and on Vancouver Island, British Columbia begin entering rivers much earlier than the above stocks, in April and May. Since most sockeye salmon lakes in the north are ice-covered in the winter and sockeye salmon migration begins soon after ice break up, there is both a south-to-north cline and an altitude-dependent factor in sockeye salmon smolt outmigration timing (Hartman et al. 1967, Burgner 1991). Besides time of ice breakup, variations in outmigration timing can be affected by water temperature; wind direction and its effects on the lake surface; and age, size, and physiological condition of the smolts (Burgner 1991).The following sections describe the specific phenological variation in biology for the two listed sockeye salmon ESUs in Washington State.

Ozette Lake ESU

This ESU consists of sockeye salmon that return via the Ozette River to spawn primarily in lakeshore upwelling areas of Ozette Lake (Gustafson et al. 1997). A minority of fish in this ESU may also spawn below Ozette Lake in the Ozette River and Coal Creek, an inflowing river tributary. Sockeye salmon do not currently spawn in tributary streams to Ozette Lake, although they may have spawned there historically. However, kokanee are abundant in Ozette Lake and spawn in these inflowing streams. Based on a large genetic distinction between Ozette Lake kokanee that spawn in lake tributaries and Ozette Lake sockeye salmon

that spawn on shoreline beaches, Ozette Lake kokanee have been expressly excluded from this ESU. However, if "kokanee-sized" *O. nerka* observed spawning with sockeye salmon on known sockeye salmon spawning beaches in Ozette Lake are identified as resident sockeye salmon, then they are to be considered as part of the Ozette Lake sockeye salmon ESU.

Significant limiting factors influencing the Lake Ozette sockeye salmon ESU include: siltation on spawning grounds, very low abundance, and genetic effects of ongoing hatchery production and artificial interbreeding with genetically dissimilar kokanee (Gustafson et al. 1997). Current escapements average less than 1,000 adults per year (700 adult 5-year average based on weir counts). Sockeye salmon in this ESU begin migrating up the Ozette River in April and May to spawn at summer's end. Juvenile rearing may continue throughout the year, with outmigration occurring in the spring.

Snake River ESU

Sockeye salmon are native to the Snake River and historically were abundant in several lake systems in Idaho and Oregon. In this century, a variety of factors (including overfishing, irrigation diversions, obstacles to migrating fish, and eradication through poisoning) have led to the demise of all Snake River sockeye salmon except those returning to Redfish Lake in the Stanley River basin of Idaho. The Snake River ESU currently includes the few individuals remaining in this single extant population.

The entire sockeye run returning to Redfish Lake may currently be less than 10 individuals. Redds of adult sockeye salmon were observed in Redfish Lake in 1988 and 1989 (Hall-Griswold 1990), though no returning fish were documented in 1990; subsequent observations of returning spawners have been sporadic year-to-year. Given the extremely limited abundance of this ESU and the out-of-state breeding grounds, the potential for encountering Snake River sockeye in Washington waters is highly unlikely. However, Washington State waterways (the Snake and Columbia Rivers) are the sole source of access for remaining fish, and the potential for occurrence must not be discounted. Redfish Lake sockeye migrate upstream from March through August to spawn from mid-September through mid-November. Emergence timing allows for outmigration during the spring months.

3.2.1.4 Steelhead

Oncorhynchus mykiss occur in two distinct life forms: as a freshwater-limited resident fish type called a rainbow or redband trout, and as an anadromous form known as steelhead. Although these forms are quite distinct from each other in terms of biology and life history, within and between forms there is considerable variability and, under some circumstances, adults may yield offspring of the opposite form (Shapovalov and Taft 1954, Burgner et al. 1992, Busby et al. 1996).

Among steelhead, the anadromous form of *O. mykiss,* populations and individuals exhibit extreme diversity in the timing of life-history events. Further compounding an understanding of this variability is the species' tendency toward facultative iteroparity (multiple spawning in lifetime). That is, whereas all other Pacific *Oncorhynchus* salmon species are semelparous,

or die after breeding, some forms of steelhead have the ability to spawn more than once (Busby et al. 1996). The frequency of multiple spawnings has been found to be variable both within and among populations. For North American steelhead populations north of Oregon, repeat spawning is relatively uncommon, and more than two spawning migrations is rare (Busby et al. 1996). South of Washington State, the frequency of multiple spawnings is higher (with up to five recorded in the Siuslaw River, Oregon; Bali 1959), but more than two spawning migrations is still unusual. The incidence of iteroparity also differs between the sexes, with multiple spawnings more common among female steelhead (Busby et al. 1996).

The rainbow trout, resident freshwater *O. mykiss*, is an incredibly adaptable species; transplantation, farming, and stocking have resulted in thriving feral populations throughout North America and, indeed, much of the world (Moccia and Bevan 1991). However, the species' historical distribution was limited to freshwater drainage basins west of the Rocky Mountains from Mexico to Alaska. Anadromous *O. mykiss* are limited to drainages with access to marine environments, and the endemic distribution of steelhead extends around the Pacific Rim from the Kamchatka Peninsula in Asia, east to Alaska, and south along the coast to northern Baja California (Barnhart 1986, Burgner et al. 1992). Within this historical range, there is considerable variation between populations and individuals of steelhead in regard to run timing, age of smoltification, degree of iteroparity, and relative time spent in freshwater and marine environments.

Although many river systems (e.g., the Columbia) support spawning runs extending throughout the year, biologically, steelhead can effectively be divided into two basic reproductive ecotypes based on the state of sexual maturity at the time of river entry and duration of spawning migration (Burgner et al. 1992). Similar to the classification used with other *Oncorhynchus* species, this includes: a stream-type (summer steelhead) that enters freshwater in a sexually immature condition and requires several months to mature and spawn; and an ocean-type (winter steelhead) that enters freshwater at maturity and spawns shortly thereafter. In Washington State, steelhead that enter freshwater between May and October are considered summer steelhead, and steelhead that enter freshwater between November and April are considered winter steelhead. It appears that summer, stream-maturing steelhead occur in habitat not fully utilized by winter steelhead; summer steelhead usually spawn farther upstream than winter steelhead (Withler 1966, Roelofs 1983, Behnke 1992).

Steelhead can spend up to 7 years in freshwater prior to smoltification, and up to 3 years in saltwater prior to first spawning. Along the west coast of North America, steelhead commonly remain in freshwater for 2 years and remain in ocean environments for 2 years prior to first spawning (Busby et al. 1996). Arguably, there appears to be evidence of a latitudinal cline for both age of smoltification and time in marine environments (southern populations in California and Oregon have been reported to have a higher frequency of 1-year-old smolts and spawning after 1 saltwater year), but this correlation has not been consistently detected (Withler 1966, Narver 1969, Sanders 1985). Even within stocks of the same river system, extreme variability is often found to be the norm. Thus, specifics of run timing, age at maturation and smoltification, and the timing of other life history events are addressed separately for each of the five listed ESUs below.

Upper Columbia River ESU

The Upper Columbia River ESU includes all steelhead spawning in the Columbia River basin upstream of the Yakima River, excluding basins of the Snake River (Busby et al. 1996). All upper Columbia River steelhead are summer steelhead. Streams and tributaries in this ESU drain the northern Cascade Mountains of Washington State with streamflow supplied by snowmelt, groundwater, and glacial runoff. The extreme cold water temperatures of this ESU are thought to retard the growth and maturation of steelhead juveniles, causing some of the oldest smolt ages reported for steelhead and residualization of juvenile steelhead that fail to smolt (Busby et al. 1996).

All anadromous fish in the region of this ESU were affected by the Grand Coulee Fish Maintenance Project (1939 through 1943), where fish returning to spawn were trapped at Rock Island Dam, downstream of the Wenatchee River. Some fish were released in basins above Rock Island Dam, while others were spawned in hatcheries with offspring released into various upper Columbia River tributaries. Throughout this period, no attempt was made to return these fish to their natal streams, resulting in an undetermined level of stock mixing within the upper Columbia River steelhead of this ESU (Busby et al. 1996).

Life history characteristics for upper Columbia River basin steelhead are similar to those of other inland steelhead ESUs, with the exception of the delayed smoltification (up to 7 years) apparently resulting from the low water temperatures mentioned above (Mullan et al. 1992). However, based on limited data available from adult fish, regardless of notable outliers, typical smolt age in this ESU remains dominated by the 2-year-olds common to Pacific Northwest steelhead stocks in general (Busby et al. 1996). Preliminary limited data indicate that steelhead from the Wenatchee and Entiat Rivers return to freshwater after 1 year in saltwater, whereas Methow River steelhead primarily return after 2 years in the ocean (Howell et al. 1985). As with other inland steelhead, steelhead in the Upper Columbia River ESU remain in freshwater up to 1 year prior to spawning.

Upstream freshwater migration for steelhead within the Upper Columbia River ESU begins as early as June, with most fish passing Bonneville Dam prior to the end of August (see below). Spawning typically occurs the following spring (or even the spring subsequent). Outmigrating 2-year old smolts also generally make their downstream migration with peak flows in the spring.

Snake River Basin ESU

This ESU includes steelhead spawning throughout the entire Snake River basin of southeast Washington, northeast Oregon, and Idaho. This region is ecologically complex and supports a diversity of steelhead populations. However, genetic and meristic data suggest that these populations are more similar to each other than they are to steelhead populations occurring outside of the basin (Busby et al. 1996). Snake River basin steelhead spawning areas are well isolated from other populations and include the highest elevations for spawning (up to 2,000 m), as well as the longest migration distance from the ocean (up to 1,500 km).

Inland steelhead of the Snake River and upper Columbia River basin are summer steelhead and commonly referred to as either A-run or B-run. These designations are based on the observation of a bimodal migration of adult steelhead at Bonneville Dam and differences in age and adult size noted in upper tributaries of the Snake River. Adult A-run steelhead enter freshwater from June to August and, as defined, pass Bonneville Dam before 25 August (CBFWA 1990, IDFG 1994). Adult B-run steelhead enter freshwater from late August to October, passing Bonneville Dam after August 25 (CBFWA 1990, IDFG 1994). Above Bonneville Dam, distinct run-timing separation is not observed, and the groups are separated based on ocean age and body size (IDFG 1994). Steelhead within this ESU generally spawn in the spring. Outmigration of smolts within this ESU is largely dependent upon hydroperiod and the suitable flows of various rivers and tributaries.

A-run steelhead are defined as predominately age-1-ocean, while B-run steelhead are defined as age-2-ocean (IDFG 1994). Adult B-run steelhead are also thought to be larger than A-run steelhead of the same age, attributed to longer residence times in saltwater (Bjornn 1978, CBFWA 1990). It is unclear if life-history and body size differences observed upstream can be correlated to the bimodal migration groups observed at Bonneville Dam. A-run steelhead are believed to occur throughout the Snake River basin and the inland (upper) Columbia River (IDFG 1994). B-run steelhead are thought to be produced only in the Clearwater, Middle Fork Salmon, and South Fork Salmon Rivers of the upper Snake River basin (IDFG 1994).

Lower Columbia River ESU

The Lower Columbia River ESU includes steelhead spawning in tributaries to the Columbia River between the Cowlitz and Wind Rivers in Washington and the Willamette and Hood Rivers in Oregon. Excluded are steelhead in the upper Willamette River basin above Willamette Falls (see Upper Willamette River ESU below), and steelhead from the Little and Big White Salmon Rivers, Washington (see Middle Columbia River ESU below). This ESU includes both winter and summer steelhead. Genetic data show specific differences between steelhead from this ESU and adjacent regions, with a particularly strong distinction between coastal and inland steelhead in the vicinity of the Cascade Crest (Schreck et al. 1986, Reisenbichler et al. 1992, Chapman et al. 1994).

More than 2 million winter steelhead and over 1 million summer steelhead smolts are released each year within the basins of the Lower Columbia River ESU (Busby et al. 1996). Winter steelhead stocks used in hatchery programs in the lower Columbia River are from Eagle Creek and Gnat Creek Hatcheries in Oregon, and Beaver Creek (Elochoman River/Chambers Creek origin) and the Cowlitz River in Washington (Howell et al. 1985). Chambers Creek winter steelhead from Puget Sound are also an important component of lower Columbia River hatchery management (Howell et al. 1985). In some cases, the influence of hatchery steelhead is pronounced; Cowlitz River wild winter steelhead are almost all the progeny of feral Cowlitz Hatchery steelhead (WDF et al. 1993). Skamania-stock summer steelhead are used extensively in both Washington and Oregon tributaries of the lower Columbia River (Howell et al. 1985, ODFW 1994, WDF et al. 1993).

This ESU is composed of winter and summer steelhead. Nonanadromous *O. mykiss*, rainbow trout, co-occur with anadromous forms throughout the lower Columbia River, although the relationship between the two forms in this geographic area is unclear. Life-history attributes for steelhead within this ESU appear to be similar to those of other west coast steelhead, with summer steelhead entering freshwater from May through October and winter steelhead beginning migration from November through April (Busby et al. 1996). As with most steelhead, spawning occurs in the spring, and juvenile outmigration varies depending upon river flows.

Middle Columbia River ESU

This ESU includes steelhead that spawn in the Columbia River basin from above Wind River in Washington and the Hood River in Oregon upstream to include the Yakima River, Washington (Busby et al. 1996). Steelhead of the Snake River basin are not included in this ESU. The Middle Columbia River ESU includes the only extant populations of winter inland steelhead in the United States – in the Klickitat River and Fifteenmile Creek – although some uncertainty exists about the exact boundary between coastal and inland steelhead (Busby et al. 1996). Currently available genetic data delineate the division between coastal and inland steelhead populations at the western margin of this ESU. Strong meristic and genetic evidence separates this ESU from steelhead of the Snake River basin, although the distinction between middle Columbia and upstream populations is based on limited genetic information and environmental differences including physiographic regions, climate, topography, and vegetation. Widespread production of hatchery steelhead within this ESU – largely based on within-basin stocks – further confuses distinction within and between populations of this region.

All steelhead in the Columbia River basin upstream of The Dalles Dam are summer-run, inland steelhead (Schreck et al. 1986, Reisenbichler et al. 1992, Chapman et al. 1994). Steelhead in Fifteenmile Creek, Oregon are genetically allied with inland *O. mykiss* but are winter-run. Recent genetic analyses also suggest that winter-run steelhead in the Klickitat River are best characterized as inland steelhead (Phelps et al. 1994, Leider et al. 1995). Winter steelhead are also found in the White Salmon River, although these are thought to be most closely allied with coastal populations (Busby et al. 1996).

Available data on life history for steelhead of the middle Columbia region indicate that most middle Columbia River steelhead smolt at 2 years and spend 1 to 2 years in saltwater prior to re-entering freshwater, where they may remain up to 1 year prior to spawning (Howell et al. 1985, BPA 1992). Winter-run steelhead in this ESU migrate upstream from September through March, while summer-run fish typically migrate from May though to December. Spawning for all fish generally occurs in the spring months, and outmigration is variable depending on available flows.

Nonanadromous *O. mykiss* (Columbia River redband trout) co-occur with the anadromous form within this ESU, and information suggests that the two forms may not be reproductively isolated, except where barriers prevent sympatry. Questions persist regarding reproductive

interaction between the forms, as well as the frequency of residualization of steelhead within this ESU (Busby et al. 1996).

Upper Willamette ESU

Regional spawning boundaries for steelhead within the Upper Willamette ESU exist outside of the State of Washington. However, fish within this ESU must transit through Washington State waterways (the Columbia River) to reach spawning grounds in the upper Willamette basin and are, thus, included within the purview of this PBE.

Geographically, the Upper Willamette ESU includes the Willamette River and its tributaries upstream of Willamette Falls. Although steelhead runs in this region are largely maintained by hatchery populations and transplanted stocks – now including early-migrating winter and summer steelhead (Howell et al. 1985, ODFW 1994) – this ESU includes only native late-migrating winter-run steelhead populations (Busby et al. 1996). In contrast to most winter steelhead in the Columbia basin that typically migrate around December, native late-migrating winter run steelhead of the upper Willamette region enter freshwater in March and April. This is thought to be an adaptation for ascending Willamette Falls (Busby et al. 1996). As with most winter steelhead, native upper Willamette steelhead spawn shortly after reaching suitable habitat in the upper reaches of the river and its tributaries. Intra-gravel development occurs through March, with outmigration occurring in the spring with higher flows.

3.2.1.5 Coho Salmon

The coho salmon (*Oncorhynchus kisutch*) is a widespread species of Pacific salmon, occurring in most major river basins around the Pacific Rim from central California to Korea and northern Japan (Laufle et al. 1986). In Washington State and throughout the Pacific Northwest, cohos are often referred to as “silvers,” reflecting the consistent coloration and morphology of the species.

In terms of life history, timing, and phenology, the coho salmon is not known for the extreme variability of other *Oncorhynchus* species described above, although coho populations do exhibit some regional biological variability. Typically, Washington State coho spend the first half of their life-cycle (18 months) rearing in freshwater and the second half (18 months) in estuarine and marine environments before returning to natal waters to spawn and die (Weitkamp et al. 1995). Thus, the vast majority of coho adults south of British Columbia spawn at 3 years of age (Gilbert 1912, Pritchard 1940, Marr 1943, Briggs 1953, Shapovalov and Taft 1954, Foerster 1955, Milne 1957, Salo and Bayliff 1958, Loeffel and Wendler 1968, Wright 1970).

As with most *Oncorhynchus* species, there are always exceptions to biological “rules” that demand qualification. First, although coho salmon within Washington State are fairly homogenous in terms of reproductive phenology, latitudinal clines have been noted in regard to freshwater rearing and spawning timing. In North Vancouver Island, a larger proportion of 4-year-old adults are known to spawn (Weitkamp et al. 1995). This trend continues north to

southeast and central Alaska where the majority of adults spawn at 4 years of age (Godfrey et al. 1975, Crone and Bond 1976). Second, generalization about coho reproduction is substantially confounded by the occurrence of jacks – sexually mature males that return to freshwater to spawn after only 5 to 7 months in the ocean (Weitkamp et al. 1995).

The proportion of jacks in a given coho salmon population appears to be highly variable and may range from less than 6 percent to more than 43 percent (Shapovalov and Taft 1954, Fraser et al. 1983, Cramer and Cramer 1994). Although jack production is thought to be a heritable trait (Iwamoto et al. 1984), it is largely influenced by environmental factors and may change within a given population over time (Shapovalov and Taft 1954, Silverstein and Hershberger 1992). Drucker (1972) suggests a latitudinal cline in the proportion of jacks, with populations in California having more jacks than regions north, and British Columbia populations having almost none (Weitkamp et al. 1995).

Coho salmon run timing, age, and timing of smoltification often reflect environmental variables but, in general, are more consistent across regions than other *Oncorhynchus* species (Weitkamp et al. 1995). Regardless of the area of origin, peak smolt outmigration generally occurs in May. Most west coast coho salmon enter rivers in October and spawn from November to December and occasionally into January (Weitkamp et al. 1995). However, some stocks from British Columbia, Washington, and the Columbia River may enter rivers earlier (July or August) or late (spawning into March) and exist sympatric with "normally timed" runs.

The following sections provide life history and phenological information on coho stocks included within the listed Washington State ESU.

Lower Columbia River/Southwest Washington ESU

The Lower Columbia River/Southwest Washington ESU includes coho salmon from all tributaries of the Columbia River below the Klickitat River on the Washington side and below the Deschutes River on the Oregon side (including the Willamette River as far as the Willamette Falls), as well as coastal drainages in southwest Washington between the Columbia River and Point Grenville (between the Copalis and Quinault Rivers). The Columbia River estuary, Willapa Bay, and Grays Harbor all have extensive intertidal mud and sandflats and similar estuarine fish faunas, and they differ substantially from estuaries to the north and south. Thus, these Washington coastal areas (north to Point Grenville) and the hydrological systems leading to them are also included in this ESU (Weitkamp et al. 1995). This ESU has recently been split into two units – the Lower Columbia and Southwest Washington ESUs. NOAA Fisheries does not yet have maps of these ESUs available. The lower Columbia ESU is listed as threatened and the Southwest Washington ESU is under review.

In the status review for lower Columbia River coho salmon, NOAA Fisheries concluded that, historically, at least one ESU of coho salmon probably occurred in the lower Columbia River basin (NMFS 1991, Weitkamp et al. 1995). However, at the time NOAA Fisheries was unable to identify any remaining natural populations warranting protection under the ESA

(Johnson et al. 1991, NMFS 1991). NOAA Fisheries' subsequent status review of coho salmon in Washington, Oregon, and Idaho (Weitkamp et al. 1995) did not reveal substantial new information on coho salmon populations considered during the earlier status review (NMFS 1991). Weitkamp et al. (1995) cited extensive hatchery production, outplanting, and high harvest rates as resulting in the disappearance of most remaining natural populations of coho salmon along the Washington coast south of Point Grenville. The one exception to this trend occurs in the Clackamas River, which supports moderate numbers of arguably natural coho salmon. This Lower Columbia River ESU was listed by NOAA Fisheries on July 28, 2005. However, little information is available on life-cycle phenology for the natural coho population that historically existed in this region.

3.3 ENVIRONMENTAL BASELINE CONDITIONS

The following sections describe general conditions in the watersheds where previously described anadromous Pacific salmonids occur in Washington, and the status of 303(d) Listed Water Bodies in Washington, which designates "impaired" water bodies as defined by the Federal Clean Water Act (CWA), Section 303d.

The Federal Clean Water Act, adopted in 1972, requires that all states restore their waters to be "fishable and swimmable." This legislative edict established a process to identify and clean up polluted waters. Every 2 years, all states are required to prepare a list of water bodies that do not meet water quality standards. This list is called the 303(d) list because the process is described in Section 303(d) of the Clean Water Act. The information is organized by five regions in Washington: coastal Washington, Puget Sound, lower Columbia River, middle and upper Columbia River, and Snake River watersheds. Figure 3.3-1 shows the extent of each region. ESUs in the Columbia River drainage do not use the same definition of upper and lower river reaches; thus, it is difficult to separate water quality information by ESU.

The discussion of baseline conditions throughout the state of Washington provides a general context for water quality issues that affect surface waters in the state. Many of the watershed issues are related to landscape-scale land use and stormwater management.

3.3.1 Limiting Factors by Region

The analysis of the effects of the NFIP to salmonids must be completed in the context of current conditions and the relative contribution of FEMA's discretionary actions.
Major land use disturbances such as forestry, agriculture, urban stormwater, non-point source pollution, and channel modification affect aquatic habitat and fish. These issues also must be discussed to provide a general state-wide context to the effects of the NFIP.

Concerned about recent trends in salmon, steelhead, and bull trout populations, the Washington State Legislature passed several bills that initiated the preparation of reports to document the health of surface waters in the state and the factors that limit salmon in each Watershed Resource Inventory Area (WRIA). These extensive reports provide a context of the land management, habitat, and infrastructure issues that affect salmonids, as well as the general existing conditions of salmonid habitat in the state.

The following sections summarize available water quality data from the WRIAs conducted by the Washington State Conservation Commission (2003).

3.3.1.1 Coastal Washington Watersheds

Coastal Washington watersheds include the WRIAs listed in Table 3.3-1. These watersheds include the Ozette Lake sockeye salmon ESU, and Lower Columbia River/Southwest Washington coho salmon ESU.

Table 3.3-1. Coastal Washington WRIA Coverage.

Watershed	WRIA
Soleduck-Hoh	20
Queets-Quinault	21
Lower Chehalis	22
Upper Chehalis	23
Willapa	24

Source: Washington State Conservation Commission 2003

A brief summary of limiting factors affecting coastal Washington watersheds is provided in the bulleted list below.

- Increased runoff, erosion, sedimentation, and presence of fines, stream incision, and scour.
- Loss of spawning gravel and large woody material (LWM) due to grazing, agriculture, forestry, residential and commercial development, and road networks.
- Estuary habitat significantly impacted by dredging, bank armoring, and diking.
- Alteration or loss of riparian floodplain, off-channel habitat, and wetland habitat due to dredging, filling, bank armoring, and construction of roads and dikes. Limited riparian ecological function, and decreased LWM, due to loss of riparian forests and vegetation from development, agriculture, and timber harvest.
- Increased peak-flow runoff velocity and volumes, low summer flows, and channel and substrate instability due to decreased hydrologic maturity from extensive logging, forest fires, channel straightening, diking, and high road densities.
- Elevated water temperatures due to lack of riparian cover and high width-to-depth ratios. Temperatures are magnified in low-flow conditions.
- Low dissolved oxygen levels due to inputs of livestock waste, urban stormwater, and industrial effluent.
- Manmade barriers (culverts, screens, dams, dikes, etc.) and natural barriers preclude passage of juvenile and adult salmonids.
- Unsuitable habitat in pools associated with hydroelectric development.
- Invasive plant (e.g., reed canarygrass [*Phalaris arundinacea*]) domination resulting in widespread bank hardening.

Insert Figure 3.3-1. Major Watersheds of Washington.

Back of Figure 3.3-1.

3.3.1.2 Puget Sound Watersheds

Puget Sound watersheds include the WRIAs listed in Table 3.3-2. These watersheds include the Hood Canal Summer-Run chum salmon ESU, Puget Sound chinook salmon ESU, and Puget Sound/Strait of Georgia coho salmon ESU.

Table 3.3-2. Puget Sound WRIA Coverage.

Watershed	WRIA		Watershed	WRIA
Nooksack	1		Nisqually	11
San Juan	2		Chambers-Clover	12
Lower Skagit-Samish	3		Deschutes	13
Upper Skagit	4		Kennedy-Goldsborough	14
Stillaguamish	5		Kitsap	15
Island	6		Skokomish-Dosewallips	16
Snohomish	7		Quilcene-Snow	17
Cedar-Sammamish	8		Elwha-Dungeness	18
Duwamish-Green	9		Lyre-Hoko	19
Puyallup-White	10			

Source: Washington State Conservation Commission 2003

A brief summary of limiting factors affecting the Puget Sound watersheds is provided in the bulleted list below.

- Increased runoff, erosion, sedimentation and presence of fines, stream incision and scour, and loss of spawning gravel and LWM due to agriculture, forestry, residential and commercial development, and road networks.
- Estuarine ecological function substantially affected by physical alteration of and surrounding land use conversions to agriculture, residential development, and roads.
- Increased peak-flow runoff velocity and volumes, low summer flows, and channel and substrate instability due to decreased hydrologic maturity from extensive logging, forest fires, channel straightening, diking, and high road densities.
- Nearshore ecological function altered by poor water quality and shoreline armoring, loss of shoreline LWM, loss of riparian shade, and loss of sediment influx.
- Limited riparian ecological function and decreased LWM due to loss of riparian forests and vegetation from development, agriculture, and timber harvest.
- Lack of frequency of adequately large and deep pools important to rearing juvenile salmonids and to adult salmonids on their upstream migration and beaver pond habitat reduced within the anadromous zone.
- Alteration or loss of riparian floodplain, off-channel habitat, and wetland habitat due to dredging, filling, bank armoring, and construction of roads and dikes.
- Stream morphology changes adversely affecting spawning success, and benthic invertebrate production, due to altered sedimentation processes from increased sediment load and precluded transport due to dams.
- Degraded water quality due to non-point source pollution.
- Decreased instream flows during dry periods due to irrigation and other water withdrawals.

- Saline waters from Puget Sound moving upstream in the mainstem Stillaguamish during low flow periods, magnifying seasonally high water temperatures and low dissolved oxygen levels.
- Elevated water temperatures due to lack of riparian cover and high width-to-depth ratios. Temperatures are magnified in low flow conditions.
- Manmade barriers (culverts, screens, dams, dikes, etc.) and natural barriers preclude passage of juvenile and adult salmonids.
- Invasions of cordgrass *(Spartina* sp.) eliminate native salt marsh vegetation, displace native plants and animals, raise the elevation of the estuary substrate, and increase flooding.
- Invasive plant domination (e.g., reed canarygrass) resulting in widespread bank hardening.

3.3.1.3 Lower Columbia River Watersheds

Lower Columbia watersheds include the WRIAs listed in Table 3.3-3. These watersheds include the Columbia River chum salmon ESU, Lower Columbia River chinook salmon ESU, Lower Columbia River steelhead ESU, and Lower Columbia River/Southwest Washington coho salmon ESU.

Table 3.3-3. Lower Columbia WRIA Coverage.

Watershed	WRIA
Grays-Elochoman	25
Cowlitz	26
Lewis	27
Salmon-Washougal	28

Source: Washington State Conservation Commission 2003

A brief summary of limiting factors affecting lower Columbia watersheds is provided in the bulleted list below.

- Increased peak-flow runoff velocity and volumes, low summer flows, and channel and substrate instability due to decreased hydrologic maturity from extensive logging, forest fires, channel straightening, diking, and high road densities.
- Increased runoff, erosion, sedimentation and presence of fines, stream incision and scour, and loss of spawning gravel and LWM due to agriculture, forestry, residential and commercial development, and road networks.
- Alteration or loss of riparian floodplain, off-channel habitat, and wetland habitat due to dredging, filling, bank armoring, and construction of roads and dikes.
- Limited riparian ecological function, and decreased LWM, due to loss of riparian forests and vegetation from development, agriculture, and timber harvest.
- Limited habitat diversity, such as deep pool presence, due to hardening of channels and lack of LWM.
- Rearing and over-wintering habitat for juvenile coho degraded by loss of floodplain habitat, low-flow passage problems, and reduced habitat quality in tributaries due to increased sediment input.

- Manmade (culverts, screens, dams, dikes, etc.) and natural barriers preclude passage of juvenile and adult salmonids.
- Downstream migrants unable to navigate large lakes due to inundation of productive habitat (spawning, incubation, fry colonization), creation of predator habitat, and elevated water temperatures.
- Elevated water temperatures due to lack of riparian cover and high width-to-depth ratios. Temperatures magnified in low flow conditions.
- Low dissolved oxygen levels due to inputs of livestock waste, urban stormwater, and industrial effluent.

3.3.1.4 Middle and Upper Columbia Watersheds

Middle and upper Columbia watersheds include the WRIAs listed in Table 3.3-4. These watersheds include the Columbia River chum salmon ESU, Lower Columbia River chinook salmon ESU, Upper Columbia River Spring-Run chinook salmon ESU, Lower Columbia River steelhead ESU, Middle Columbia River steelhead ESU, Upper Columbia River steelhead ESU, and Lower Columbia River/Southwest Washington coho salmon ESU.

Table 3.3-4. Middle and Upper Columbia WRIA Coverage.

Watershed	WRIA		Watershed	WRIA
Wind-White Salmon	29		Chelan	47
Klickitat	30		Methow	48
Rock-Glade	31		Okanogan	49
Walla Walla	32		Foster	50
Esquatzel Coulee	36		Nespelem	51
Lower Yakima	37		Sanpoil	52
Naches	38		Lower Lake Roosevelt	53
Upper Yakima	39		Lower Spokane	54
Alkali-Squilchuck	40		Little Spokane	55
Lower Crab	41		Hangman	56
Grand Coulee	42		Middle Spokane	57
Upper Crab-Wilson	43		Middle Lake Roosevelt	58
Moses Coulee	44		Colville	59
Wenatchee	45		Kettle	60
Entiat	46		Upper Lake Roosevelt	61
			Pend Oreille	62

Source: Washington State Conservation Commission 2003

A brief summary of limiting factors affecting the middle and upper Columbia watersheds is provided in the bulleted list below.

- Increased runoff, erosion, sedimentation and presence of fines, stream incision and scour, and loss of spawning gravel and LWM due to agriculture, forestry, residential and commercial development, and road networks.
- Increased peak-flow runoff velocity and volumes, low summer flows, and channel and substrate instability due to decreased hydrologic maturity from extensive logging, forest fires, channel straightening, diking, and high road densities.
- Limited habitat diversity, such as deep pool presence, due to hardening of channels and lack of LWM.

- Limited riparian ecological function and decreased LWM due to loss of riparian forests and vegetation from development, agriculture, and timber harvest.
- Alteration or loss of riparian floodplain, off-channel habitat, and wetland habitat due to dredging, filling, bank armoring, and encroachment of roads, dikes, and rail lines.
- Rearing and over-wintering habitat for juvenile coho degraded by loss of floodplain habitat, low-flow passage problems, and reduced habitat quality in tributaries due to increased sediment input.
- Manmade (culverts, screens, dams, dikes, etc.) and natural barriers preclude passage of juvenile and adult salmonids. Downstream migrants unable to navigate large lakes.
- Stream morphology changes adversely affecting spawning success, and benthic invertebrate production, due to altered sedimentation processes from increased sediment load and precluded transport due to dams.
- Salmon distribution and productivity naturally limited by lack of hydrology to support perennial flows in some drainages.
- A lack of overwintering juvenile rearing habitat due to losses in floodplain connectivity and riparian zone conditions.
- Elevated water temperatures due to lack of riparian cover and high width-to-depth ratios. Temperatures magnified in low flow conditions.
- Low flows exacerbated by water diversions and withdrawals.
- Poor design and operation of fishways.
- Development of floodplain and wetland is naturally limited in some areas which consist of deeply incised canyons with narrow valleys.
- Threat of direct trauma from unscreened and inadequately screened surface water diversions (pumps and ditches) and improperly designed water diversions and dams.
- Lower beaver activity than historical levels.
- Channel widening and obliteration of riparian zones caused by a 75- to 100-year flood event in 1996.

3.3.1.5 Snake River Watersheds

Snake River watersheds include the WRIAs listed in Table 3.3-5. These watersheds include the Snake River Fall-Run chinook salmon ESU, Snake River Spring/Summer-Run chinook salmon ESU, and Snake River basin steelhead ESU.

Table 3.3-5. Snake River WRIA Coverage.

Watershed	WRIA
Lower Snake	33
Palouse	34
Middle Snake	35

Source: Washington State Conservation Commission 2003

A brief summary of limiting factors affecting Snake River watersheds is provided in the bulleted list below.

- Increased runoff, erosion, sedimentation and presence of fines, stream incision and scour, and loss of spawning gravel and LWM due to agriculture, forestry, residential and commercial development, and road networks.
- Limited riparian ecological function and decreased LWM due to loss of riparian forests and vegetation from conversion for agriculture and development.
- Development of floodplain and wetland is naturally limited in some areas which consist of deeply incised canyons with narrow valleys.
- Limited habitat diversity, such as presence of deep pools and spawning gravel, due to areas of steep natural topography in Blue Mountains.
- Manmade (culverts, screens, dams, dikes, etc.) and natural barriers preclude passage of juvenile and adult salmonids.

3.3.2 303(d) Listed Water Bodies

Section 303(d) of the Federal Clean Water Act of 1977 (33 U.S.C. §1251 et seq.) requires that Washington State periodically prepare a list of the state's surface waters in which beneficial uses of the water (such as aquatic habitat, drinking water, recreation, industrial water supply, and agricultural use) are impaired by pollutants. Washington's Department of Ecology (Ecology) designates waters to be placed on the 303(d) list as guided by federal law, state water quality standards, and state 303(d) policy. Washington's 2002/2004 303(d) list has recently been released and is available for review via the internet at Ecology's website (http://www.ecy.wa.gov/programs/wq/303d/2002/2002-index.html).

Water bodies placed on Washington's 303(d) list include estuaries, rivers, lakes, and streams that: (1) have specific water quality parameters that do not meet state standards; and (2) are not expected to improve within the next 2 years. The following descriptions summarize water quality problems that have led to 303(d) listings within the state and specifically jeopardize the health and continued existence of listed salmonid stocks.

- **Water Temperature.** Temperature is important for the health of all aquatic life. Salmonids require cooler water temperatures for spawning and optimal survival rates. Warm water temperatures commonly occur due to loss of vegetation shading streams or the warming of stormwater runoff from land uses such as buildings and pavement. Hot water may also be discharged from power plants or industrial sources.

- **Erosion and Sedimentation.** Erosion results in sedimentation of streams that increases turbidity within aquatic habitat. Erosion-related problems are commonly exacerbated by construction, agriculture, and development of urban land uses and roads.

- **Fecal Coliform.** The occurrence of fecal coliform bacteria in waters is significant for human health as an indicator of the presence of disease-carrying organisms. Common sources of fecal coliform include livestock, municipal sewage, and failing septic tanks.

- **Toxic Substances.** Toxic substances from industry or other sources may accumulate in the sediment beds of water bodies as well as in the tissues of aquatic organisms. Toxic substances are not allowed to be introduced above natural existing levels in waters where

there is the potential to adversely affect water uses, to result in toxicity to sensitive biota dependent upon the waters, or to adversely affect public health.

- **Organic Waste.** Excessive amounts of organic waste in water increase the presence of aerobic bacteria that break down the waste. The aerobic bacteria consume much of the dissolved oxygen that fish and other aquatic creatures require for survival. Sources of organic matter include dead plants, leaves, grass clippings, manure, sewage, and food waste.

- **Nutrients and Dissolved Oxygen.** The presence of nutrients such as phosphorus, nitrogen, and carbon in waters may cause rapid growth of algae and other aquatic plants (eutrophication). Eutrophication may make waters unusable for recreation and increases the presence of decaying organic waste, depriving other aquatic life of dissolved oxygen. Common sources of nutrients include urban and agricultural runoff, sewer system discharge, leaking septic systems, and erosion of nutrient rich soil.

On Washington's 1996/1998 303(d) list, the most prevalent problems in state waters were temperature and fecal coliform infractions. Both of these problems are commonly associated with non-point source pollution.

According to the 2002/2004 Draft Assessment, a total of 1,328, or 56 percent, of the 2,362 polluted-water listings from 1998 have been placed into other categories. Fully 19 percent no longer show evidence of pollution. Still, because more waters are being tested, the overall number of polluted water segments on the list has increased slightly, from 2,362 to 2,682 (Ecology 2004).

For waters listed under 303(d), allowable Total Maximum Daily Loads (TMDLs) are established regarding criteria pollutants. TMDLs identify the maximum amount of a pollutant that may be released into a waterbody so as not to impair the use of the water. TMDLs also allocate an allowable amount of a pollutant among an array of aquatic constituents. In addition, the allowable release of pollutants into waters listed under 303(d) may be reduced under permits issued by Ecology before a TMDL is established.

In summary, while a significant number of Washington's water bodies have shown improvement in water quality standards since 1998, WRIAs throughout the state include a number of habitat and land use limitations that affect salmon use and spawning. The following section describes Federal, State, and local floodplain programs in Washington State that contribute to baseline conditions.

3.4 FLOODPLAIN RELATED PROGRAMS

In addition to the environmental factors considered in the existing environment, it is also necessary to review the array of overlapping regulatory programs that protect floodplains in Washington State to understand the relative contribution that the NFIP may have in affecting species through development in floodplains.

Requirements at the Federal, State, and local level guide activities within Washington's floodplains. These requirements create a complex regulatory tapestry that determines the type and intensity of development within and around the State's waterways. Any proposed development in the floodplain must adhere to regulation aimed at shoreline management, threatened and endangered species conservation, dredged and fill material disposal, waterway maintenance, growth management, and numerous other criteria. These many directives represent the critical determinants of the NFIP-covered properties, as any property owner seeking a floodplain development permit must first illustrate that "all necessary permits have been received from those governmental agencies from which approval is required by Federal or State law…" (44 CFR § 60.3 (a)(2)).

Given the multi-tiered regulatory environment within which the NFIP exists, it is important to understand the function of these various regulations, how they individually and collectively interact to influence development within the floodplain, and the role each plays in relation to the NFIP. The remainder of this section provides background information on floodplain-related regulatory programs at the Federal, State, and local level. Each level of government is discussed individually below.

3.4.1 Federal

At the Federal level there are five regulatory programs that can affect floodplain development: (1) Sections 404 and 401 of the Clean Water Act; (2) Sections 9 and 10 of the Rivers and Harbors Act; (3) Executive Order 11988; (4) the National Environmental Policy Act; and, (5) the ESA. Each of these regulatory programs influences activities in and near waterways in important but different ways.

3.4.1.1 Section 404 and 401 of the Clean Water Act

The purpose of the Clean Water Act (CWA), passed in 1972, is to maintain surface water quality through control and reduction of water pollutants. Through a variety of regulatory and non-regulatory initiatives, the Clean Water Act aims to ensure the physical and biological integrity of the nation's waterways, including wetlands. Although the CWA covers a wide range of activities, two primary pieces, Sections 404 and 401, most directly influence development and related activities within floodplains.

Section 404 of CWA addresses activities associated with the dredging or placement of fill material into U.S. waterways. "Fill material" includes not just soil or dredge material but bridge footings, pier pilings, or other man-made materials. Under this section, a permit must be approved by the U.S. Army Corps of Engineers (Corps) for any activity that includes the discharge of dredged or fill material into wetlands or other waters of the U.S. Permits

provided by the Corps fall into one of two categories: Individual or general. Individual permits are required for specific activities that may potentially create significant impacts. Such activities include dams, levees, and highways along the waterway. General permits may be granted by the Corps on a nation-wide, state-wide, or regional basis for activities that produce only minimal adverse effects. These general permits may cover individual actions or a collection of actions, such as minor road crossings, and utility line backfill. Thus, the Corps has a direct authority regulating wetlands and 404 permits are one regulatory mechanism that affects development along river corridors.

In addition to the role of the Corps in day-to-day operations, the U.S. Environmental Protection Agency (EPA) plays a key oversight role in the implementation of Section 404. EPA develops and administers the environmental criteria used in evaluating permit applications, determines which activities are exempt from Section 404 review, and may comment or review on individual permit applications. Additionally, EPA maintains the ability to veto any permit decision rendered by the Corps if the project has been determined to have a significant unavoidable effect on the waterway. Throughout the process, the U.S. Forest Service (USFS), NOAA Fisheries, and state resource agencies all play an advisory role for the Corps and EPA.

Similarly, the main function of Section 401 of CWA is to allow states and tribes to review and approve, condition, or deny all Federal permits or licenses that may produce discharge within the jurisdiction's waterway. According to the statute, applicants for a Federal permit must demonstrate that a development approval has been received from either the State in which the proposed discharge will originate or the interstate water pollution control agency with jurisdiction over the navigable waters in question. As a result, all Federal permits, including those issued by the Corps, must also meet all applicable State (or interstate) water management provisions.

In addition to these other aspects of the CWA, the National Pollutant Discharge Elimination System (NPDES) Stormwater Program is a comprehensive, two-phased national program for addressing the non-agricultural sources of stormwater discharges that adversely affect the quality of our nation's waters. The program uses the NPDES permitting mechanism to require the implementation of controls designed to prevent harmful pollutants from being washed by stormwater runoff into local water bodies. Recent changes in the NPDES permit requirements effective in Washington State include mandatory permits for any earth-moving or ground-clearing for areas larger than 1 acre.
Implementation of this phase of the program will provide a higher degree of agency review and corresponding measures to protect aquatic resources.

3.4.1.2 Sections 9 and 10 of the Rivers and Harbors Act

Sections 9 and 10 of the Rivers and Harbors Act represent additional Federal legislation that influences the type and intensity of development around navigable waters. Originally passed in 1899, Section 9 of the Act prohibits bridges, dams, dikes, or causeways to be constructed over or within U.S. navigable waters without Congressional approval (33 U.S.C. § 403, Chapter 425). Both the U.S. Coast Guard and the Corps have jurisdictional authority in the administration Section 9. State legislatures may authorize the construction of such structures

if the affected navigable waters are contained wholly within the state. Section 10 requires approval from the Chief of Engineers for the construction of wharfs, piers, jetties, or other structures. These provisions establish substantial Federal authority over many actions in Washington's floodplains.

3.4.1.3 Executive Order 11988 – Floodplain Management

Issued in 1977, Executive Order 11988 – Floodplain Management required all Federal agencies to consider and minimize the risk and impacts of a range of actions on flood management, human health and safety, and natural function of floodplains. Actions impacted under the order included the acquisition, management, and disposal of Federal facilities and land; Federally financed or assisted construction and improvements; and Federal land use programs and activities (42 F.R. 26951). Prior to any Federal action, the agency must determine whether the proposed action will occur in the floodplain, consider alternatives "to avoid adverse effects and incompatible development in the floodplains," notify State and local agencies of the action, and provide an opportunity for public review and comment. The Executive Order requires at a minimum that Federal structures and facilities meet the minimum requirements of the NFIP although Federal agencies are generally held to a higher standard than the private development regulated by NFIP communities. Federal agencies often can decide not to fund a project (no action) or require that the project be modified prior to funding it to meet the requirements of the order. Executive Order 11988 reviews are generally conducted as part of environmental review under the National Environmental Policy Act. However, they still must be undertaken in situations where no NEPA review is required.

3.4.1.4 National Environmental Policy Act

The National Environmental Policy Act (NEPA), signed into law in 1969, established a process by which the environmental impacts of Federal actions (or actions with a Federal nexus) are considered during decision-making. As such, NEPA requires that all proposals on Federal legislation or action include an analysis of: (1) the environmental impacts of the proposed action; (2) any unavoidable adverse environmental effects of the proposal; (3) alternatives to the proposed action; and (4) a discussion of short-term and long-term effects of the proposal on the environment. Through the preparation of Environmental Assessments (EAs) and Environmental Impact Statements (EISs), project impacts related to fish and wildlife (specifically, listed species), transportation, land use, environmental justice, and a host of other topics are analyzed. The level of NEPA analysis—either an EA or an EIS—depends upon the magnitude of impacts and the ability of the applicant to successfully mitigate those impacts.

3.4.1.5 Endangered Species Act

The Endangered Species Act (ESA) influences development near waterways through species and habitat protection. This is particularly true in Washington State where a number of anadromous fish species are listed as threatened or endangered. The specific purpose of the ESA, which initially became law in 1973, is to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved…" and to

contribute to the re-establishment of these species. Under Section 7 of the Act, Federal agencies must consult with NOAA Fisheries if a project has the potential to affect listed salmon or steelhead. This includes agencies such as the Corps, which regulates wetland fill.

Additionally, Rule 4(d) of the ESA establishes restrictions against killing or injuring (also knows as "take") endangered and threatened fish and wildlife populations or altering their habitat. Upon issuing a rule under 4(d), NOAA Fisheries proposes regulations deemed "necessary and advisable to provide for the conservation of the species." Regulations utilized may include any or all of the prohibitions contained in Section 9 of the ESA, as well as other actions deemed necessary to protect special status species. These conservation measures may apply to development activities, programs, and/or regulatory actions. After consultation with NOAA Fisheries, a Federal, State, or local agency may implement programs that meet the aims of the 4(d) rule while also establishing exemptions for particular activities. In some cases, "exempt" activities may result in take as long as the program as a whole adequately protects the listed species. Enforcement of 4(d) rules is the responsibility of the affected communities and NOAA.

NOAA Fisheries published 4(d) rules for salmon and steelhead listed along the west coast of the U.S. in 2000 (NOAA Fisheries 2000). The rules stipulate a number of "limits," or programs and activities, where NOAA Fisheries will not apply "take" provisions if the program follows NOAA Fisheries guidelines. NOAA Fisheries provided guidelines for 13 program types ranging from fisheries management (Limit #4) to water diversion screening (Limit #9) to Residential, Commercial, and Industrial Development (Limit #12). These guidelines have prompted many governmental entities to seek approval for programs and exemptions under the Rule.

Regional salmon recovery efforts may include a wide range of governmental, Tribal, and non-governmental organizations. Examples of efforts within Washington include activities such as the Snohomish Basin Conservation Plan, the Regional Road Maintenance Plan, and the Puget Sound Tri-County Initiative, a cooperative salmon recovery effort by King, Pierce, and Snohomish Counties.

Given that floodplains represent a common source of habitat for threatened and endangered populations, new development proposed within Washington's floodplains is frequently required to adhere to ESA requirements. Because of the protected status of a number of salmon species in the Northwest and their statewide significance, the State of Washington and its local jurisdictions have taken additional steps to protect listed species and guide development in the floodplain. These measures are discussed in the next two subsections.

3.4.1.6 Coastal Zone Management Act

The State of Washington manages its coastal zone through a partnership with the Federal government as expressed in the 1972 Federal Coastal Zone Management Act (Act). The Act calls for the "effective management, beneficial use, protection, and development" of the nation's coastal zone and promotes active State involvement in achieving these goals. The Act requires participating coastal states to develop management programs that demonstrate how they will carry out their obligations and responsibilities to manage their coastal zone.

Upon Federal approval of a state's coastal zone management program, the state benefits by becoming eligible for Federal coastal zone grants. Grant allocation is based on the total number of shoreline miles and shoreline population density within the state. Because of the relationship with Washington's Shoreline Management Act, the Department of Ecology oversees the Washington Coastal Zone Management Program. In 1976, Washington became the first state in the nation to have a Federally approved coastal zone management program. The program protects wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and fish and wildlife habitat. Through joint programs with the Federal government, the program is intended to provide comprehensive management of coastal zone resources through coordinated permit processes, land owner assistance, and grants to communities.

3.4.2 Washington State

In addition to Federal legislation, the State of Washington utilizes a number of policies and programs that influence development within the State's floodplains. These regulations range from programmatic, state-wide land use management and planning laws, such the Growth Management Act (GMA) and the Shoreline Management Act (SMA), to the site-specific permitting processes associated with programs such as the WDFW Hydraulic Project Approval (HPA). A summary of relevant state policies and programs is provided below.

3.4.2.1 Floodplain Management Laws

Due to the substantial amount of water resources within the State of Washington, floodplain management represents a high priority at the state level. Washington maintains a number of programs and policies to manage development and activities within the floodplain, while also relying heavily on the NFIP standards for guidance. The State established its first floodplain management law in 1935 and has consistently amended the law over the last 70 years. Currently, Washington's Floodplain Management law prohibits residential development and "substantial repair" within designated Flood Control Zones (FCZ) and regulatory floodways. An exception to this prohibition is allowed for existing farmhouses within the floodway that meet established provisions (Ecology must approve any construction in these areas). When it is necessary, County governments also have the power to levy taxes, condemn property, and undertake flood control activities (RCW 86.12). This provides counties with a significant amount of influence in matters related to flood management. Additionally, the State maintains a Flood Control Assistance Account Program (FCAAP) to assist local jurisdictions in planning and flood control maintenance efforts. To be eligible for these funds, a community must have a Comprehensive Flood Hazard Management Plan completed and be a NFIP member in good standing (Ecology 2004a). In other aspects of State law, including land management and use criteria in the Flood Management Regulations, the state defers to the NFIP.

In the implementation of the Floodplain Management Program, at least ten agencies play a role, including five essential agencies. The five essential agencies include Ecology, the Division of Emergency Management (DEM), WDFW, Washington State Department of Transportation (WSDOT), and Washington Department of Natural Resources (WDNR). The role of these agencies is as follows:

- **Ecology**—State Coordinating Agency for the NFIP; coordinates with FEMA; provides technical assistance to NFIP communities; conducts Community Assistance Visits (CAVs) and Community Assistance Contacts (CACs) on behalf of FEMA; administers Washington's Floodplain Management law;
- **DEM**—coordinates State disaster mitigation, preparedness, response, and recovery activities;
- **WDFW**—administers Hydraulic Project Approval (HPA) process (see below); gives approval to Ecology for all FCAAP projects after consultation between the agencies; provides input to local jurisdictions on wetland and riparian protections;
- **WSDOT**—experienced at flood-flow modeling, both using conventional methods and expanding on these methods to include some of the more contemporary models; and
- **WDNR**—administers the Forest Practices Act, which includes the issuance of permits that involve practices relevant to floodplain management.

Also, in a Memorandum of Agreement (MOA) between signed between DEM and Ecology in 1995, the State established a single planning requirement for local flood hazard management plans with a common review process, including integration with GMA planning and funding provisions (Ecology 2004a).

3.4.2.2 Shoreline Management Act

In 1972, the State of Washington passed the Shoreline Management Act (SMA) with the expressed intent to "prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines" (RCW 90.58.020). To that end, the SMA defines "shorelines of the state," which are determined by specific characteristics and must be managed in a manner consistent with the priorities of the Act. All marine waters, streams, and rivers with over 20 cubic feet per second (cfs) of mean annual flow, and lakes of over 20 acres in size are classified as Shorelines of the State. Areas connected with these shorelines, including upland areas which extend 200 feet landward from the water's edge (called Shorelands), associated biological wetlands, river deltas, and, in some cases, the 100-year floodplain base floodplain elevation (BFE), must also be managed according to the SMA.

When a shoreline is determined to be significant state-wide, the appropriate jurisdiction in the area must adopt a Shoreline Master Program (SMP) to implement the protections of the SMA. A SMP, which functions as a Comprehensive Plan for the shoreline, must address three basic policy areas: shoreline use, environmental protection, and public access. As a guideline for shoreline use, the SMA provides a list of "preferred uses" that are consistent with effectively managing the control of pollution and the general impact of development on the environment. Additionally, the SMA emphasizes that land use along these significant shorelines should preserve the statewide interest over local interests. According to the SMA, an adopted SMP should also protect natural resources along the shoreline, including "land, vegetation, and wildlife and the waters of the state and their aquatic life." The SMP should also preserve the natural character and beauty of the shoreline whenever possible. To ensure that these needs are addressed, the SMA requires jurisdictions to address the preservation of natural resources, "including, but not limited to scenic vistas, aesthetics, and vital estuarine

areas for fisheries and wildlife protection," as well as the prevention and minimization of flood damage" (WAC 173-26-201). To complement the effective land use management and environmental protection, the provision and maximization of public access to these shorelines is also emphasized. Whenever feasible, the availability and utility of the State's shorelines for public use should be maximized (RCW 90.58.020).

To implement these policy areas, stretches of shoreline are designated under different categories, depending on their characteristics and function. These SMP designations include "Conservancy," "Natural," "Rural," Rural Conservancy," "Urban," and "Urban Rural." The designation of an area under a particular classification allocates a specific level of environmental protection. Generally, areas classified as Conservancy are provided with the greatest amount of protection, while the requirements associated with the Urban designation allows much more flexibility for adjacent land uses.

In addition to the requirement for the preparation of the SMP, the SMA also establishes a permitting process for development within the Act's jurisdiction. Accordingly, the SMA requires that permits be obtained for any oil or natural gas exploration project. Permits, called Substantial Development Permits (SDPs), must also be obtained for any "development" (defined within the SMA) with a total cost or fair market value over $5,000 or any project that will "materially interfere with normal public use of the water or shorelines of the state." An SDP will not be approved unless it can be shown that the development is consistent with the SMA, other Ecology rules, and the local SMP. Local jurisdictions are generally responsible for ensuring this consistency, but Ecology provides oversight for implementation of the program and is required to approve conditional uses and variances for proposed projects. If Ecology determines that an SDP is inconsistent with any of the applicable statute, it may file an appeal with the State's Shoreline Hearings Board. Through the SDP program, new development within and adjacent Washington's major waterways is managed to reduce environmental impacts and ensure continued ecosystem functions.

3.4.2.3 Growth Management Act

A second key programmatic policy employed in the State of Washington is the Growth Management Act (GMA) (RCW 36.70A). This piece of legislation, instituted in 1990, created a system for planning for and effectively managing new growth within the state. Similar to the SMA, the GMA aims to reduce the impact of piecemeal development within established or fast-growing urban areas. Planning under GMA is required for: (1) any county (and cities within those counties) with a population of 50,000 or more and population growth over 17 percent in the previous 10 years; (2) any county, regardless of size, that experienced an increase 20 percent or more over the previous 10 years; and (3) any county that wishes to plan under the statute (RCW 36.70A.040).

Currently, 29 of the 39 counties (74 percent) in the state fully plan under GMA (undertake growth, critical areas, and natural resource lands planning). Counties not currently fully planning under GMA (only undertake planning for critical areas and natural resource lands) include: Asotin, Whitman, Adams, Lincoln, Okanogan, Klickitat, Skamania, Cowlitz, Wahkiakum, and Grays Harbor (CTED 2005a). As a part of the adoption of GMA, the legislature mandated that all counties will participate in growth management by 2007.

Because cities which are located in non-GMA counties do not need to fully plan under GMA, 22 percent (62 of 282) of the cities and towns in Washington are only partially planning under GMA (CTED 2005b).

GMA requires all appropriate jurisdictions to develop Comprehensive Plans in accordance with 13 state-wide goals (RCW 36.70A.020). Every Comprehensive Plan must include eight "Elements": Land Use, Housing, Capital Facilities, Utilities, Rural (lands not considered for urban growth), Transportation, Economic Development, and Parks and Recreation. Each Element must ensure the provision of adequate resources and improvements over a 20-year time span and adequately accommodate the expected population growth over that time. The 13 state-wide goals within the Act must be integrated into all components of Comprehensive Plans. Of these 13 goals, two specifically address open space, recreation, and environmental protection. Goal 9, Open Space and Recreation, directs jurisdictions to "retain" open space and "conserve" fish and wildlife habitat. Goal 10, Environment, requires the protection of air and water quality and the consistent availability of water resources.

As a part of the Comprehensive Plan preparation, local jurisdictions must designate natural resource areas such as farm and forest lands; environmentally "critical areas" such as wetlands, frequently flooded areas, and other sensitive natural areas; and urban growth areas (UGA), where future population growth will be located. Areas designated as natural resource areas are set aside for use by natural resource industries to reduce the pressure on rural lands. Similarly, protections, including buffers and other habitat preservation measures, are implemented for those lands designated as Critical Areas. Prohibitions on new development and controls on adjacent land uses represent common strategies for preserving these important biological resources (see below for more discussion on Critical Areas). The establishment of UGAs allows local jurisdictions to determine where and how future growth will occur. With these areas identified, local jurisdictions can plan for the provision of appropriate and cost-effective infrastructure, such as transportation, sewer and water, etc. Additionally, GMA requires concurrency between the provision of infrastructure and land development and requires jurisdictions to coordinate their planning processes with adjacent jurisdictions. Collectively, the designation of land types and emphasis on coordination provide local jurisdictions significant control over the type and location of new development within floodplains and other important areas.

3.4.2.4 State Forest Practice Act

Washington utilizes a comprehensive approach to forestry management throughout the state. Through the implementation of the State Forest Practices Act (Title 76.09 RCW) and supporting administrative rules (Chapter 222 WAC), the State directs the management of forest land. Originally passed in 1974 and subsequently amended, the Forest Practices Act regulates activities related to State and private timber production. Guidance is provided on a range of activities, including road construction and maintenance, timber harvesting, reforestation and the use of chemicals.

As a part of the timber harvest regulations, the administrative rules cover a number of key areas. The rule designates two separate riparian management zones, one for Eastern Washington and one for Western Washington. As a part of each zone, a riparian

management zone (RMZ) buffer width requirements are established for all Type S ("shorelines of the state" under Chapter 90.58 RCW) or Type F (defined in the statute) waters. These buffers can range from 90 to 200 feet in Western Washington and from 75 to 130 feet in Eastern Washington. Similarly, the rule requires buffers around wetland areas, known as wetland management zones (WMZ). These buffers vary depending on the type of wetland under consideration, but can be as large as 200 feet and as little as 25 feet. Specific guidance on how and when certain types of harvesting can be performed is also included in the timber harvest regulations. Comparable regulations are provided for other activities.

Due to their focus on forest resource lands, these regulations will not, in most case, apply to development within the floodplain.

3.4.2.5 State Salmon Recovery Plans

In 1999, the Washington State Joint Natural Resources Cabinet released a summary of the "Statewide Strategy to Recover Salmon, Extinction is Not an Option." A separate volume with more detailed information followed in November 1999. The document is intended to be a long-term guide for salmon recovery. This 2000-2001 Action Plan provided an outline of specific programs, outside existing ones, that Washington State would initiate for salmon recovery. These programs are guided by:

- Major statewide policies and initiatives related to the "Four Hs" – habitat, harvest, hatcheries, and hydropower.
- Joint objectives for State agency activities, such as cooperation to fully integrate enforcement, monitoring, and data collection activities.
- Specific strategies and programmatic approaches that could lead to conservation of salmon and protection of State, local, and/or private actions from legal exposure under ESA.
- Monitoring of State and local progress in developing and implementing salmon recovery plans.
- Early and immediate actions to address key factors for decline where resource risks are severe.
- State participation in regional and local responses, including collaborative, incentive-based approaches to salmon recovery.

State and Federal recovery funding is used to support a number of salmon recovery efforts throughout the state. An example is the Lead Entity program. WDFW administers grants to the Lead Entities with funds provided by the Salmon Recovery Funding Board. Lead Entities are funded to solicit salmon habitat projects and to establish priorities for projects that are submitted. Project selection is guided by a habitat strategy that each Lead Entity has developed to address problems specific to its watershed. Locally based citizen and technical committees strive to identify those projects that are both scientifically sound and in harmony with the needs of the community. In addition, projects must have the support of affected landowners so that implementation is likely to succeed. Under this process, State agencies play an important role in providing both financial and technical support to Lead Entities.

3.4.2.6 Hydraulic Project Approval

In addition to the State-wide legislation mentioned above, the State of Washington also manages an important, site-specific permitting process known as the Hydraulic Project Approval process. Laws in the "Hydraulic Code" (RCW 77.55) require that any project that proposes to "divert, obstruct, or change the bed or flow of state waters" must receive a permit from the WDFW to ensure that environmental damage is prevented. In this process, WDFW reviews the permit materials to ensure that all construction will reduce the effect on the State's fish, shellfish, and their habitat. Generally, a "no-net-loss" policy toward the productive capacity of nearby fish and shellfish habitat is implemented. Obtaining a permit under this program is required for any construction within the waterway. Examples of the range of activities included in the Hydraulic Code are streambank protection; bridge, pier, and dock construction; pile driving; channel realignment; and a number of others.

3.4.2.7 State Implementation of Section 401 of the Clean Water Act

Although Section 401 of the Clean Water Act is managed through the Corps and EPA, Ecology maintains the ultimate responsibility for its implementation in Washington. Ecology is designated, by statute, as the agency responsible for issuing the Section 401 water quality certification in the state. As such, Ecology must review all proposals and certify that proposed dredging and/or filling within the state will meet established water quality standards (Ecology 2005). A Federal permit issued within the state is not valid unless an approval by Ecology has been provided. Ecology's role in the approval of Section 401 permits allows State priorities to be directly incorporated into Federal decision-making processes.

3.4.3 Local Jurisdictions

Local jurisdictions represent the final tier of the complex regulatory framework that determines floodplain management strategies and priorities. Local jurisdictions are the critical actors in the management of floodplains, as they are responsible for implementing their own ordinances as well as State and Federal mandates. As mentioned above, local jurisdictions planning under GMA must identify and protect Critical Areas within their boundaries. To do this, jurisdictions must develop a Critical Areas Ordinance (CAO) that sets out strategies for conserving and protecting areas of biological importance, such as wetlands. The CAO plays a crucial role in the management of floodplains and associated areas. Additionally, through the establishment of zoning designations and permitted uses within those zoning designations, the local jurisdiction regulates the types and intensity of development within the floodplain. Because of their importance, these local actions are discussed below.

3.4.3.1 Critical Areas Ordinance (CAO)

Critical areas include wetlands, aquifer recharge areas, frequently flooded areas (at minimum, the areas below the BFE), geologically hazardous areas, and fish and wildlife conservation areas (WAC 365-190-080). Critical Areas may overlap with areas protected by the ESA because these areas can contain endangered, threatened, and sensitive species (both

Federal and State), but also include non-sensitive species and habitat designated by the State. Using the best available science, local jurisdictions must identify lands that fit into each of these five Critical Areas categories and develop appropriate measures to maintain natural conditions and functions within the area. Additionally, local government must ensure that any actions proposed in the CAO must be consistent with its Comprehensive Plan. If the Comprehensive Plan is not consistent, the jurisdiction is required to bring the plan into conformance with the CAO. Due to the prevalence of Critical Areas adjacent to waterways, CAOs represent a very important mechanism for habitat protection in the state and will greatly influence where residential and commercial development will be located.

Currently, all counties in Washington plan for Critical Areas and areas designated as natural resource land. Even counties that are not currently planning under GMA must designate Critical Areas and provide adequate protection. Consequently, all cities and towns within the state plan for Critical Areas, even if they simply adopt the regulations of the County.

3.4.3.2 Zoning Laws

Zoning is the final key component in the management of Washington's floodplains. The zoning code within a community is the implementation mechanism for the Comprehensive Plan. In the Comprehensive Plan, the general goals, guidelines, and policies for land within the jurisdiction are established. The zoning code translates those general guidelines and policies into site-specific regulations for new development. Within a zoning designation, some uses are allowed while others are forbidden. For example, in an Industrial zone, particular types of activities, such as light manufacturing, may be permitted, but retail or residential uses may be prohibited. Establishing a list of permitted uses (also known as a Land Use Table) allows the local jurisdiction to separate, combine, or integrate different uses. The local jurisdiction can greatly influence the types and intensity of development by establishing setback requirements, floor area ratios (FAR), building heights, and numerous other characteristics. These conditions can be extremely helpful in reducing or eliminating the impact of development along established waterways and within the floodplain.

Thus, floodplain management by local jurisdictions exerts a substantial influence over development in the floodplain. Zoning, comprehensive plans, wetland and surface water protections, endangered species considerations, frequently flooded area policies, and other frameworks often combine to produce multi-layered protections of floodplains, including limits to density, prohibition of development, and/or mandatory buffers. Any proposed project in the floodplain must meet all of these overlapping requirements before the area can be developed and flood insurance issued on any buildings.

4.0 NFIP DISCRETIONARY ACTIONS

As described in Chapter 2, ESA Section 7 should focus on actions where "there is discretionary Federal involvement or control." Consequently, the impact analysis contained in this document focuses on those actions where FEMA has discretionary authority over implementation. In the NFIP, there are three particular areas where FEMA has some level of discretion and can exert direct control over program implementation:

(1) SFHA mapping;
(2) Minimum floodplain criteria; and
(3) The Community Rating System.

To effectively determine the impacts related to these three activities, and to identify appropriate mitigation measures to reduce those impacts, this section provides a detailed description of each element. This discussion expands upon the general discussion of the NFIP provided in Chapter 2.

Following the detailed description of the aforementioned elements, this section presents a series of six example communities in Washington that participate in the NFIP. These example communities depict the broad range of NFIP community types and illustrate the role of the NFIP in these various communities. Data related to the NFIP, as well as descriptions of other applicable regulatory frameworks, are presented for each community.

4.1 DETAILS OF THE MAPPING PROGRAM

To meet the objective that flood studies be conducted to accurately assess the flood risk within each flood-prone community, the 1968 National Flood Insurance Act called for: 1) the identification and publication of information, within five years following August 1, 1968, for all floodplain areas that have special flood hazards; and 2) the establishment of or update to flood-risk zones in all such areas to be completed over a 15-year period following passage of the Act. Furthermore, FEMA is directed to revise and update floodplain areas and flood risk zones upon determination by FEMA that the revision or update is necessary and upon request from any state or community that provides sufficient technical data justifying the request. Limitations on funding have generally prevented FEMA from restudying all of the areas that need revisions or updates.

The adoption of the 1% annual chance flood as the standard for the NFIP grew out of a number of historical events and review of appropriate standards for flood protection measures. The Tennessee Valley Authority (TVA) and the U.S. Army Corps of Engineers (USACE) began using a 100-year flood standard in the 1950s and 1960s, respectively. This standard was further reinforced in 1966 by Executive Order 11296 on Evaluation of Flood Hazard in Locating Federally Owned or Financed Buildings, Roads, and Other Facilities and Disposing of Federal Lands and Properties. The National Flood Insurance Act of 1968 that established the NFIP directed the U.S. Department of Housing and Urban Development (HUD) to establish floodplain management criteria and to designate flood hazard areas. The University of Chicago's Center for Urban Studies was contracted by HUD to conduct a seminar to make recommendations on these criteria. The report from this process

recommended the use of the 100-year flood standard, and this was published by HUD's Federal Insurance Administration as a proposed rule on February 27, 1969. With its adoption and use by the NFIP, the 100-year flood standard became the de facto national standard for floodplain management. The standard was revisited by the U.S. Senate Committee of Banking, Housing, and Urban Affairs hearings on the Flood Disaster Protection Act of 1973 and again in 1981 as part of the Vice President's Task Force on Regulatory Relief. The 100-year flood standard was supported in both instances and no changes were made. Additional details on the history of the 1% annual flood standard are found in Appendix G.

At the start of the NFIP, it was the intent that communities needed to be mapped so that they could participate in the Program. Quickly, it became clear that the time it took to perform a detailed study for a community would delay the implementation of the Program in many flood-prone communities. As a result, an interim process was implemented where Flood Hazard Boundary Maps, which delineated the boundaries of the community's Special Flood Hazard Areas (SFHAs), were prepared using approximate methods. These methods identified on an approximate basis a 1-percent-annual-chance floodplain, but did not include the determination of Base Flood Elevations (BFEs) (1-percent-annual-chance flood elevations), flood depths, or regulatory floodways. (Regulatory floodway is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water-surface elevation more than a designated height.) The Flood Hazard Boundary Map was intended to assist communities in managing floodplain development, and to assist insurance agents and property owners in identifying those areas where the purchase of flood insurance was advisable but, they were an interim product until the Flood Insurance Study (FIS) was developed.

FISs that use detailed hydrologic and hydraulic analyses to develop BFEs, designate floodways, and risk zones for developed areas of the floodplain were subsequently produced for most NFIP communities. In production and updating of FISs, there is a combination of two study approaches (approximate and detailed) used to identify flood hazards within a community. Detailed study methods typically employ the use of engineering models and, at a minimum, result in the determination of SFHAs and BFEs or flood depths that will be displayed on the FIRM. The approximate approach uses resources such as topographic maps, aerial photographs, any available flood information, and rudimentary hydrologic and hydraulic analyses. This type of analyses allows FEMA to determine the general boundaries of the SFHA but, not to develop BFEs and a floodway.

The decision whether to use the approximate or detailed methods is generally based on existing and anticipated development in and near the floodplain. However, there are some other considerations that need to be taken into account such as available funding to perform the flood study both from FEMA and the local community. Flood hazard information for flooding sources that affect developed or developing areas are based on detailed studies whenever possible; approximate study methods, which are less rigorous than detailed methods and do not determine BFEs or floodways, may be used for undeveloped or sparsely developed areas.

The main components of any study used to develop flood hazard data for the NFIP are topographic data, survey methodology, and flood hazard identification techniques (modeling and mapping). A detailed study will be one in which flood elevations and a flood profile are published. This will require local floodplain administrators to adopt those flood elevations in their local floodplain management ordinances, thereby restricting them to the use of those elevations only. A detailed study with a floodway is similar to a detailed study, with the exception that a floodway will be published, which leads to further floodplain management requirements; however, the development of a floodway does not have an impact on insurance rates or purchase requirements. For areas designated as approximate, the floodplain management requirements are less stringent because there are no flood elevations associated with those areas. In these cases, the local community must use the best available data and their local knowledge of flooding in the area to determine the appropriate floodplain management practices. Developers are required to provide base flood elevations for subdivisions and other development above an established threshold for these areas.

After completing the analyses of the flood hazards for a community, a FIS report can be compiled and flood hazard data can be reflected on the FIRM which will function as the basis for rate-setting by FEMA. FIRMs are also used by states and communities in implementing their floodplain management regulations, by lenders in implementing the mandatory flood insurance purchase requirement, by federal agencies in implementing Executive Order 11988 and other environmental requirements, and by all levels of government in land use and emergency planning and management. The FIS report gives a narrative of the flood hazards as well as the flood profiles and floodway data, while the FIRM reflects the graphical representation of the flood risk within a community. As stated previously, the level of flood risk varies within the community so, approximate and detailed analyses methods are labeled differently throughout. Table 4.1-1 summarizes the SFHAs subject to inundation by the 1-percent-annual chance flood and how the zone designations label correlates directly to the level of study that has been performed in that area.

Processes for Reflecting Changes to the Flood Maps

The flood risk information presented on the FIRM and in the FIS report forms the technical basis for the administration of the NFIP. FEMA exercises great care to ensure that the analytical methods employed in the FISs are scientifically and technically correct, that the engineering standards followed meet professional standards, and ultimately, that the results of the FIS are accurate. Although the NFIP maps and FIS reports are prepared according to specific technical standards, FEMA recognizes that changes to the maps and reports may be necessary. The reasons for these changes are due to the availability of more or new technical data, changes in the physical conditions either natural or man-made within the floodplain or watershed, and improvements in the techniques used in assessing flood risk. Maps will also be revised to reflect increased development pressure in a community (urban growth boundaries, etc.), often using approximate methodologies with the intent to study the areas in more detail at a later date when it begins to develop. Changes to the maps or FIS can be initiated from either the community or FEMA.

Table 4.1-1. Special Flood Hazard Area Designations.

Zone Designation	Definition	Type of Analysis
A	SFHA with no BFEs or floodway determined	Approximate
AE	SFHA with BFEs determined and in some cases, floodway determined	Detailed
A1-A30	SFHA with BFEs determined and in some cases, floodway determined	Detailed
AH	SFHA with flood depths of 1 to 3 feet (usually areas of ponding); BFE determined	Detailed
AO	SFHA with flood depths of 1 to 3 feet (usually sheet flow on sloping terrain or ponding); average depths determined	Detailed
V	Coastal flood zone with no BFE determined	Approximate
VE	Coastal flood zone with velocity hazard (wave action); BFE determined	Detailed
V1-V30	Coastal flood zone with velocity hazard (wave action); BFE determined	Detailed

FEMA can revise maps by conducting a new or revised FIS or through a Physical Map Revision (PMR) or a Letter of Map Change (LOMC). Development of a new or revised FIS is described in the previous section. A PMR involves the revision of a full FIRM panel that will then be reprinted and published with a new effective date. There are a number of LOMCs that FEMA issues, such as the Letter of Map Amendment (LOMA), Letter of Map Revision based on Fill (LOMR-F), Letter of Map Revision (LOMR), and conditional versions of these letters. Depending on the exact situation or cause of revision, either a particular LOMC type or PMR may be issued by FEMA to reflect or note the change to the current effective FIRM.

Although FEMA uses the most accurate flood hazard information available, limitations of scale or topographic definition of the source maps used to prepare the FIRM may cause small areas that are at or above the flood elevation to be inadvertently shown within the SFHA boundaries. Also, the placement of fill may elevate small areas within the SFHA boundaries to an elevation at or above the flood elevation.

The LOMA process is to correct inadvertent inclusions and it results from an administrative procedure that involves the review of technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the current effective FEMA map and establishes that a specific property is not located in an SFHA, thereby removing the Mandatory Flood Insurance Purchase Requirement. A LOMA merely provides a greater level of accuracy than the current mapped SFHA can provide. No physical change to the floodplain has occurred and no fill has been placed in the floodplain.

A LOMR-F is submitted for properties on which fill has been placed to raise the structure or lot to or above the 1-percent-annual-chance flood elevation. NFIP regulations require that the lowest adjacent grade of the structure be at or above the 1-percent-annual-chance flood elevation for a LOMR-F to be issued removing the structure from the SFHA. The participating community must also determine that the land and any existing or proposed structures to be removed from the SFHA are "reasonably safe from flooding". To remove the entire lot and structure, both the lowest point on the lot and the lowest floor of the structure must be at or above the 1-percent-annual-chance flood elevation.

The LOMR process is an administrative process by which a community can submit technical data to revise the FIS and FIRM. The result is a letter from FEMA to the Chief Executive Officer of the community officially revising the current effective FIRM and FIS. Along with providing the community official a letter stating the changes to the floodplains, floodways, or flood elevations, FEMA provides revised portions of the FIRM and FIS. The reason for these type of revisions were mentioned previously, such as, physical change, either natural or man-made, to the floodplain or watershed, more up-to-date flood hazard data becomes available, and/or there are improvements in the processes in which to assess flood risk.

Because LOMAs, LOMR-Fs, and LOMRs officially amend or revise the flood maps, they must reflect existing conditions, such as an “as-built” project. There are instances where communities, developers, and property owners request FEMA to review and comment on proposed projects in floodplain areas. Such requests typically include data and analyses of the pre- and post-project conditions so that FEMA can ascertain the impact on flood hazards of the proposed project. For such requests, FEMA reviews the data and a response is provided in the form of a “Conditional” LOMA, LOMR-F, or LOMR. The final response from FEMA will state whether the proposed project, if built as proposed, would meet the minimum floodplain management criteria of the NFIP and if so, what revisions will be made to the community’s NFIP maps. The conditional or more specifically, FEMA comment on the proposed project, does not constitute a building permit because the authority to approve projects and issue building permits lies with the local community and, in some instances, State agencies.

A conditional Letter of Map Revision is only required when someone proposes an encroachment in the SFHA or SFHA and floodway that results in increases in BFEs of a certain amount based on the regulations.

The NFIP regulations directs FEMA to revise and amend maps and FIS reports, as warranted, or after it receives requests from community officials and individual property owners. To help FEMA ensure that the maps and reports present information that accurately reflects existing flood risks, the NFIP regulations require that each NFIP community inform FEMA of any physical changes that affect BFEs in the community and, within 6 months of the date that such data are available, submit those data that show the effects of the changes.

Over the lifetime of the program, numerous map revisions and amendments have been processed. Table 4.1-2 summarizes the total number of map changes that have been

processed in Washington since 1974. By far, map amendments have been the most common adjustment, with almost 2,000 issued over the 30-year period. The next most common group, LOMR-Fs, only totaled 158. Figures 4.1-1 through 4.1-3 illustrate the distribution of each of these map changes throughout the state.

Table 4.1-2. LOMAs or LOMRs issued by FEMA in Washington State since 1974.

	LOMA or LOMR Type					
	CLOMAs	**LOMAs**	**CLOMR-Fs**	**LOMR-Fs**	**CLOMRs**	**LOMRs**
Number Issued	11	1,972	17	158	15	132

Since 1999, when many salmon and steelhead ESUs were listed, only a total of 32 LOMR-Fs and 6 CLOMR-Fs have been processed in Washington. These are listed in Appendix I. Although these individual adjustments and revisions address salient map issues, FEMA recognized a number of significant limitations in its mapping program in 1997. At that time, two-thirds of FEMA's flood maps were more than 10 years old, with many of them created using outdated, manual techniques. These old maps often underestimated flood hazards and risks. To address these limitations, FEMA developed and implemented a plan called the Map Modernization Project. A number of actions are currently being undertaken to upgrade the flood map inventory. These actions include:

- Converting existing maps for approximately 12,160 communities nationally (60,800 map panels) to digital format—approximately 257 of these communities (2,641 map panels) are located in Washington; this effort will also resolve community-identified map maintenance needs for 16,500 map panels (nationally);
- Conducting flood data updates and producing digital flood maps for approximately 4,100 communities with inadequate floodplain mapping (20,500 map panels)—of these 23 communities will be located in Washington;
- Developing digital flood maps for approximately 2,700 flood-prone communities nationally that currently do not have flood maps (13,700 map panels)—none of these communities is in Washington;
- Integrating communities, states, and regional agencies into the mapping process through the Cooperating Technical Partners (CTP) initiative—13 communities, including the State of Washington, will participate in this initiative;
- Converting all mapping projects, in both digital conversions flood date updates, to metric, as required by Executive Order 12770, and to the North American Vertical Datum (NAVD) of 1988; and
- Improving customer service to make the maps easier to obtain and use, including electronic and digital printing and distribution.

4.1.1 Discretionary Actions Potentially Affecting Listed Species

In contrast to many other actions within the mapping program that are administrative in nature or where discretion is limited by statute, there are three elements that allow FEMA the flexibility in implementation.

Insert Figure 4.1-1. Distribution of Letter of Map Amendments

Back of Figure 4.1-1. Distribution of Letter of Map Amendments

Insert Figure 4.1-2. Distribution of Letter of Map Revisions

Back of Figure 4.1-2. Distribution of Letter of Map Revisions

Figure 4.1-3. Distribution of Letter of Map Revisions based on Fill

Back of Figure 4.1-3. Distribution of Letter of Map Revisions based on Fill

It is clearly stated in the 1968 Act that FEMA is required to identify and map flood risk but, there are some processes by which this is accomplished that can be discretionary. Based on the above discussion and a review of the components of the mapping program, four primary areas of discretion have been identified.

(1) Level of study performed in the FIS, including the designation of a regulatory floodway;
(2) Review and issuance of CLOMRs, CLOMR-Fs, and CLOMAs;
(3) Requirements associated with LOMRs and LOMR-Fs; and
(4) Map Modernization.

Level of Study Performed During the FIS

The level of study performed on a particular flooding source is discretionary because the level of detail on a given flooding source is directly related to the available funding and the flood risk associated with an area. In areas that have greater flood risk due to development, the intent is for FEMA to apply more funding to that study and ensure that BFEs and in many cases, a floodway can be determined for the area. When more detail is added to an area, there are more restrictive minimum floodplain management regulation requirements set forth by FEMA in Code of Federal Regulations 44, Section 60.3.

The Guidelines and Specifications for Flood Hazard Mapping Partners (Guides and Specs), Appendix C, "Guidance for Riverine Flood Analyses and Mapping" states that the FEMA lead and other members of the Flood Map Project Management Team will decide which flooding source(s) within the community will be studied using detailed hydraulic analyses. Also, the Guides and Specs state that the Mapping Partner performing the hydraulic analysis shall determine flood elevations for the 10-, 2-, 1-, and 0.2-percent annual chance floods, unless otherwise instructed by the FEMA lead.

In addition to the development of BFEs, the establishment of a regulatory floodway is discretionary. As stated previously, the regulatory floodway represents the portion of the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water-surface elevations more than a designated height. Having a regulatory floodway requires the community to significantly limit encroachment and development within the floodway. For communities that have flood elevations, but no floodway designated, the analysis is done on a case by case basis for each development proposal.

Review and Issuance of Conditional Letter of Map Amendments, Conditional Letter of Map Revisions Based on Fill, and Conditional Letter of Map Revisions

The concept of the CLOMA, CLOMR-F, and CLOMR is advisory in nature and does not revise or amend the NFIP map. This is not a permit process rather it is a way to review project(s) for floodplain mapping purposes before a community or developer begins construction. When this process was originally developed, the intent was to ensure that FEMA's constituents (including states and communities) were aware of the impact that the development within the SFHA would have on mapped flood hazard and associated flood risk.

In addition, it was a process that was established to show responsiveness to our constituents and review projects prior to the start of construction to ensure that if the project was built that it would meet the minimum floodplain management requirements. By reviewing the proposed plans, FEMA can ensure the following: the constituent has met the minimum floodplain management regulations, property owners are notified if their property is going to be adversely impacted by the construction within the SFHA, and in the case of CLOMRs, inform the community of what the changes will be in the flood elevations and SFHAs once the project is completed and reflected in the FIS. In addition, the process avoids costly mistakes on the part of communities and developers in constructing projects in expectation that they would be credited by FEMA as providing flood protection.

By issuing conditional letters, the community and constituents are receiving a comment by FEMA on their proposed project. For instance, if the appropriate data is submitted for a CLOMA or CLOMR-F, the comment letter would state that a parcel of land or proposed structure would not be inundated by the base flood if built as proposed. The CLOMR comment letter will inform the community of the impacts that the proposed project will have on the mapped flood hazards (if the project is built as proposed) The applicant always has the option to not undertake the project or modify the project, depending on FEMA's response.

Requirements to Process Letter of Map Revisions and Letter of Map Revisions Based on Fill

The National Flood Insurance Act of 1968 clearly requires FEMA to revise and update flood hazards and flood risk zones but, the act does not state how map revisions should be processed. As stated in the previous section, FEMA developed an administrative process (i.e., LOMR and LOMR-F) to revise maps. A LOMR is a letter from FEMA officially revising the current effective FIRM map to show changes to floodplains, floodways, or flood elevation. A LOMR-F is a letter from FEMA officially stating that an existing structure or parcel of land that has been elevated by fill would not be inundated by the base flood and therefore, there is no mandatory purchase requirement.

During the process of revising the floodplain, floodway, or flood elevations, FEMA requests specific scientific and technical data that will be used to revise the FIS and FIRM and the discretion lies in the requirements of this data. The LOMR process was developed because it enabled FEMA to quickly and less expensively update small portions of the FIS and FIRM. In the case of LOMR-Fs, the fill that has been placed covers a small portion of the floodplain and does not affect flood elevations; therefore, due to the map scale FEMA does not revise the FIS or FIRM for these cases.

The LOMR process is simply a way of reflecting the most up-to-date floods hazards. In some cases, LOMRs are processed to reflect man-made changes (i.e. bridges, culverts, levees, etc.) while, others are processed to reflect natural changes in the floodplain (i.e. channel meandering and erosion). In both cases, the changes have already taken place and FEMA is just reflecting the changes in the FIS and on the FIRM. This update is FEMA's

commitment to providing timely and accurate flood hazard data so that property owners within these areas and local government officials can make informed floodplain management and insurance purchase decisions.

Map Modernization Project

Lastly, FEMA has been allotted discretion within the Map Modernization Project. The goal of the Map Modernization Project is to provide increased accuracy for SFHAs based on improved data. Both the scope and process related to this endeavor is overseen and managed by the agency subject to the language contained in the Congressional appropriations for the initiative. The prioritization of targeted areas for updates and the components of the program are under FEMA's control. Additional steps could be taken within this project to ensure that efforts to protect listed species are maximized. Any appropriate steps to achieve this goal will be identified in Section 8 of this PBE.

4.2 DETAILS OF THE MINIMUM FLOODPLAIN CRITERIA

A second category of discretionary actions that may affect listed species in Washington is the NFIP minimum floodplain criteria. As a part of the 1968 Act , Congress prohibited FEMA from issuing flood insurance to property owners within a community that has not adopted and implemented at least the minimum floodplain management criteria established within the Act. If a local floodplain ordinance is not in place, or if that ordinance does not meet these established conditions, a community cannot be made eligible for the NFIP. Similarly, if a community fails to maintain a floodplain ordinance or adopts an ordinance that does not meet established guidelines, that community could be suspended from the program. A participating community in the NFIP must also require permits for all development in the SFHA, including, but not limited to, filling, grading, paving, and dredging. To assist local communities in the development of floodplain management program, FEMA provides a model floodplain ordinance as a baseline template (see Appendix D for the model ordinance).

FEMA ensures compliance with the established NFIP regulations by reviewing and approving each community's adopted ordinance and maintaining a dialogue with the community. Through Community Assistance Visits (CAV) and Community Assistance Contacts (CAC), FEMA, and states on behalf of FEMA, oversee community activities and monitor implementation of the program. If, in reviewing a community's activities, FEMA identifies deficiencies or violations, FEMA has the option to place the community on formal probation. Initially, FEMA will notify the community of these issues and provide the community with time to rectify them. If, over time, the community is making adequate progress in addressing the issues, probation will not be applied. If the community does not address the issues, formal probation will be initiated (usually approximately 1 year long). During this time, new policies can be sold and existing policies renewed, but policyholders are surcharged a $50 fee on their premium. If, during the probationary period, the community does not address FEMA's concerns, the community can be suspended from the NFIP. During suspension, existing policies cannot be renewed and new policyholders cannot be sold. The possibility of losing insurance coverage creates an incentive for local communities experiencing development pressure to adhere to FEMA's minimum eligibility requirements.

The applicable minimum criteria vary depending on the level of floodplain analysis performed within the community. For each additional level of detail provided in the FIS (see Section 4.1 for information on the different levels of analysis performed within the floodplain), additional minimum requirements for community floodplain management ordinances are established. Appendix E displays the guidelines associated with each level of flood hazard analysis. NFIP regulations contain specific elevation and structural performance requirements for all buildings constructed within the SFHA. NFIP minimum criteria establish different requirements for properties in A zones and V zones, but specific elevation and structural performance requirements are included for all buildings in the SFHA. These requirements form the foundation of floodplain management in a community and, consequently, greatly influence acceptable development in the floodplain. Many states and individual communities have adopted more restrictive regulations that go beyond NFIP minimum requirements. The State of Washington has several more restrictive floodplain management requirements, as do a number of individual Washington communities.

4.2.1 Criteria Potentially Affecting Listed Species

Within the minimum criteria and in other parts of the guidelines for the NFIP (Chapter 60), there are a number of provisions that could potentially directly or indirectly affect floodplain habitat. The potential for these specific regulations to affect salmon and steelhead habitat is discussed in Chapter 8 of this PBE.

Provisions that potentially could directly or indirectly affect habitat:

- Precedence Clause –
  [[60.1(d)] "Any flood plain management regulations adopted by a State or community which are more restrictive than the criteria set forth in this part are encouraged and shall take precedence."

- Federal and State Permits –
  [60.3(a)(2)] "Review proposed development to assure that all necessary permits have been received from those governmental agencies from which approval is required by Federal or State law…"

- Floodplain Data Standards –
  [60.3(b)(4)] "Obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State, or other source, including data developed pursuant to paragraph (b)(3) of this section…"

- Watercourse Alteration and Capacity –
  [60.3(b)(6)] "Notify, in riverine situations, adjacent communities and the State Coordinating Office prior to any alteration or relocation of a watercourse, and submit copies of such notifications to the Administrator."

  [60.3(b)(7)] "Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained;"

[60.3(c)(10)] "Require until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community" (also known as the "cumulative rise analysis").

- Floodway Standards –

  It is extremely difficult to obtain the necessary clearance to construct new structures within a regulatory floodway. Under the NFIP, hydrologic modeling must show that there is no rise in the BFE within the floodway for new construction. Theoretically, this could occur by placing a new structure behind a hydraulic shadow, reducing the elevation of the floodway in a separate location to accommodate the displacement of the new structure, or somehow moving the floodway location (personal communication, Carey, 2006).

  Construction in the floodway is even more restrictive under the Washington Administrative Code (WAC). Under the WAC, no development is allowed in the floodway under any circumstances, and substantial improvements (defined as greater than 50% of current assessed value) are not allowed. Thus, in Washington State and within all Washington ESUs, development within the mapped floodway is not allowed.

  When FEMA has determined flood elevations, A zones, and provided data from which the community shall designate its regulatory floodway, the community shall:

  "[60.3(d)(2)] Select and adopt a regulatory floodway based on the principle that the area chosen for the regulatory floodway must be designed to carry waters of the base flood, without increasing the water surface elevation of that flood more than one foot at any point;"

  [60.3(d)(3)] "Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses…that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge;"

  "[60.3(d)(4)] "Notwithstanding any other provisions of § 60.3, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in the base flood elevations, provided that the community first applies for a conditional FIRM and floodway revision (standards in § 65.12)."
- Performance Standards for Buildings-
  [60.3(a)(3)] "Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall (i) be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral

movement of the structure…, (ii) be constructed with materials resistant to flood damage, (iii) be constructed by methods and practices that minimize flood damages, and (iv) be constructed with electrical, heating, ventilation, plumbing…and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding."

[60.3(c)(2)] "Require that all new construction and substantial improvements of residential structures within Zones A1-30, AE, and AH zones on the community's FIRM have the lowest floor (including basement) elevated to or above the base flood level, unless the community is granted an exception by the Administrator…"

[60.3(c)(3)] "Require that all new construction and substantial improvements of non-residential structures within Zones A1-30 (see above)…(i) have the lowest floor (including basement) elevated…or, (ii) together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water…"

[60.3(c)(7)] "Require within any AO zone (i.e., the shallow flooding zone) on the community's FIRM that all new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated above the highest adjacent grade…"

[60.3(c)(8)] "Require within any AO zone…that all new construction and substantial improvements of nonresidential structures (i) have the lowest floor (including basement) elevated…or, (ii) together attendant utility and sanitary facilities be completely flood-proofed to that level…"

- Subdivision and Public Utility Requirements –
  [60.3(a)(4)] "Review subdivision proposals and other proposed new development, including manufactured home parks or subdivisions, to determine whether such proposals will be reasonably safe from flooding…"

  [60.3(a)(6)] "Require within flood-prone areas new and replacement sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters…"

  The above specifications are the minimum required for participating in the NFIP. Some communities have enacted requirements that exceed these. These specifications influence development, to varying degrees. In Washington floodplains, the NFIP often serves as a baseline for the development of other policies and processes. Additional, non-required guidelines are listed below.

- Planning Considerations –
  [60.22 (a)] "The flood plain management regulations adopted by a community for flood-prone areas should:
  - Permit only that development of flood-prone areas which (i) is appropriate in light of the probability of flood damage and the need to reduce flood losses, (ii) is an acceptable social and economic use of the land in relation to hazards involved, and (iii) does not increase the danger to human life;

- Prohibit nonessential or improper installation of public utilities and public facilities in flood-prone areas."

[60.22 (b)] "In formulating community development goals after the occurrence of a flood disaster, each community shall consider:

- Preservation of the flood-prone areas for open space purposes;
- Relocation of occupants away from flood-prone areas;
- Acquisition of land or land development rights for public purposes consistent with a policy of minimization of future property losses; and
- Acquisition of frequently flood-damaged structures."

4.3 COMMUNITY RATING SYSTEM

A final discretionary element in the NFIP that may affect listed salmon and steelhead species is the Community Rating System (CRS). Building upon the minimum eligibility requirements within the 1968 Act, FEMA established the CRS in 1990 and Congress codified it in 1994. Reductions in insurance premiums are based on the extent to which communities exceed the minimum requirements of the NFIP and on other activities the community undertakes to reduce flood damages. In general, the goals of the CRS are as follows:

- Reduce flood losses (i.e., protect public health & safety, reduce damage to property, prevent increases in flood damage from new construction, reduce the risk of erosion damage, and protect natural and beneficial floodplain functions);
- Facilitate accurate insurance rating; and
- Promote awareness of flood insurance.

Utilizing a criteria-based scoring system described in the CRS Coordinator's Manual (2002), FEMA ranks communities based on 18 creditable activities. All of the creditable activities fall within one of four general categories: Pubic Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness. Table 4.3-1 lists the various activities, along with their associated available credit, under each general category. Within each of the 18 activities, there are specific "Elements" for which communities can receive CRS credits (for more info on these Elements, see the Coordinator's Manual). A total of 25 Washington communities participate in the CRS, most of which are counties and larger communities in the Puget Sound watershed.

Generally, a more stringent regulatory framework related to floodproofing, preservation of open space, and protection of natural resources (and floodplain function) is rewarded with a higher score. Through an application process, local communities must demonstrate which criteria are currently being met and specify exactly how. Data to support these conclusions must also be provided to FEMA. In reviewing applications, FEMA utilizes a five-step process to determine the number of credits given to a community:

- **Element Credit Points**—the determination of whether the community's program includes the Elements associated with a particular creditable activity;
- **Impact Adjustment**—for each Element, the effectiveness/size of the activity is determined to measure the expected impact/improvement (using impact ratios);

- **Credit Calculation**—credit points are multiplied by impact ratios and summed to determine the amount of credit received for each activity;
- **Community Growth Adjustment**—a multiplier for the 400 series activities is applied to reflect the communities growth rate (the higher the rate, the larger the multiplier); and
- **Community Classification**—points for all of the activities are totaled to determine the community's overall score.

Table 4.3-1. Creditable Activities and Associated Point Totals within FEMA's Community Rating System.

Credit Number	Activity	Maximum Points Allowed	Average Points Received
Series 300	Public Information	754	394
310	Elevation Certificates Maintenance of FEMA elevation certificates for new construction	142	72
320	Map Information Provide FIRM information to people who inquire, and publicize this service	140	138
330	Outreach Projects Send information about flood hazard, flood insurance, flood protection measures, and/or natural and beneficial functions of floodplains to floodprone residents or community residents	290	81
340	Hazard Disclosure Real estate agents advise potential purchasers of floodprone property about the flood hazard Regulations require notice of the hazard	81	24
350	Flood Protection Library Public library maintains references on flood insurance and flood protection	30	22
360	Flood Protection Assistance Give inquiring property owners technical advice on how to protect their buildings from flooding, and publicize this service	71	57
Series 400	Mapping and Regulations	4,776	723
410	Additional Flood Data Develop new flood elevations, floodway delineations, wave heights, or other regulatory flood hazard data for an area not mapped in detail by the flood insurance study Have a more restrictive mapping standard	1,230	148
420	Open Space Preservation Guarantee that currently vacant floodplain parcels will be kept free from development	900	206
430	Higher Regulatory Standards Require freeboard Require soil tests or engineered foundations Require compensatory storage Zone the floodplain for minimum lot sizes of 1 acre or larger Regulate to protect sand dunes Have regulations tailored to protect critical facilities or areas subject to special flood hazard	1,750	159
440	Flood Data Maintenance Keep flood and property data on computer records Use better base maps	226	78

Table 4.3-1. Creditable Activities and Associated Point Totals within FEMA's Community Rating System.

Credit Number	Activity	Maximum Points Allowed	Average Points Received
	Maintain elevation reference marks		
450	Stormwater Management Regulate new development throughout the watershed to ensure that post-development runoff is no worse than pre-development runoff Regulate new construction to minimize soil erosion and protect or improve water quality	670	132
Series 500	Flood Damage Reduction	6,565	513
510	Floodplain Management Planning Prepare, adopt, implement, and update a comprehensive flood hazard mitigation plan using a standard planning process (this is a minimum requirement for all repetitive loss communities)	235	34
520	Acquisition and Relocation Acquire and/or relocate flood-prone buildings so that they are out of the floodplain	3,200	177
530	Flood Protection Based on the number of flood-proofed or elevated pre-FIRM buildings in the floodplain	2,800	66
540	Drainage Systems Maintenance Conduct periodic inspections of all channels and retention basins	330	236
Series 600	Flood Preparedness	1,220	318
610	Flood Warning Program Provide early flood warnings to the public and have a detailed flood response plan keyed to the flood crest predictions	200	99
620	Levee Safety (non-Army Corp of Engineers Levees) Maintain levees not otherwise credited in the flood insurance rating system that provide some flood protection	900	153
630	Dam Safety (All communities in a state with an approved dam safety program receive some credit.)	120	66
All Series (total)		13,315	1,948

Source: FEMA brochure, "The National Flood Insurance Program's Community Rating System" (no date)

The total points available are separated into ten different classes. All communities enrolled in the NFIP begin as a Class 10 community. As actions satisfying the criteria associated with the 18 creditable activities are demonstrated, the community moves into a new class. Class 1 represents the highest possible rating. The credits required to obtain the various classes and the resulting discounts on insurance premiums are summarized in Table 4.3-2.

In addition to the credit points required for a class, there are also prerequisites that communities must meet to achieve Class 7, Class 4, and Class 1. For example, the community must show that it has a minimum Building Code Effectiveness Grading Schedule (BSEGS) classification to achieve a Class 7 or a Class 4. Class 4 and Class 1 have other prerequisites designed to ensure that the community has a balanced and comprehensive floodplain management program. The Washington communities that participate in CRS tend

on the average to achieve higher classes than elsewhere in the nation. This may be due to all of the other environmental requirements in State law and their response to ESA requirements. For example, King County as a Class 3 is the 2nd highest ranking county in the nation, and 20 of the Washington CRS communities are Class 6 or better.

Table 4.3-2. CRS Ratings for Washington State.

Rate Class	Credit Points Required	Insurance Discount Assessed	Number of Washington Communities in Class
1	4,500+	45%	0
2	4,000 – 4,499	40%	0
3	3,500 – 3,999	35%	0
4	3,000 – 3,499	30%	1
5	2,500 – 2,999	25%	4
6	2,000 – 2,499	20%	6
7	1,500 – 1,999	15%	9
8	1,000 – 1,499	10%	5
9	500 – 999	5%	0
10	0 – 499	0%	227 (min. criteria)

Source: FEMA brochure, "The National Flood Insurance Program's Community Rating System (no date)

As a part of its triennial review of the CRS, FEMA has incorporated a number of changes into the 2005 CRS Coordinators Manual to address ESA issues. (Final manual is in press.)

- Addition of the following statement within Activity 110, Purpose and Scope: "The CRS encourages communities to develop and implement locally pertinent programs that exceed the minimum criteria of the National Flood Insurance Program (NFIP). It is the intent of CRS to credit only those activities that are compliant with applicable federal, state, and local laws and regulations, including the Endangered Species Act of 1973. Where this is an issue, it is the responsibility of the community to demonstrate that an activity complies with those laws and regulations."

  FEMA has tried to identify all of the individual activities that could impact on species and modified them accordingly. This statement has been added to allow FEMA the flexibility to withhold credit for any activities that may be identified in the future that are not consistent with ESA.

- Exclusion of parking lots from credit under Activity 420, Open Space. Parking lots had previously been listed as an example of an open space use (no credits are believed to have been provided for parking lots in Washington CRS communities). Additional language has been added so that the objective of this active now is "to prevent development that obstructs floodwaters, exposes insurable buildings to damage, *or adversely impacts on water quality or quantity or other floodplain functions."*

- Addition of a third environmental requirement under Activity 530, Retrofitting for crediting small scale structural flood control projects: "In addition to having all necessary federal and state permits and having undergone an environmental review, the applicant must now demonstrate compliance with Section 7 or 10 of ESA (whichever is appropriate) if the project potentially affects a listed species or critical habitat and was constructed after listing of the species or designation of the habitat.

They can do this by submitting evidence of a completed consultation with NMFS or FWS on the project, if a federal agency was involved, or an incidental take permit or documentation that none was required."

- Modification of the process associated with Activity 540, Drainage System Maintenance. The new process will be as follows:
  - Step 1: Community must define its drainage system based on the criteria in the manual. They do not need to include watercourses where there will be no damage to buildings from small, more frequent floods. Many natural streams will fall into this category.
  - Step 2: Community will identify the parts of its drainage system that will be inspected and maintained. Credits will be prorated based on the percentage of the total drainage system that the community inspects and maintains.
  - Step 3: Communities with portions of the drainage system that are habitat for listed species will have two options, the community can:
    - Accept prorated points and not maintain those areas. (For most communities, this will make no difference in CRS class rank.), or
    - Develop a "fish-friendly" maintenance program that achieves both purposes. King County has been determined to have such a program based on their implementation of the State of Washington road maintenance best practices.
    - If a community chooses to implement the fish-friendly maintenance program, full credit in the targeted activities would be allocated.

Because these additions are included in the 2005 update of the CRS Coordinator's Manual, this PBE considers these modifications a part of the program and analyzes them as such.

4.3.1 CRS Guidelines Potentially Affecting Listed Species

In contrast other elements of the NFIP where much is prescribed by laws, the criteria and rating system included in the CRS are largely discretionary. The activities associated with incentives in the CRS have been developed by FEMA itself based on the advice of the Community Rating System Task Force, which contains representatives from stakeholder groups including State and local government and the insurance industry. In the 1994 Act, Congress made only one stipulation on the CRS: that all activities included in the CRS have some relation to reducing flood damage. Therefore, all criteria included must contribute to a reduction in flood risk for the local community. But these criteria can and do address other issues as well.

Three of the four categories of activities included in the CRS have the potential to affect fish and their habitats. These series include: Series 400, Mapping and Regulation; Series 500, Flood Damage Reduction; and Series 600, Flood Preparedness. See Table 4.3-1 for more information on the actions related to each series. Alterations may be necessary in these series to better address listed salmon and steelhead species.

4.4 NFIP COMMUNITY EXAMPLES IN WASHINGTON

The role of the NFIP in local communities varies throughout Washington depending on the jurisdiction's floodplain setting, the available resources, and the level of development pressure. In general, jurisdictions west of the Cascades, particularly in the Puget Sound region, must account for large rivers and high amounts of precipitation. Generally, these jurisdictions are characterized by adequate resources and technical staff and often face high levels of development pressure. In contrast, eastern Washington jurisdictions are in more arid settings with large areas devoted to agriculture and ranching. These jurisdictions frequently have fewer resources available for technical staff and deal with relatively low levels of development pressure. While a jurisdiction must meet minimum standards to participate in the NFIP, the factors listed above often affect the amount a given community exceeds the minimum standards.

At the state level, FEMA partners with the Washington State Department of Ecology (Ecology) to ensure that NFIP requirements are being met. FEMA provides funding for Ecology staff to assist communities in developing floodplain management ordinances, provide general technical assistance on implementing their floodplain management programs, and conduct Community Assistance Visits (CAVs) to provide technical support for communities and to review administration of the program. Ecology and FEMA may conduct joint CAVs, particularly for the larger, more sophisticated jurisdictions. FEMA has ultimate authority for the NFIP program. Ecology can request that a jurisdiction come into compliance, and if problems continue, then FEMA will be notified. Ecology also reviews the jurisdiction's SMP as there are overlapping concerns between this and the NFIP.

To provide an overview of how the NFIP works in a range of Washington communities, this section describes floodplain management in six example jurisdictions—three located on the western side of the Cascade Mountains and three on the eastern side—and explains the role of the NFIP in each. The location of the six jurisdictions, including both counties and cities, is displayed in Figure 4.4-1.

Population growth, and its associated development pressure, represents a key factor in the role of the NFIP in Washington communities. Generally, with population growth and development pressure comes more intense demands for development in the floodplain. The six example communities vary substantially both in their size and their development pressure. Table 4.4-1 lists the total population of all six cities and the state as a whole since 1970, as well as their population growth rate. The trend of intense development pressure in Western Washington and limited pressure in Eastern Washington (although Kittitas County experienced substantial growth in the 1990s) is well illustrated in the table.

In addition to population growth, the increase in residential units within a community is important. Housing increases illustrate how much new development is occurring in the community. Table 4.4-2 shows the total housing units and housing growth rates in each of the example communities. Total numbers of housing units can provide a general idea of development in the community, but not the floodplain. Communities with very high populations and growth can have almost no floodplain development.

Insert Figure 4.4-1. Location of Example NFIP Communities

Back of Figure 4.4-1. Location of Example NFIP Communities

Together, Table 4.4-1 and Table 4.4-2 serve as the background for the discussion of individual communities below. These data illustrate the range of size and development activity in the various communities. In the following subsections, each community is described, starting with those on the west side of the Cascades.

Table 4.4-1. Population Growth in the Example Communities, 1970 – 2004.

Jurisdiction	Total Growth					Growth Rate (%)			
	1970	1980	1990	2000	2004	1970-1980	1980-1990	1990-2000	2000-2004
Westside									
City of Sumas	722	712	744	978	1,079	-1.4	4.5	31.5	10.3
City of Ocean Shores	800	1,777	2,301	3,836	4,240	122.1	29.5	66.7	10.5
City of Monroe	2,687	2,869	4,278	13,795	15,480				
Clark County	128,454	192,227	283,053	345,238	383,300				
Pierce County	412,344	485,667	586,203	700,818	744,000	17.8	20.7	19.6	6.2
Eastside									
City of Colfax	2,664	2,780	2,713	2,844	2,845	4.4	-2.4	4.8	0.0
City of Waitsburg	953	1,035	990	1,212	1,210				
Walla Walla County	42,176	47,435	48,439	55,180	56,700	12.4	2.1	13.9	2.8
Kittitas County	25,039	24,877	26,725	33,362	35,800	-0.6	7.4	24.8	7.3
State									
Washington	3,567,890	4,132,353	4,866,663	5,894,143	6,167,800	15.8	17.8	21.1	4.6

Source: State of Washington Office of Financial Management (2004); State of Washington Office of Financial Management (2002)

Table 4.4-2. Housing Increases in Example Communities 1970-2004.

Jurisdiction	Total Units					Growth Rate (%)			
	1970	1980	1990	2000	2004	1970-1980	1980-1990	1990-2000	2000-2004
Westside									
City of Sumas	*	*	322	385	404	*	*	19.6	4.9
City of Ocean Shores	*	*	2,101	3,170	3,551	*	*	50.9	12.0
City of Monroe	1,049	1,193	1,712	4,014	4,903	14	43.5	134.5	22
Clark County	42,916	72,806	92,849	134,030	151,951	70	27.5	44	13
Pierce County	133,716	187,443	228,842	277,060	300,117	40.2	22.1	21.1	8.3
Eastside									
City of Colfax	1,089	1,256	1,283	1,357	1,389	15.3	2.1	5.8	2.4
City of Waitsburg	*	*	448	512	529	*	*	14	3
Walla Walla County	14,559	18,138	19,029	21,147	22,011	24.6	4.9	11.1	4.1
Kittitas County	9,127	11,709	13,215	16,475	17,760	28.3	12.9	24.7	7.8
State									
Washington	1,221,931	1,689,478	2,032,337	2,451,075	2,625,293	38.3	20.3	20.6	7.1

*Source: State of Washington Office of Financial Management (2004); State of Washington Office of Financial Management (2005); United States Census Bureau (2003). * Data not available.*

4.4.1 Westside Examples

This subsection describes three Western Washington NFIP communities, with a range of technical resources, population patterns, and floodplain regulations. The communities discussed below include the City of Sumas in northern Whatcom County, the City of Ocean Shores in Grays Harbor County, and Pierce County in the southern Puget Sound area. Tables 4.4-3 and 4.4-4 summarize characteristics of the NFIP program in these communities, including their initial FIRM date, SFHA contract information, and the number of map changes completed since the completion of the community's FIRMs. Contracts represent the number of individual buildings that are covered by flood insurance (there may be multiple policies in a building represented by one contract). SFHA contracts are those that are on buildings in the Special Flood Hazard Area designated on the FIRM. Pre-FIRM insurance contracts are those that cover buildings with construction dates before FEMA issued the initial FIRM for the community. Post-FIRM contracts are those that cover buildings with construction dates after FEMA issued the initial FIRM for the community. Data presented in these summary tables are referenced in the descriptions of each community.

Table 4.4-3. NFIP Summary Statistics for Westside Jurisdictions.

Jurisdiction	Initial FIRM Date	SFHA Contracts. Pre- and Post-FIRM	Construction dates of Buildings with Post-FIRM SFHA Contracts,				
			1975-1984	1985-1994	1995-1999	since 1999	Total
City of Sumas	05/15/85	227	0	29	16	18	63
City of Ocean Shores	3/1/78	61	8	16	13	9	46
City of Monroe	1/12/83	34	1	2	11	9	23
Clark County	8/2/1982	221	7	43	53	35	138
Pierce County	8/29/87	502	0	65	91	38	194

Source: FEMA 2005c.

Table 4.4-4. Total Map Revisions and Amendments for Westside Jurisdictions.

Jurisdiction	CLOMR	LOMR	CLOMR-F	LOMR-F	CLOMA	LOMA
City of Sumas	0	0	0	0	0	1
City of Ocean Shores	0	0	0	0	0	3
City of Monroe	0	0	0	1	0	4
Clark County	0	3	1	7	0	28
Pierce County	0	1	1	3	0	62

Source: FEMA 2005b.

4.4.1.1 Sumas

The City of Sumas is located in northern Whatcom County along the Canadian-U.S. border. Johnson Creek and the Sumas River are the primary flooding concerns for the city. The large majority of the city is located within the floodplains of these two waterways in a generally flat portion of Whatcom County. Of the 237 separate policies within the city, only 5 of these are for structures outside of the 100-year floodplain. The vast majority of contracts are for buildings built prior to the issuance of the City's FIRM. There are only 18 contracts for buildings built in the SFHA after 1999, the year a number of the Puget Sound salmonids were listed under the ESA.

Because of the prominence of floodplains in the area, the City has established a floodplain ordinance that goes well beyond the NFIP minimum eligibility standards. For example, Whatcom County has provided detailed, digital floodplain mapping that Sumas has incorporated into their floodplain program. Sumas has identified "special flood risk zones" based on a risk analysis that includes more accurate flood data, analysis of velocity zones, and current infrastructure conditions. In these zones, no net gain in building footprint is allowed. If a new building is to be constructed on a lot in these zones, an existing building must be removed. Since the completion of its FIRM, FEMA has processed only one LOMA and no other map changes in the City of Sumas. With a Class 7 rank in the CRS, the City's floodplain management program contains a significant amount of sophistication and technical know-how.

Due to Sumas' superior floodplain ordinance, the City also utilizes the information of the NFIP in its CAO. To reduce duplication in policies, the City has chosen to simply incorporate much of its NFIP program into the CAO by reference. Wetlands are afforded protection through the City's SMP. Because most of the city is within the SFHA, the workings of the NFIP have a strong influence on how development can occur in the city. The City's strong floodplain ordinance generally discourages development in the SFHA. The vast majority of structures were constructed pre-FIRM and before the City developed their current strong floodplain ordinance.

In the recent past, Sumas has been facing increasing development pressure from the Bellingham area. To effectively manage floodplain development in the face of this growth, the City has taken a keen interest in floodplain management. The City Administrator for Sumas functions as the NFIP coordinator and frequently takes advantage of FEMA's seminars for jurisdictions participating in the program.

4.4.1.2 Ocean Shores

Ocean Shores is located at the southern end of the Long Beach peninsula in Grays Harbor County in extreme western Washington. Due to the placement of the city on this thin peninsula, coastal flooding in Ocean Shores could potentially occur from the Pacific Ocean to the west or from North Bay to the east. This creates a unique situation for floodplain management. A number of small lakes and inland sloughs are also present on the peninsula, creating concerns about freshwater flooding as well. Although many properties within the

city were once quite close to the ocean and bay, a substantial amount of accretion over the last few decades has increased the amount of space between existing development and the water. Still, beach erosion from high energy storms on the Pacific Ocean side of the peninsula represents a significant concern within the city.

The Ocean Shores floodplain ordinance meets the minimum standards required by FEMA, but no additional steps have been taken to increase the City's CRS rating. Ocean Shores maintains the minimum rating possible for the CRS program. A total of 276 NFIP policies are currently in effect in the community, 203 of which are outside of the SFHA. Many of the remaining policies are within the V zone and subject to wave impacts during coastal flooding. The last CAV indicated that the City was in compliance with NFIP regulations, but existing data on local flood hazards may be out of date. The City has indicated that they may provide FEMA with new information in the future that more accurately depicts the flood hazards in the jurisdiction. FEMA will review a map revision request according to its regulations and scientific criteria. Ocean Shores' program is jointly administered by the City Planning Department and the City Administrator. Since the City's FIRM was adopted, FEMA has only processed three LOMAs and no other map changes.

To complement its NFIP floodplain ordinance, the City maintains a CAO, which they are currently in the process of updating with Grays Harbor County staff. Rather than establishing a separate ordinance, the City has chosen to incorporate the CAO requirements into particular portions of the City's Municipal Code. For riverine floodplains, the Code defers to the Corps' Flood Proofing Regulations (Corps 1995). In cases where the Federal and local regulations conflict, the Federal regulations take precedence (Ocean Shores Municipal Code, Chapter 18.28.010). Tidal floodplain regulations require all structures to be at least 13 feet above mean sea level. Additionally, the City's Municipal Code provides guidance on a number of issues related to development in the floodplain, including anchoring, construction and materials, utilities location, and others. All of these requirements build upon the NFIP minimum eligibility criteria. As a part of their management of critical areas, the City does not mandate particular buffer widths around sensitive areas. Instead, site-specific analyses of necessary buffers are completed with the assistance of Ecology and/or the Corps.

Ocean Shores is somewhat rare in that it currently does not fully plan under GMA. Grays Harbor County is scheduled to begin planning under GMA by the end of 2007. At that time, Ocean Shores will be required to fully participate in growth management. Currently, the City only plans for critical areas and natural resource lands (as described above).

4.4.1.3 City of Monroe

The City of Monroe is located in south-central Snohomish County along the Skykomish River, about 2 miles upstream from the confluence with the Snoqualmie River. Monroe has seen strong growth in the past 10 years with a current population of 15,920. The Skykomish River and contributing tributaries are the main floodplain concerns for the city. Only 23 structures have been constructed within the SFHA since a FIRM was developed; of those 23,

only 9 structures were constructed in the SFHA since 1999 when Puget Sound salmonids were listed under the ESA.

Monroe's floodplain ordinance goes beyond the FEMA minimum standards, and the city has a CRS rating of 6, which shows a relatively high level of regulatory sophistication. The city also maintains a relatively restrictive CAO that addresses buffers for surface waters. For Type 1-3 waters, there is a 200-ft buffer imposed for both sides of the surface water. Provisions in the CAO allow for increased buffers for special circumstances, including the protection of fish listed under the ESA. In addition, the CAO addresses protective buffers for wetlands.

The city last had a CAV in 2001. Forty eight claims have been made to FEMA over the life of the project, with only one repetitive loss claim. Of the total of 70 policies, 35 of these are outside of the SFHA. During the life of the program 25 claims have been paid in Monroe with seven substantial claims

4.4.1.4 Clark County

Clark County is located in south-western Washington along the Columbia River. The County has seen large growth over the past 20 years, mostly centered around the City of Vancouver. A number of smaller communities combined make up the larger Vancouver metropolitan area. Other than around Vancouver and several small communities along the Columbia River, most of the county is rural with predominant agriculture. The eastern third of the county is in U.S. National Forest. The county has seen large increases in population and housing since 1980.

Clark County has a fairly restrictive flood ordinance that is more restrictive than the FEMA minimal standards and has earned the county a CRS rating of 7. The county has a total of 505 policies, of which 278 are outside of the SFHA. There have been a total of 76 claims paid over the life of the project, with just two repetitive loss claims. FEMA has processed one CLOMR-F and seven LOMR-Fs since a FIRM was established in 1982. The county has a total of 221 SFHA contracts, 138 of which were issued since 1970. Thirty-five of these contracts have been issued for construction in the SFHA since 1999. A total of 55 claims have been paid with only 3 substantial claims.

In addition to a more restrictive floodplain ordinance and other floodplain management measures, the county has a restrictive CAO that addresses the protection of surface waters. Type 1 and 2 waters have buffers of 250 ft, and Type 3 waters are assigned 200-ft buffers

4.4.1.5 Pierce County

Pierce County is located in western Washington at the southern end of the rapidly growing Puget Sound region. As illustrated in Table 4.4-1, Pierce County is considerably larger than any of the other jurisdictions under study and has experienced consistent growth over the past 30 years. The primary urban center in Pierce County is the City of Tacoma. Other cities, including Lakewood, Puyallup, Sumner, and University Place, are also in the county. In all,

the County has 998 current policies (unincorporated area only), of which 460 are outside of the designated 100-year floodplain. The program has paid 246 claims for flood-related losses over its life, with 36 of these defined as "substantial losses." FEMA has processed a LOMR, a CLOMR based on fill, three LOMRs based on fill; an insignificant amount of development activity for a 1,800 sq mi county with a population over 700,000.

Generally, Pierce County is quite sophisticated in its floodplain management. The County has a very restrictive floodplain ordinance that includes setbacks for channel migration zones, pothole areas, fast-moving water areas, and for B-zone areas on the FIRMs. Due to the tight regulation of the floodplain and the other floodplain management activities it has undertaken, the County received a CRS rating of Class 5 in its most recent review. Also, it is possible that the County's program could be rated higher in the near future. The County is engaged in a variety of public outreach programs regarding floodplain management and critical areas and receives substantial credit under the CRS for a higher level of regulation, protection of open space along floodplains, and maintenance of stormwater facilities. These additional steps exceed the minimum floodplain criteria. Because of the complexity of the issues and the sophistication of the County's program, the last CAV was completed jointly by FEMA and Ecology.

In addition to its floodplain management program, Pierce County also maintains an extensive CAO. In this ordinance, the County mandates buffers around wetlands and fish and wildlife conservation areas, and establishes specific standards for the management of flood hazard areas, landslide hazard areas, seismic hazard areas, and erosion hazard areas. Required buffer widths near wetlands vary depending on the category of the wetland, as defined by Ecology. Category I wetlands require a buffer of 150 feet, while Category IV wetlands only require a 25-foot buffer (Chapter 18E.30 of the County Code). Similarly, buffers around fish and wildlife conservation areas vary depending on the water type, as defined the Washington Department of Natural Resources. These buffers range from a maximum of 150 feet to a minimum of 35 feet. For both buffer types, buffer widths can be adjusted depending on individual circumstances. The Pierce County CAO also mandates that channel migration zones be regulated as floodways, greatly reducing the development capacity of these areas.

4.4.2 Eastside Examples

On the east side of the Cascade Mountains, three communities were chosen for study: the City of Colfax in Whitman County, Walla Walla County, and Kittitas County. NFIP contract data and map change information are presented in Tables 4.4-5 and 4.4-6. As might be expected with their low levels of development, these eastside jurisdictions maintain a substantially lower number of contracts than those recorded in the westside communities. Generally, fewer map changes have been made in these jurisdictions. As in the previous section, these data will be referenced in the descriptions of individual communities.

Table 4.4-5. NFIP Summary Statistics for Eastside Jurisdictions.

Jurisdiction	Initial FIRM Date	SFHA Contracts. Pre- and Post-FIRM	Construction Dates of Buildings with Post-FIRM SFHA Contracts,				
			1975-1984	1985-1994	1995-1999	since 1999	Total
City of Colfax	8/1/78	0	0	0	0	0	0
Walla Walla County	12/1/83	40	9	1	4	2	15
Kittitas County	5/5/81	219	108	13	58	19	198
City of Waitsburg	11/3/82	46	0	5	3	2	10

Table 4.4-6. Total Map Revisions and Amendments for Eastside Jurisdictions.

Jurisdiction	CLOMR	LOMR	CLOMR-F	LOMR-F	CLOMA	LOMA
City of Colfax	0	0	0	0	0	0
Walla Walla County	0	4	0	0	0	2
Kittitas County	0	0	0	9	2	28
City of Waitsburg	0	1	0	0	0	1

4.4.2.1 Colfax

Colfax is a small town in Whitman County, near the eastern border of Washington. With only approximately 1,300 residents, the City of Colfax is one of the smallest jurisdictions included in this analysis. The largest nearby city is Pullman, Washington. In total, the town maintains only nine NFIP policies, all of which are outside the designated SFHA. This low number of policies stems from the fact that the two sources of potential flooding in the town, the Palouse River and the South Fork Palouse River, have levees on both sides. These levees are credited on the City's FIRM, indicating that they have been certified by the Corps as providing flood protection. These levees greatly reduce the flood risk for the vast majority of the property in the town.

As a result of this reduced risk, Colfax has simply adopted the NFIP model floodplain ordinance and does not participate in the CRS program. Jurisdictions with few resources or with only a small number of policies often do not choose to enter the CRS. No development will occur in the SFHA because of the existing levees. Also, it is unlikely that the City will expand to such a degree that would be a concern in the future. There have been no paid flood losses in the town and no map changes since it joined the NFIP.

Although the City's floodplain ordinance is limited, it does maintain a CAO to protect wetlands and other environmentally sensitive areas. Prior to the construction of any project, wetlands must be identified through a field investigation using either the Corps or Ecology methodology. Buffers required around wetlands will be a maximum of 200 feet (Category I) and a minimum of 25 feet (Category IV). If activities destroy wetlands within Colfax, the

City requires a mitigation ratio of 3:1 for Category I wetlands and 1:1 for Category IV wetlands. The CAO also includes regulations related to the preservation of critical wildlife habitat, and the management of frequently flooded areas, geologically hazardous areas, and aquifer protection areas.

The City of Colfax, like Ocean Shores on the west side, does not currently plan under GMA. Whitman County will be required to plan under GMA by the end of 2007. At that time, Colfax will be required to plan for growth management.

4.4.2.2 City of Waitsburg

The City of Waitsburg is a small community located in Walla Walla County of southeast Washington, northeast of the city of Walla Walla. The city is located along the Touchet River, which flows into the Walla Walla River, which flows into the Columbia River downstream of the Snake River confluence. Waitsburg uses the NFIP and state minimum standards for its floodplain ordinance. The city has a CAO that offers minimal additional protection for surface waters that include buffers of 25 ft from the ordinary high water mark for the Touchet River and 15 ft for the other primary surface water feature, Coppei Creek. The city does not participate in the CRS program. Of the total of 58 current policies 14 of these are outside the SFHA. Twenty-five claims have been paid and seven of these have been for substantial losses.

The city is remote and not experiencing growth pressures. Only 10 new NFIP contracts have been issued since a FIRM was established in 1982, and there have been only two new contracts since 1999. So while the city uses minimal standards for protection of the floodplain, there is little growth in the vicinity. There have been 31 paid losses over the life of the program with no repetitive losses.

4.4.2.3 Walla Walla County

Walla Walla County is a largely agricultural county in eastern Washington that includes the City of Walla Walla, a number of small, unincorporated towns, and portions of the Columbia and Snake Rivers. Located along the southern border of the state, Walla Walla County abuts the State of Oregon. Although the County contains a sizeable number of residents (22,011 in 2004), there are only 97 NFIP policies in existence in the entire county. Of those, 96 are for single-family residences. Fifty-seven of these policies cover properties located outside the 100-year floodplain. In general, development pressure in the county is extremely low and the only city of any size is Walla Walla, which has its own floodplain regulations.

Like the City of Colfax, the County adopted a slightly modified version of the model floodplain ordinance. Important modifications to the ordinance include a more restrictive building code for structures in the SFHA and an allowance for fish habitat improvement structures in the floodplain. Additionally, within the rural residential Mill Creek 5 zoning district, development is limited to areas outside of the floodway and floodplain. Other stipulations in the code come from the NFIP model ordinance. At this time, the County has

not chosen to enter into the CRS. Only four LOMRs and two LOMAs have been processed since a FIRM was finished in 1983.

In addition to its floodplain and SMP regulations, Walla Walla County established a CAO that covers surface waters and wetlands. The CAO regulates uses within and near critical areas by creating "protection zones" around wetlands and other aquatic areas. Protection zones around a critical area may be as large as 100 feet or as small as 25 feet. The County plans to re-evaluate and possibly amend its existing CAO by 2006 to meet the State's best available science requirement. This update could result in a more stringent CAO for the County.

4.4.2.4 Kittitas County

Kittitas County stretches from the Cascade crest into the arid shrub-steppe habitat of eastern Washington and includes the cities of Cle Elum and Ellensburg. Kittitas contains a slightly lower population than Walla Walla County but is characterized by many of the same attributes. Overall, development pressure is relatively low in the county due to the predominance of Federally and State-owned land, ranching, and agriculture. The County's flooding potential originates along the two largest rivers in the county, the Yakima and the Cle Elum Rivers, and their tributaries. Because of the flat topography in many areas, the floodplain ordinance covers a number of areas where shallow flooding occurs with no velocity concerns.

Kittitas County maintains a Flood Damage Prevention Ordinance which draws heavily from the NFIP model ordinance. The ordinance provides guidance on construction materials and methods, utilities location, subdivision of land, and a number of other topics. During the last CAV, suggestions were made by Ecology for the improvement of the floodplain ordinance, which were incorporated by the County. All totaled, 320 policies have been issued in the County. Of these, 102 of these are located outside the 100-year floodplain. Eighty-seven paid losses have occurred since the NFIP program was adopted in the county, with 13 of these paid losses being substantial. Currently, the County does not participate in the CRS program.

Kittitas County has adopted a CAO that also includes protections for wetlands and critical wildlife habitat, which includes streams and riparian zones. The County's CAO establishes buffer width ranges for wetlands and riparian habitat. Wetland buffers are regulated based on the category of wetland. Table 4.4-7 lists the County's buffer requirements.

Buffer ranges are used by the County to take site-specific variation into account. The County uses specific criteria to determine the actual buffer size within the established range (Chapter 17A.04.025). Buffer widths may also be averaged, if certain conditions are demonstrated.

In addition to buffers, the County maintains two other key policies that influence floodplain development. First, a no-net-loss of floodplain storage policy has been established along all shorelines of the state. This greatly influences the type and intensity of development along these waterways.

Table 4.4-7. Kittitas County Wetland Buffer Regulations.

Category	Buffer
Wetlands	
I (any size)	50-200 feet
II (over 2,000 sf)	25-100 feet
III (over 10,000 sf)	20-80 feet
IV (1 acre)	Depends on zoning lot line setbacks, shall not exceed 25 ft
Riparian Habitat	
I	40-200 feet (from OHWM)
II	40-100 feet
III	20-50 feet
IV	10-20 feet
V	None

**Note: OHWM = Ordinary High Water Mark*
Source: Chapter 17A.04.020 (Kittitas County Municipal Code)

Second, the protections allocated to wildlife in the County also include "species of local importance." Utilizing a standardized system for certifying these species, the County maintains a list of important local species. This additional designation supplements State and Federal species protection.

4.4.3 Population and NFIP Policy Growth Summary

The relationship between population growth within communities throughout the state and floodplain development is varied and affected by a number of factors previously discussed. Table 4.4-8 summarizes these statistics for the example communities.

A review of these data indicates that the percentage increase in SFHA contracts are significantly less than the corresponding percentage increases in population and residential housing units. Increases in SFHA contracts within the state (44 percent) have been substantially less than increases in residential housing (114 percent) and population growth (73 percent) between 1975 and 2004. In addition to the state trend, the example NFIP communities provide a view into the variability of NFIP policy growth in different jurisdictions. This may reflect the overlapping result of floodplain ordinances, critical areas ordinances, SMPs, and public perception of floodplain risk throughout the state. It is of particular note that the Cities of Sumas and Ocean Shores have seen substantial growth in population and residential housing units but much lower increases in the number of SFHA contracts despite having much of their jurisdiction within the SFHA.

Kittitas County was the one jurisdiction where the percentage of SFHA contracts grew at a faster rate in proportion to residential housing or population. Half of this increase in post-FIRM policies occurred between 1985 and 1999 (see Table 4.4-5). This may be a reflection of the lower floodplain standards in 1985-1999 compared to the greater floodplain restrictions on building near surface waters as required in their recent CAO—given the relative slow growth in post-FIRM construction since 1999.

Table 4.4-8. Population and NFIP Contract Increases for the Example Communities.

Jurisdiction	Percent Residential Housing Growth 1970-2005*	Percent Population Increase 1970-2004	SFHA Contract Growth 1975-2005	Percent Contract Increase
City of Sumas	26%**	49%	63	27%
City of Ocean Shores	69%**	430%	46	75%
City of Monroe	367%	413%	23	45%
Clark County	254%	198%	138	60%
Pierce County	124%	80%	194	38%
City of Colfax	28%	27%	0	0%
City of Waitsburg	18%**	27%	10	28%
Walla Walla County	51%	34%	9	23%
Kittitas County	95%	43%	108	49%
Washington State	114%	73%	6,189	44%

* Data available in 10-year increments from national census.
** Data only available for 1990-2005.

Growth in SFHA contracts between 1994 and 1999 could also result from better implementation of the mandatory purchase requirement by lenders, as required by the 1999 Reform Act. (Note: Policies could grow even if no new development occurred in the floodplain. As older homes were sold and new financing obtained, lenders could require flood insurance on buildings that had not been previously insured.). Despite the explosive growth in population and housing in the City of Monroe and Clark County there has been a much slower increase in the number of contracts for the SFHA.

5.0 CONSERVATION MEASURES

Conservation Measures are elements that have been developed to minimize or eliminate effects to listed species or their critical habitat. They may either be part of the project action or specifically included to address endangered or threatened species concerns.

The following narrative lists, by subheading, the Conservation Measures that are built into the NFIP or have been added by FEMA.

5.1 EDUCATION AND OUTREACH

Education and outreach can guide participating communities to implement responsible floodplain management and increase awareness of NFIP requirements regarding protection of listed species and critical habitat. FEMA proposes an increase of education and outreach activities to participating communities through the following steps:

- Develop a floodplain bulletin similar to the NFIP Floodplain Management Bulletins that expands upon the requirement of Part 60.3a (2). This bulletin would focus on the processes and resources available to a community for determining compliance with Section 9, ESA. The processes include ESA authorization under Sections 4d, 7, and 10.
- Develop standardized article(s) for publications like "Watermark" that discuss the ESA/NFIP issue (development in floodplains and the potential impacts associated with development, NFIP ordinance requirements for complying with the ESA, etc.) and provide resources for improving understanding and implementation of the program.
- Contact Washington community floodplain administrators by phone, letter, email, or in person with the focus on educating them on the requirements for ESA compliance as it pertains to their ordinance and the minimum NFIP requirements.
- Attend and discuss at regional (such as Northwest Regional Floodplain Managers Association [NORFMA]) and national floodplain conferences (such as Association of State Floodplain Managers [ASFPM]) the responsibilities of all parties for complying with ESA while implementing the minimum requirements of the NFIP.
- Provide education to resource agencies (such as NOAA Fisheries, USFWS, USACE, State agencies) on NFIP and FP management requirements for complying with ESA.

5.2 TRAINING

With an increased emphasis on the protection of listed fish and critical habitat, FEMA can build awareness of these issues with participating communities and key staff by using existing training tools and incorporating resource protection elements into the program guidelines (Chapter 60):

- Incorporate elements of endangered species protection, particularly as it pertains to Part 60.3a2, a4, a6 and LOMC process, into the NFIP training residence course.
- Develop an insert for the NFIP desk reference discussing the Part 60.3a(2) (and other sections) requirement as it pertains to ESA.

- Conduct internal training to FEMA/State staff on the ESA compliance requirements of Part 60.3, including tools for assisting communities.
- Add the topic of endangered species protection to the agenda for one-on-one community training associated with the CAV, as many communities may have other more restrictive regulations that govern it.

5.3 PROCESSES

FEMA internal process elements will be modified to consider the protection of listed species and Critical Habitat. FEMA proposes the following modification to these processes:

- Modify LOMCs to more clearly emphasize the requirements of participating communities to comply with all necessary Federal, State, and local permits, including the ESA. The following actions will be necessary:
    - Amend the MT1 and MT2 forms to specifically ask on the community acknowledgement page whether the requested action complies with Section 9, ESA and to provide sufficient documentation from a qualified source, such as a biological services consultant, in-house environmental personnel, or other sources with ESA experience and knowledge.
    - For actions that have the potential to take, notify the applicants of this potential and provide FEMA guidance on consultation routes available (Section 10, Section 4d, or non-Federal representative under Section 7). The LOMC action shall not be completed and issued by FEMA until receipt of documentation from the applicant demonstrating NOAA Fisheries' approval (in the form of a concurrence letter, Biological Opinion, authorization under 4d, etc).
    - For a LOMC request where FEMA requires additional documentation as mentioned above, FEMA shall provide the community or requester 90 days to provide additional documentation. If the additional data is provided after the 90 days has lapsed, it will be treated as a new submittal and will be subject to all submittal/payment procedures.
- Notify all participating communities in Washington of the compliance requirements and options available under ESA (Section 4d, 7, 10) prior to their issuance of any floodplain permit that has potential to violate Section 9.
    - For those communities who qualify under Section 4d of the ESA for actions requiring floodplain development permits, documentation of approval by NOAA Fisheries shall be maintained in the community file with the floodplain permit.
    - For those communities who desire Section 7 consultation for floodplain development permits that potentially have a take, FEMA will designate them, along with any perspective applicant, as non-Federal representatives for conducting Section 7 consultation. All effect determinations, supporting documentation, and NOAA Fisheries approvals (concurrence letters, Biological Opinions) shall be kept on file by the community.
    - For those communities who pursue an ESA Section 10 permit for floodplain development permits that potentially have a take, copies of the Section 10 permit shall be obtained prior to issuance of the floodplain development permit. Documentation of the Section 10 permit shall be kept on file by the community.

- For those floodplain development permits that result in no take under ESA Section 9, the community shall maintain on file the appropriate documentation to substantiate their determination.

5.4 MONITORING AND ENFORCEMENT

While the above modifications to education, training, and process will provide minimization measures in the implementation of the NFIP, there is a need for continual monitoring and enforcement to ensure that these program elements are meeting their intended goals. FEMA proposes the following steps to ensure that the programs are working:

- Hire an ESA experienced/knowledgeable contractor to provide ESA support to the mapping center. This contractor would assist in the review of ESA compliance documentation provided for map change requests and ensure the appropriate determinations are sufficient for agency ESA compliance.
- Add an element to the checklist for CAV compliance to verify that the community is assuring compliance with ESA in their permitting as part of the minimum floodplain management requirements (44CFR60.3).
- Invite NOAA Fisheries staff to participate in CAVs for reviewing appropriate documentation and identifying the adequacy of the conservation measures.
- Develop a mechanism for tracking and quantitatively monitoring the effectiveness of ESA protection measures through the CAV and LOMC process.
- For a period of 5 years, provide NOAA Fisheries with annual reports on the implementation of the program as it pertains to ESA compliance, along with any recommendations to improve it. The report shall state the number of communities evaluated, the number of permits issued, the number of LOMCs issued, the type of documentation maintained for each, any Conservation Measures implemented, and recommendations for improving the process.

5.5 CHANGES TO CRS

The following narrative outlines a number of existing provisions or recent modifications that FEMA recently initiated for the CRS to emphasize the protection of listed species and Critical Habitat.

- **Introduction. Page 110-6.** This section includes a provision that the CRS credits only those activities that are consistent with Federal, State, and local environmental laws and regulations, including ESA. This requires the participating community to demonstrate its compliance with all environmental regulations, including the ESA, and allows FEMA to withhold CRS credit for noncompliance.

- **Section 420 Open Space. Pages 420-2 through 420-7**. FEMA made a series of changes to make it clear that CRS will not credit paved parking lots as open space. The objective of this activity has also been clarified to include preventing adverse impacts on water quality or quantity or other floodplain functions. A minor exemption is made for parking

areas with pervious services, but only if they are needed to directly support the open space use.

- **Section 530 Flood Protection, Page 530-5**. A specific requirement is added that the community demonstrates compliance with ESA where applicable to get credit for flood protection.

- **Section 540 Drainage System Maintenance, Pages 540-2 through 540-5**. Various language changes are made to make it clear that FEMA will not provide CRS credit for maintenance activities that violate Federal or State environmental laws and regulations, including ESA. It also makes it clear that it is not necessary to have maintenance procedures that clear out all woody debris from natural streams to get the credit.

5.6 RESOURCE NEEDS AND TIMELINE

Table 5.6-1 summarizes the required resources and the estimated timing for implementation of the various proposed Conservation Measures. Some measures can begin immediately because they require little funding and can be integrated with existing processes. Other elements will require additional funding requests and modifications to existing procedures and thus will take longer to implement.

Table 5.6-1. Conservation Measure Resource Summary.

Conservation Measure	Resources Required	Timeline for Starting
Education		
1. Washington Floodplain Bulletin	Development (contractual services) Review (in-house) Publication (GPO) Distribution (Web, Regions, Publications Warehouse)	1 year
2. Standardized Articles • Watermark • ASFPM • Regional FP newsletters	Development (contract spt) Review (in-house) Publication (GPO, in-house) Distribution (Web, email, NFIP)	1 year
3. Technical Assistance Visits	Personnel (Federal/State) Contractors	3 years
4. Conferences • ASFPM • NORFMA • Various Floodplain Management Association	Personnel (Federal/State) Funding for Travel/fees	3 years
5. Other Federal Agencies • NOAA Fisheries • USACE • USFWS • NRCS • HUD	Personnel (Fed/State) Funding for travel	2 years
Training		
1. NFIP Desk Reference insert	Development (contractual services) Review (in-house) Publication (GPO) Distribution (Web, email, mail)	6 months
2. FEMA FP Mgrs.	Personnel (Federal)	2 months
3. CAV/CAC	Personnel (Federal/State) Funding for Travel	2 years
Processes		
1. LOMC Forms	Development (contractual services) Review (in-house) Publication (GPO) Distribution (Web, Pub Warehouse)	6 months
2. LOMC QA/QC	Personnel (contract spt)	6 months
3. Consultation (internal for ESA Sections 4,7,10)	Personnel (FEMA/NOAA Fisheries)	3 months
Monitoring and Enforcement		
1. QA/QC	Personnel (contract spt)	3 months
2. Checklists	Development (contractual services) Publication (GPO) Distribution (Web, Pub Warehouse)	2 years
3. Tracking and Reporting	Personnel (FEMA, contractual services)	1 year
4. Enforcement • Probation • Suspension • Criminal Charges (NOAA Fisheries)	Personnel (Fed)	3 years

6.0 ANALYSIS OF EFFECTS

The following section describes the methods, the assumptions used in the analysis of effects, and some background research on potential environmental effects of the NFIP. The direct, indirect, and cumulative effects of the program are then described, followed by the ESA effect determination according to Section 7 of the ESA.

6.1 METHODS

To assess the potential effects to salmon and steelhead in Washington from implementation of the NFIP, this PBE follows the guidelines outlined by NOAA Fisheries in the following documents:

- Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale (NMFS 1996);

- The Habitat Approach: Implementation of Section 7 of the Endangered Species At for Actions Affecting the Habitat of Pacific Anadromous Salmonids (NMFS 1999); and

- NOAA Fisheries Habitat Conservation Division Programmatic Consultation Guidance (NOAA Fisheries 2003a).

The NFIP is a voluntary program that provides flood insurance coverage and establishes minimum floodplain management requirements for participating communities, but has no direct regulatory authority. Participating communities in Washington are broadly scattered throughout the state. Because of these facts, the analysis approach in this PBE is not specific to any particular region or listed fish species. Rather, the analysis provides a broad-scale, programmatic description of potential effects as they relate to the discretionary aspects of the program and potential effects to listed salmon and steelhead throughout the state.

The analysis approach first reviews the general effects of development in the floodplain to listed fish. The summary of scientific literature on the effects of floodplain actions provides a context for discussing the general effects of floodplain development and resulting effects to terrestrial and aquatic systems and listed fish. The second part of the narrative discusses the relative contribution of the NFIP in Washington on floodplain development.

The overall programmatic evaluation is habitat based. Effects to floodplain, riparian, and aquatic habitat are assumed to have direct and indirect effects to fish that inhabit the local river reach. Where possible, the effects of the program are related to baseline conditions of watersheds to provide a landscape-level context. Because of the divergent habitat conditions of freshwater systems and marine and estuarine systems, the analysis provides examples of impacts for these habitat types.

The known effects of floodplain development are one portion of the analysis. The primary issue, however, is not how development in the floodplain affects fish but rather the degree to which such development is associated with the discretionary actions of the NFIP. Thus, the effects analysis also describes the role of the NFIP, floodplain development, and FEMA discretionary actions.

6.2 ASSUMPTIONS

The following assumptions have been used in developing the analysis of effects for the NFIP in Washington:

- The planning period for the analysis extends over a 20-year period.
- The NFIP is a voluntary program administered by FEMA. Most floodprone communities participate in the NFIP so that their citizens can purchase flood insurance and to qualify for Federal financial assistance in their flood hazard areas.
- Regulation of floodplain development is the responsibility of local government. FEMA establishes minimum floodplain management criteria for participating communities and ensures that they adopt and enforce ordinances that meet these criteria, but has no regulatory authority and no direct role in making land use decisions.
- The analysis assumes a worst-case scenario regarding impacts to floodplains and listed fish species.
- Jurisdictions enrolled in the NFIP comply with all program guidelines.
- Local jurisdictions enforce their Critical Areas Ordinance, as specified under the Growth Management Act (GMA) and the Shoreline Master Program..
- The analysis covers listed fish and proposed or designated Critical Habitat throughout the state and not just within participating communities, in anticipation that other communities may choose to participate in the program at a later date and to reflect effects that may extend beyond jurisdictional boundaries.

6.3 GENERAL EFFECTS OF FLOODPLAIN DEVELOPMENT

Conversion of natural floodplains to man-made landscapes (residential housing, roads, clearing and grading, etc.) significantly alters the processes that support plants, fish, and wildlife. This can cause detrimental changes to spawning, rearing, migration, and refuge habitat in adjacent aquatic systems. Removal of native vegetation alters rates and patterns of erosion along the bank, channel migration patterns, surface and groundwater flow, and nutrient cycling. The loss of riparian habitat can affect a number of ecosystem functions including shade; temperature control; water purification; woody debris recruitment; channel, bank, and beach erosion; sediment delivery; and food supply (Gregory et al. 1991; Waters

1995, Naiman and Bilby 1998; Spence et al. 1996). Other changes resulting from floodplain development may include (Bolton and Shellberg 2001):

- Reduction in amount and complexity of habitat
- Increased scouring of channels
- Reduction or loss of channel migration, vegetation, and sediment supply

Landscape-level changes in floodplain and aquatic system interactions can significantly change natural processes, particularly regarding streamflow. Booth and Reinelt (1993) found that when a watershed reaches approximately 10 percent effective impervious area, significant changes occur in Western Washington streams. Others have noted detrimental effects at impervious surface levels below 10 percent (May et al. 1997).

Such effects are well documented in the literature. The primary issue for this PBE, however is to what extent, if any, does the NFIP encourage floodplain development that would cause potential harm to listed species or critical habitat. .

NOAA Fisheries guidance defines direct effects as:

> *"Direct or immediate effects of the project on the species or its habitat. Direct effects include those resulting from interdependent or interrelated actions…Direct effects include all immediate impacts (adverse and beneficial) from project related actions. According to ESA rules and regulations, direct effects occur at or very close to the time of the action itself. Examples could include construction noise disturbance, loss of habitat, or sediment that results from construction activity."*

FEMA does not authorize any land use decisions, has no regulatory authority regarding land use decisions, and any actions that occur on the County or local level are not directly controlled by the NFIP. Therefore, the potential effects of the NFIP are more appropriately discussed under indirect effects in the following section. There are no direct effects associated with the NFIP.

6.4 INDIRECT EFFECTS

Because the NFIP does not authorize any land use decisions and has no regulatory authority the effects of the program are indirect; there are no direct effects associated with the NFIP. The program may contribute to floodplain development in limited circumstances, but more often it tends to discourage it. It is difficult to discern the NFIP's contribution to this indirect effect among the State and local land use regulatory framework. This section provides an overview of previous research into the effects of the NFIP, followed by an analysis of the effects of NFIP components. The influence of the program on activities within the floodplain is first discussed, followed by likely indirect effects. Each component of the NFIP previously discussed (mapping, minimum criteria, and CRS) is addressed separately.

6.4.1 Overview of Contribution of NFIP to Development in Floodplains

A number of studies indicate that flood insurance availability generally has a negligible effect on the rate of floodplain development because the availability of NFIP insurance is seldom a major consideration in decisions by developers and property owners to purchase property in SFHAs (Chivers and Flores 2001, National Research Council 1990, U.S. General Accounting Office 1982, Kriesel et al. 1999). Comparisons of the development patterns between NFIP communities and development in Coastal Barrier Resource Areas (CBRAs) areas suggests that land development is not significantly inhibited by the unavailability of NFIP insurance (Salvesen 2002, Daniel 2000, U.S. General Accounting Office 1992, Godschalk 1984).

A previously completed comprehensive literature review on the potential developmental and environmental impacts of the NFIP throughout the U.S. (American Institutes for Research 2005) provides a good overview of the NFIP role in floodplain development. The document concludes that the effect of the NFIP on floodplain habitat is mixed, it is difficult to discern whether the NFIP discourages or encourages floodplain development, and most studies that conclude the NFIP has affected floodplain development provide no statistics to support the claim and mistake the effects of general development on habitat with the effects of the NFIP program on development.

Many of the documents reviewed depended on a few case studies or largely anecdotal or impressionistic evidence for their conclusions and typically did not provide any empirical evidence to support conclusions that the NFIP promotes unwise development within the floodplain. In contrast, some well-designed studies indicate that the NFIP, to some extent, encourages floodplain development (Bollens 1990, Burby et al. 1988). Six other studies concluded that the NFIP significantly protected wetlands and coastal areas by impeding development in these critical resource areas (Bollens et al. 1988, Baumann and Emmer 1976). Another 17 studies indicated that the NFIP had no significant development impacts or that impacts were difficult to discern.

Several researchers note that studies that focus on development during the Emergency Program (the early stage of the NFIP) are likely not accurate indicators of the long-term impact under the NFIP once a community adopts a FIRM. Some authors (Burby 2002, Kusler 1982) suggest that construction requirements under the post-FIRM program inhibit development of the floodplain, and that once a community adopts a FIRM all development in SFHAs must meet strict standards and be at or above the BFE. Meeting these standards can impose a cost barrier, particularly in coastal areas (American Institutes for Research 2005).

Several studies reviewed people's perceptions of flood risk to analyze the link between availability of flood insurance and amount of floodplain development. Some studies that assess the public's perceptions about low frequency/high damage events, such as flooding, conclude that many people are unaware of or discount such risks. In conjunction, most people believe their homes will never be flooded and see no reason to purchase flood insurance (KRC Research and Consulting 1995, Bozell, KRC Research and Consulting, and

Westhill Marketing Sciences n.d.). In summary, the literature on perception of floodplain risk indicates several important conclusions (American Institutes of Research 2005):

- Many people put their lives and property in jeopardy because they underestimate the risks to which they are exposed.
- When informed of the risks, many take no action.
- The availability or absence of flood insurance is unlikely to influence decisions about whether flood insurance is desirable or prudent.

In a review of coastal development issues (FEMA 1997) in a Coastal Barrier Resource Area, where flood insurance is prohibited, there appeared to be no lack of development pressure and corresponding construction. This study indicated that in V Zones, real estate is particularly expensive and property owners either felt comfortable with the risk of no flood insurance or purchased more expensive insurance from private insurers such as Lloyds of London. Extensive interviews with local government officials, insurers, loan officials, developers, and realtors reinforced the concept that the lack of NFIP insurance had no effect on development within the coastal zone.

In conjunction with these perceptions, one would assume that if flood insurance availability promotes development, then most people in floodplains would purchase and retain flood insurance. However, most people purchase flood insurance because they are required to do so (Kriesel and Landry 2000). In Washington, for the period of 1974 to 2004, the number of contracts in SFHAs has increased 49 percent while the population has increased 73 percent over the approximately same period (1970 – present). Thus, it appears that development in the floodplain in Washington occurs at a significantly lower proportion than the population rate. Variations in floodplain development among example jurisdictions is discussed later in this document. Table 6.4-1 indicates the growth of SFHA contracts from 1975 to the present.

Table 6.4-1. Number of SFHA Contracts in Washington State from 1975-2005.

Pre-Firm SFHA Contracts	Post-FIRM SFHA Contracts	Number Post-FIRM Contracts with Construction between 1975-1984	Number Post-FIRM Contracts with Construction between 1985-1994	Number Post-FIRM Contracts with Construction between 1995-1999	Number Post-FIRM Contracts with Construction between 1999 - 2005
14,142	6,189	520	2,391	1,780	1,498

The data are provided as available from FEMA sources. Notice that the number of new contracts in the 6-year period ending in 2005 is less than the 4-year period ending in 1999 (also see population statistics in Chapter 4). This is likely the effect of a number of regulatory factors, including increased awareness and management of floodplains, a greater concern for listed fish in Washington state and subsequent strengthening of local CAOs, and regional salmon recovery efforts that recognize the importance of floodplain processes to fish. Of course these are complicated by other outside influences such as state-wide and

county-specific economic factors and population trends. It also should be noted from the discussion in Section 4 that in the example communities approximately half of the NFIP policies in each community are for properties outside of the SFHA.

Policies holders do not always retain their flood insurance. As many as 500,000 flood insurance policies are cancelled or not renewed each year throughout the U.S. Between 2002 and 2004, 1.5 million policies lapsed or were not renewed (American Institutes of Research 2005). Some of this change is likely due to property owners moving, because the property was no longer in a SFHA, or because a building was sold and a new owner purchased a new policy. But some proportion of these policies should have been retained because it is required. In general, however, these data suggest that the availability of flood insurance is not a primary cause of development in floodplains and is only one of several influences (American Institutes of Research 2005).

Environmental effects associated with the NFIP that are inferred by some studies are more precisely attributed to general development impacts and are not the result of well-designed studies (American Institutes of Research 2005). The following sections provide an analysis of the effects NFIP components on development and any corresponding effects to salmon and steelhead.

6.4.2 Mapping Program

The mapping component represents a key piece of the NFIP. FEMA, by statute, is obligated to map the nation's floodplains. Once FEMA issues a flood hazard map for a community, the community has one year to adopt floodplain management regulations and join the NFIP or else it becomes a sanctioned community. Federal agencies cannot provide financial assistance for acquisition and construction purposes in the designated flood hazard areas of a sanctioned community. For communities that are already participating in the NFIP, issuance of a map triggers the requirement that a community adopt or amend its floodplain management ordinance to incorporate the new data. For the overall mapping program, FEMA has only limited discretion. FEMA is directed by statute to map floodplains throughout the nation (subject to the availability of funding) and the maps must be technically and scientifically correct. The statute also lays out detailed appeals processes that FEMA must adhere to when issuing flood studies and maps. However, there are several sub-parts of the mapping program where FEMA does exercise discretion that could indirectly affect listed species. Each of these elements and their potential impact on salmonids is discussed below.

6.4.2.1 Level of Study Performed During the FIS

One important issue in the mapping process (preparation of the FIRM) is the level of analysis undertaken during the initial mapping exercise. In general, the level of analysis within the state's floodplains varies from community to community. Some communities, if they are deemed to have limited existing development and little development pressure in the floodplain, are characterized using only approximate methods. For other communities which have floodplain development and development pressure, more extensive analyses are

undertaken, including defining flood depths, developing detailed flood elevations, and designating a regulatory floodway, among other actions. As noted in Chapter 4, additional specificity in analysis prompts additional, more stringent regulations on development. There is general guidance on scoping studies in Guidelines and Specifications for Flood Hazard Mapping Partners and a general understanding of what areas need to be studied by FEMA staff. However, there are often funding constraints that drive mapping decisions. There are areas that cannot be mapped to level of detail that is appropriate because sufficient funds are not available. As a result, more limited analysis of the floodplain may actually allow development where it would otherwise be prohibited or significantly constrained (i.e., when a regulatory floodway has been designated). With only limited analysis, development may be sited closer to the waterway, potentially indirectly affecting salmon habitat by reducing riparian habitat and increasing localized erosion and runoff. Limited analysis may also work conversely by preventing development on land that would otherwise have been outside the floodplain on a more detailed map.

Although the level of analysis may influence how much the floodplain is developed for an NFIP community, local regulations, such as a community's CAO, specifically determine where development may be sited and identify floodplain and riparian areas designated for protection. All new development within the floodplain must adhere to these local requirements prior to receiving flood insurance through the NFIP. FEMA has no involvement in land use decisions other than establishing minimum NFIP requirements and assuring that they are adopted and enforced by communities. Consequently, variation in the requirements of the CAO exerts a more substantial influence on the location of development within the floodplain than the level of analysis performed.

The level of analysis performed in communities such as Ocean Shores, with its limited CAO that incorporates Federal requirements and mandates buffers through a site-by-site analysis, and Colfax, which simply adopted FEMA's minimum floodplain ordinance, may have slightly greater effects from floodplain development than in more technically sophisticated jurisdictions such as Pierce County, with its extensive regulation of floodplain development and mandatory buffers. In these smaller jurisdictions, salmon habitat and related conditions may be indirectly adversely affected by the type of analysis performed and the corresponding less stringent development standards.

6.4.2.2 One Percent Annual Chance Flood

Although FEMA determines that through Congressional mandates the utilization of the 1% chance flood is non-discretionary, it is recognized to have potential to affect salmonid habitat. The 1% annual chance flood, represents a fundamental measure used in the mapping of a community's floodplain. The A-zone designated on all FIRMs throughout the state, regardless of location, is delineated by the 1% annual chance flood. Structures located beyond this elevation are not required to maintain flood insurance or meet the minimum floodplain criteria established in the NFIP regulations. As a result, new development frequently clusters just outside of the SFHA (ASFM 2004). This clustering of new development could, in some locations, indirectly adversely impact salmonids. The magnitude of the impact resulting from development depends on site-specific topographic

and hydrologic characteristics. In cases where the 1% annual chance flood boundary is close to a waterway, clusters of development and the associated infrastructure to support it could reduce floodplain habitat and increase localized erosion and runoff. On the other hand, implementation of this minimum standard has reduced development within the SFHA zone. As discussed in the previous section, a number of studies indicate that the NFIP contributes to floodplain preservation through the SFHA parameter.

It should be noted that the clustering of development just beyond the regulated scope of the NFIP would likely occur regardless of the specific standard utilized. Designation of a more appropriate elevation standard for the NFIP would need to be based upon its role in flood risk management. Over time, the 1% Flood has been evaluated to determine its appropriateness in floodplain management and continues to be the chosen standard, although some question its suitability given recent meteorological trends (ASFM 2004).

In general, the location of development in a community will largely be determined by its CAO regulations. In those communities where FEMA's floodplain designations are the basis for much public policy (usually smaller jurisdictions with limited resources and reduced development pressure), the influence of the 1% Flood boundary on development may be more significant. Jurisdictions like Kittitas, Colfax**,** and Ocean Shores would be placed in this category. In areas with more progressive floodplain management policies, such as Pierce County and the City of Sumas, the NFIP is overshadowed by the local CAO. Even in less sophisticated jurisdictions, such as Kittitas County, development in the SFHA is substantially less than the proportional growth of housing in the county (Table 4.4-8). Thus, even with the minimum floodplain protection of the NFIP requirements, it appears that rapidly growing areas successfully limit floodplain development.

6.4.2.3 Map Changes

Some aspects of map changes have the potential to affect listed fish, others do not. The LOMA process simply amends a current FEMA map by providing a greater level of detail and accuracy than the current SFHA. There has been no physical change in the floodplain and no fill has been placed. Thus the LOMA process has no effect to list fish or critical habitat.

When a structure has been raised using fill (known as a LOMR-F) or when other flood management techniques have been employed, FEMA reviews the supporting data and removes the property (or properties) from the FIRM if specific criteria are met. As illustrated in Table 4.1-2, LOMAs and LOMR-Fs are the two most common map changes approved by FEMA. As would be expected, LOMAs have been by far the most common map modifications of FEMA's floodplain maps, with over 1,900 amendments. LOMR-Fs represent the second-most common map change in Washington, with a total of 158 since 1974 (54 percent of LOMRs). This equates to an average of only 5.3 Letter of Map Revisions Based on Fill per year, an insignificant number based on the amount of development occurring throughout the state (also see discussion in Chapter 4).

Due to the different type of modifications they address, the effect of LOMAs and LOMRs on salmonid species varies. As a process focused on natural alterations within the floodplain, the approval of LOMAs does not affect salmonid species. These map changes simply function to ensure that established FIRMs sufficiently represent the actual boundaries of the 1% chance flood. FEMA's approval of LOMRs, specifically those involving fill (LOMR-F and some LOMRs), may indirectly affect salmonid species by creating an indirect incentive for development, although statistically this is not shown to be the case.

When a property is removed, the owner is no longer required by FEMA to maintain flood insurance. Evatt (1999) estimated flood insurance premiums for residential structures in riverine locations to range from approximately $1,000 to $4,700 per year (based on Federal Insurance Administration data). When calculated over the 30-year life of a loan, the cost of flood insurance can be substantial, ranging from $30,000 to $141,000 (using Evatt's estimates). Therefore, through the LOMR-F process, the filling of properties and the development atop it may be indirectly encouraged. However, the LOMR-F process requires an administrative fee and other indirect costs that could exceed thousands of dollars, thereby negating some of the potential cost savings. This minor indirect incentive for floodplain development created by the LOMR-F process may deleteriously affects salmonids and their habitat. New development resulting from LOMR-Fs may modify the floodplain by removing riparian vegetation and increasing impervious surfaces (due to the development itself and the infrastructure to support it). FEMA does, however, require that all map changes meet the requirements of local, State, and Federal permits, including those of the ESA. In addition, FEMA does not regulate local land use; this is conducted by the local jurisdiction.

In the six example jurisdictions examined, larger jurisdictions, such as Pierce and Kittitas Counties, were most likely to have requests for LOMR-Fs. This may be due to their larger floodplain areas and development pressures. Kittitas County recorded a total of 9 LOMR-Fs since its initial participating in the NFIP, while Pierce County recorded three. None of the cities investigated had utilized the LOMR-F to update their maps since adopting their FIRMs. As statistically demonstrated, the impacts of LOMR-F's in the representative communities are negligible. Implementation of the conservation measures will further minimize or avoid any potential effects LOMR-F's may have on listed species or their habitat.

For LOMR's that reflect existing conditions based upon better data, FEMA's approval is a discretionary administrative process for implementing a non-discretionary requirement under the National Flood Insurance Act of 1968. The revisions of the maps based upon best available data will result in shrinking or expanding the floodplain, thereby resulting in potential indirect or cumulative adverse or beneficial effects. For LOMRs and CLOMRs reflecting natural made changes in the floodplain (i.e., channel meandering, erosion) or the use of better data (i.e., topography, modeling, etc) the effect is considered beyond the discretionary control of FEMA and is, therefore, not subject to consultation.

For LOMR's that involve man made changes, the modification of the floodplain and the subsequent indirect adverse or beneficial effect would have occurred without FEMA's involvement. The non-discretionary requirement of the NFIP Act requires FEMA to modify the map. However, any development within the floodplain would require compliance with

Section 9 as part of the floodplain permitting requirement at the local level. FEMA will not issue a LOMR until the applicant demonstrates compliance with Section 9, ESA. Implementation of the conservation measures will ensure minimization of impacts and any potential effects will be addressed either through Section 4d, 7 or 10, of the ESA prior to issuance of the LOMR.

For CLOMRs and CLOMR-Fs that involve man made changes and floodway revisions, the potential for indirect adverse or beneficial effects exists. The removal of the floodplain may allow additional development, which has the potential to indirectly impact riparian areas and species. It also may increase the floodplain which will add additional protections and provide a potential beneficial effect. Changes in the floodway boundary, although not tied to a geographic feature, does have the potential to indirectly allow development to occur within the riparian zone or prohibit it. This has the potential to indirectly adversely affect or beneficially affect species and habitat. FEMA will not issue a CLOMR until the applicant demonstrates compliance with Section 9, ESA. All effects will be addressed either through Section 4d, 7 or 10, of the ESA prior to issuance of the CLOMR.

To place this in perspective, there have been only 32 LOMR-Fs and 6 CLOMR-Fs in the entire state of Washington since 1999, when most ESUs were listed. Thus, the amount of review required by FEMA on an annual basis would be minimal and would be accounted for in the Conservation Measures that improve this review process.

6.4.2.4 Map Modernization Project

The Map Modernization Project is a third discretionary element of the NFIP mapping component that could affect listed salmonids. This project provides sufficient funding to update the nation's flood map inventory through a number of activities, including converting existing maps to digital format, conducting flood data updates in communities with inadequate floodplain mapping, and making maps easier to obtain and use (see Chapter 4). Existing maps in 257 communities in the State of Washington will be converted to a digital format, and 27 communities will have their floodplain data updated to more accurately depict flood risk.

Improving accuracy of floodplain maps in these 27 communities will allow the communities to more effectively manage their floodplains. With these improved data, the communities will be able to more effectively steer development away from current hazard areas and/or ensure adequate flood-proofing of structures in high risk locations. These updated maps may also increase the awareness of flood risk in these communities and potentially motivate the jurisdictions to adopt more stringent floodplain management regulations. Similarly, the availability of electronic versions of exiting floodplain maps could raise awareness in the 257 communities targeted within the project.

Generally, the activities included in the Map Modernization Project should result in indirect beneficial effects on salmonids and their habitat. Acceleration of mapping changes, increased awareness of flood risk and more accurate maps will enable more informed decisions within local jurisdictions. More informed decisions should result in the reduction of floodplain

development and, consequently, the preservation of riparian and floodplain habitat near salmon-bearing waterways. Less development and more riparian habitat should beneficially affect all of the habitat pathways included in Appendix F.

6.4.3 Minimum Floodplain Criteria

In addition to the mapping requirements of the NFIP, the minimum floodplain criteria represent a second key discretionary component of the program. As described in Section 4.2, these minimum criteria establish the baseline elements that must be incorporated into all community floodplain ordinances to participate in the NFIP. Consequently, these criteria are a critical component of the NFIP program and have far reaching consequences for local jurisdictions and their floodplain management program. A number of specific criteria were identified as potentially affecting listed salmonid species in Section 4.2.1 (a table including the full list of criteria is also provided in Appendix E).

This section reviews those criteria to determine which of them may affect listed salmonids. These are only minimum criteria, and many jurisdictions far surpass them in their floodplain ordinances and related policies. As stated in 44 CFR §§ 60.1 (d), "any floodplain regulations adopted by a State or community which are more restrictive than the criteria set forth…are encouraged and take precedence." Therefore, any additional steps by local jurisdictions override any FEMA minimum criteria, whether the community participates in the CRS program or not. Nevertheless, this analysis focuses specifically on the effects of minimum criteria implementation because many jurisdictions simply adopt the NFIP minimum criteria in their floodplain management ordinances (see discussion of communities in Section 4.4 for examples).

6.4.3.1 Floodplain Management Ordinance Requirement, General

One of the primary underpinnings of the NFIP is the requirement that local jurisdictions adopt a floodplain management ordinance to participate in the program. By requiring that the minimum criteria discussed in the remainder of this subsection be met, additional standards for development are established. Development within the floodplain therefore must adhere to additional regulations above and beyond the standard local development requirements. With these added regulations come additional processes and costs that must be absorbed by the developer (or the prospective homeowner). As a result, the additional regulations may create a hindrance to new floodplain development. When a jurisdiction contains equally developable and desirable land within and outside of the floodplain, Burby and French (1981) determined the additional costs of development associated with meeting the floodplain management criteria hindered development in riverine floodplains. At the same time, the study found that other factors, including site amenities and the amount of existing floodplain development, also influenced the effectiveness of floodplain management regulations. Other studies have similarly concluded that the presence of floodplain management regulations reduces the amount of development in the riverine floodplains (Burby et al. 1988; IFMRC 1994). Development regulations for coastal floodplains have been less effective in reducing the amount of development, with the numerous amenities

associated with the coast often counterbalancing the additional costs of development (Miller 1990).

In general, the requirement to establish a floodplain management ordinance as a part of the NFIP most likely serves as a deterrent (varying in strength, based on site-specific characteristics) to floodplain development. This reduction in development can be inferred from the housing and Post-FIRM SFHA contract data included in Section 4.4. In all of the example communities, the number of Post-FIRM contracts represents a small portion of the total development in the area. This dampening of development within the floodplain thus creates an indirect beneficial effect on salmonid species by preserving riparian and floodplain habitat.

Because of the interrelationship between the NFIP and local land use regulations, it is difficult to discern patterns of land use directly related to the NFIP. That said, there are some trends that appear to be related to the NFIP implementation:

- Development in the SFHA has been reduced after the FIRM becomes effective.
- The rate of development in the SFHA has been significantly less than the population growth rate for the state and counties.
- Due to requirements under GMA, land use trends appear to be more strongly tied to CAO regulations of local jurisdictions than to the NFIP.

From the data presented in Chapter 4, there appears to be a relationship between the level of development pressure, the sophistication and available resources of the local jurisdiction, and the amount of development within the SFHA. While development pressure is high in counties of the Puget Sound, these jurisdictions have the most stringent floodplain regulations including protections for the channel migration zone, for instance. These jurisdictions also have sophisticated assessment tools and robust staff to assist in the management of floodplains. Thus, there is minimal development in the SFHA. Jurisdictions with few resources and little development pressure are on the other end of the scale. While they may have regulations that follow the NFIP minimum requirements, there is no pressure to develop in the SFHA and little development occurs. Walla Walla County is such an example.

Other jurisdictions that have moderate resources and minimum or moderate level of floodplain regulations and moderate or growing development pressure may experience some development in the SFHA. From the historical statistics provided earlier, Kittitas County appears to be in this middle category. Table 6.4-2 summaries this relationship among development pressure, level of floodplain regulation, and ensuing development in the SFHA. It also should be noted that those jurisdictions dealing with the most rapid growth (Puget Sound area) are also the ones with the most sophisticated and restrictive CAOs, which go well beyond the NFIP minimum standards. In these jurisdictions, the greater restrictions of the CAO are the dominant force regarding floodplain land use, not the NFIP minimum requirements.

Table 6.4-2. Relationship Among Regulatory Standards, Development Pressure, and Potential Floodplain Effects in Washington State.

Sophistication and Available Resources of Jurisdiction	Development Pressure in Jurisdiction		
	High	Medium	Low
High	No effects. Higher regulatory standards overshadow NFIP requirements.	No effect	No effect
Medium	Possible minor adverse effects. Depending on jurisdiction, local CAO may not adequately address long-term effects of floodplain development.	Possible adverse effects. Depending on jurisdiction, local CAO may not adequately address long-term effects of floodplain development.	No effect
Low	Possible adverse effects due to high development pressure and low regulatory standard. This condition is not present in Washington State because of CAO requirements and stricter regulations in counties and cities with high development pressure.	Possible adverse effects as described above.	Negligible adverse effects.

Washington State requires measures that are more restrictive than some NFIP guidelines. For instance, the NFIP allows some new structures in the floodway (the modeled major flood conveyance area – see Section 4) only if stringent hydraulic tests are met. In contrast, Washington State allows no new construction in the floodway under any circumstances. In addition, many jurisdictions enforce a zero-rise standard for the floodway rather than the NFIP one foot-rise.

6.4.3.2 Federal and State Permit Provision

According to 44 CFR §§ 60.3(a)(2), prior to the allocation of flood insurance for a project, the local jurisdiction approving the development must ensure that all applicable State and Federal permits have been received. Specifically, this requirement ensures that the proposed development meets the requirements of Federal and State policies listed in Chapter 3.

As such, the development must be shown to meet the standards of the Endangered Species Act and National Environmental Policy Act (if applicable), the Growth Management Act, any pertinent Salmon Recovery Plans, and the local Critical Areas Ordinance and Shoreline Master Programs. Collectively, these policies ensure that site-specific considerations will be made for new developments prior to the provision of flood insurance. Enforcement of this provision is the sole responsibility of the local jurisdiction participating in the program. The Conservation Measures regarding the formal education and training process for participating communities and FEMA staff, and the stipulations for more rigorous review will ensure that the endangered species review process is fulfilled. Requiring the review of proposals for the

receipt of all Federal, State, and local permits creates an indirect benefit for listed salmonids by ensuring that appropriate measures will be taken to reduce impacts on fish and their habitat.

6.4.3.3 Planning Considerations

Overlapping with the requirement for State and local permitting processes, the NFIP minimum criteria specify a number of planning considerations that FEMA recommends. In general, these criteria recommend that local jurisdictions, when creating their floodplain management policies and regulations, ensure that all specifications are consistent with State and local requirements. In this, the NFIP regulations give deference to established policies. Similarly, 44 CFR §§ 60.22(b) sets out a number of community goals that should be considered after a flood disaster. Among these are the preservation of open space, relocation of existing residents, and acquisition of frequently flood-damaged structures. At the least, these suggestions raise awareness of potential options for reducing future flood damage. Unfortunately, the political feasibility of some of these actions most likely precludes their implementation following a disaster. Regardless, collectively, these planning considerations promote coordination between different policies and regulations while also encouraging deliberation on alternative strategies for reducing future flood damage, which could benefit listed salmonids. Overall, these stipulations result in a minor, indirect benefit to salmonids.

6.4.3.4 Cumulative Rise Analysis Provision

CFR 60.3 (c) (10), which addresses communities that have elevation data but no regulatory floodway, requires that:

> until a regulatory floodway is designated, that no new construction, substantial improvement or other development (including fill) shall be permitted within Zones A1- and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase water surface elevation of the base flood more than one foot at any point within the community.

This provision basically applies the same one foot rise standard to development as designating a floodway. The influence of this provision on potential development is mixed. First, the provision may prohibit new development that would occur within the floodplain prior to the designation of a regulatory floodway. In this situation, analysis by the developer or local jurisdiction would be required to determine the impact of the proposed development on the water surface elevation. Undertaking this analysis would add a substantial cost to the proposed development and, consequently, discourage some proposed development. This provision requires that a hydrologic analysis be conducted for a specific development proposal to show that there would be no increase in the base flood elevation. This stringent requirement restricts development in the vast majority of cases but does allow a negligible amount of building that can meet the standard:

- For some development this will be an additionally regulatory hurdle and expense and they may decide to move back out of the floodplain.

- For other development, the development would be pushed back away from the river in order to keep the increase limited to 1 foot (the same as would happen if a floodway were designated).
- Some development closer to the stream could still occur, but it would be minor development that could take place without increasing flood stages (e.g. agricultural uses, some minor fills behind existing obstructions, backyards uses, etc.). This development usually does not involve buildings and FEMA has limited authority to regulate it.

Thus, there is an overall beneficial effect from restriction of development with a negligible adverse effect for those rare occasions where a building can meet this restrictive standard. Few jurisdictions have applicable floodplain zones that fall under this provision. And those communities facing the greatest development pressures, coupled with floodplain management concerns, have mapped their floodway. Even some smaller communities, such as Sumas, have sophisticated floodplain data on lands within their jurisdiction. Thus, any adverse, indirect effect to salmonids from this provision is negligible.

6.4.3.5 Regulatory Floodway Standards

Once a regulatory floodway has been designated, 44 CFR §§60.3(d)(3) and 60.3(d)(4) establishes a set of requirements related to development within the floodway. As per provision 60.3(d)(2), the regulatory floodway must be wide enough to transport waters of the base flood without increasing the surface water elevation by more than 1 foot at any point. Therefore, the floodway generally encompasses the waterway itself and large portions of the adjacent floodplain. Within the floodway, 60.3(d)(3) prohibits encroachment, including fill, new construction, and substantial improvements, within the regulatory floodway, unless it can be illustrated that flood levels would not be increased. New construction must be able to show that there will be no rise in water level in the modeled floodway. This could occur if a structure were built in the downstream hydraulic shadow of some feature or if compensatory measures were used to increase the capacity of the floodway elsewhere. However, Washington State regulations allow no new structures in the floodway under any circumstances so this does not occur in any ESU.

In limited situations encroachments can take place within the floodway that will increase flood stages under the procedure at 44 CFR 65.12. This provision is used mainly for public uses such as bridge crossings, dams and other water control structures, but it could be result in some additional floodplain development that could not otherwise occur under NFIP floodway requirements. The community must obtain a conditional FIRM and floodway revision prior to permitting the project and meet a series of additional requirements (for example all property owners have to agree and no insurable buildings can be impacted by the increased flooding).

Thus, FEMA can approve or deny a change to the boundary, based on provisions in 44 CFR §§ 65.12, in order to allow for additional development. In general, floodway provisions will substantially limit the development within the regulatory floodway, including highly valuable coastline and riparian areas. Consequently, development in areas potentially affecting

salmonids (i.e., very close to the waterway) is significantly limited. This floodway restriction reinforces or complements local setback requirements and other requirements such as CAOs. Thus, the floodway standards provide an indirect benefit for listed salmonids.

While the vast majority of floodway development is restricted, a negligible amount of development that can meet the floodway standard could be allowed. The overriding effect of this provision is beneficial because it restricts development.

6.4.3.6 Building Performance Standards

In addition to the requirements on development within the floodplain, the NFIP minimum criteria establish specific standards related to the type and elevation of new development. As a part of 44 CFR §§ 60.3(a)(3), all proposed building sites should be evaluated to ensure that the development is "reasonably safe from flooding." As such, NFIP provisions mandate that all new residential construction and substantial improvements must "have the lowest floor (including basement) elevated to or above the base flood level," unless the project is granted an exception (60.3(c)(3)). Additionally, all new non-residential construction must have the lowest floor elevated or be designed so the all areas below BFE are "watertight with walls substantially impermeable to the passage of water" (60.3(c)(3)). The minimum floodplain management criteria also mandate that all sanitary sewer systems must be "designed to minimize or eliminate infiltration of floodwaters into the systems and discharges form the systems into flood waters" (60.3(a)(6)). With all sewer systems meeting this requirement, contamination of the waterway during a flooding event will be minimized and water quality will be maintained. This, consequently, produces a beneficial indirect effect on salmonids species.

Other components address structural/engineering aspects of buildings. It is the initial decision to allow a building in a floodplain that may have an effect on fish habitat, not the specific engineering components of a structure. Thus, there are no adverse indirect effects associated with the building standards.

6.4.4 Community Rating System

Generally, the CRS component of the NFIP is designed to create an incentive for local jurisdictions to exceed the minimum criteria in their floodplain management ordinance and related policies. To that end, the rating system reduces insurance premiums in communities that score well (see Section 4.3 for more information). This rating system provides points for a wide range of activities, including open space preservation, acquisition and relocation, higher, and floodplain management planning, among others. This is an entirely voluntary program, and only 10 percent of the participating communities in Washington take part. Puget Sound communities account for 45% of those participating (see Appendix H). Obtaining full points within the system is impossible due to the numerous mutually exclusive criteria, and the average number of credits received in most categories is substantially lower than the maximum available (see Table 4.3-1). Receiving a high score is also difficult, with the highest scoring jurisdiction in Washington receiving a rating of 3 (see Section 4.3). Of 1,000 communities in the nation, only three are Class 4 or better. Nevertheless, most of the

credits granted within the CRS are beneficial for salmonids and their habitat, as illustrated below. All available credits within the CRS were analyzed to identify their impact on listed salmonids. Those determined to affect listed species are discussed individually below.

6.4.4.1 Open Space Preservation (420)

Within the CRS, Credit 420, Open Space Preservation, provides local jurisdictions with up to 900 points for guaranteeing that "currently vacant parcels" within the floodplain will be kept free from development. Local jurisdictions receiving credits under this CRS category retain more open space and thus reduce the amount of floodplain area available for development. The largest point totals in this category (725 points) are allocated for land that is maintained through public ownership, private reserve, or through regulation" (FEMA 2002). An addition 100 points may be received if parcels are restored to a natural state or state that supports natural and beneficial functions.

The old version of the CRS included parking lots in the category of "open space" because they do not impede flood flow. FEMA has recognized the potential to create an incentive to pave areas and has removed parking lots from the open space category.

Encouraging the preservation of open space through these credits is beneficial for listed salmonids in a number of ways: (1) the preservation of riparian and floodplain habitat, improving habitat access and watershed conditions; (2) the preservation of native vegetation, depending on the site's location and habitat makeup; (3) the reduction or slowing of runoff created in nearby urban areas; and (4) supporting the continued availability of LWM along the waterway.

6.4.4.2 Higher Regulatory Standards (430)

In addition to providing credits for open space preservation, the CRS also provides up to 1,750 points to jurisdictions that adopt higher flood management regulatory standards. These stricter standards could include regulations related to the siting of development, prohibiting filling properties for development, the establishment of low-density zoning adjacent to the waterway, and others. Up to 100 points may also be allocated for the preservation of "natural and beneficial functions" near the waterway. Due to their sometimes duplicative nature with other requirements, the average points received for this credit are very low (only 159) compared to the total possible. These standards are prorated based on the affected area, which keeps the acquired points low. For example, if half of a community's floodplain is open space it receives no other higher regulatory standard credit for those areas since no development can occur here. Likewise some of the 1,750 points are for activities such as coastal AE zones that apply only to small numbers of communities. Overall, the elements within this credit will beneficially affect salmonids by decreasing the amount of and intensity of development in the waterway, preserving riparian habitat, and improving watershed conditions by limiting roads and other structures on adjacent land.

6.4.4.3 Stormwater Management (450)

To receive credit in the Stormwater Management category, local jurisdictions must implement plans and programs to reduce the overall stormwater runoff in floodplain development. As such, one of the elements provides up to 450 points for effective stormwater management and planning. Additionally, the jurisdiction must ensure that post-development runoff is no worse than the pre-development stormwater measurements. These criteria beneficially affect listed salmonids by reducing the amount of sediment and potentially toxic runoff deposited into the waterway, improving water quality and habitat access. Most communities in Washington receive CRS credit for this provision.

6.4.4.4 Floodplain Management Planning (510)

Similar to the Stormwater Management credit, the Floodplain Management Planning credit assigns points for the adoption of a floodplain management plan by the local jurisdiction. This floodplain management plan may reduce the amount of floodplain development within a community through more effective natural resource planning. Credits are available to jurisdictions that include a natural resource planning component in their flood management plan. Of course, the preparation of a floodplain management plan does not necessarily reduce the amount of floodplain development allowed within a community. A floodplain management plan stressing floodproofing and reducing flood risk through other means may not have a significant effect on listed species. In general, though, any additional floodplain management planning approved for CRS credit would be expected to better accommodate and protect listed species. As with any plan, the plan needs to be implemented in order to have any effect.

6.4.4.5 Acquisition and Relocation (520)

Credits can also be received through the CRS if local jurisdictions acquire and/or relocate existing buildings within the floodplain. A maximum of 3,200 points (the highest available for any action) are available for these activities. Acquisition and relocation of existing buildings could potentially decrease the total amount of floodplain development within a community. On average, local jurisdictions receive only 177 of the maximum points available in this category. Funding constraints, willing sellers, and political factors contribute to this low point total. Local jurisdictions most likely utilize this strategy only for frequently flooded properties. In general, the reduction of structures within the floodplain through acquisition and relocation would have a beneficial effect on listed salmon by increasing riparian and floodplain habitat. To date approximately 400 structures have been removed in Washington under this provision. Nationwide, the figure is about 28,000.

6.4.4.6 Flood Protection (530)

CRS provides up to 1,000 points for structural flood control projects that protect existing floodprone structures. Very few communities have received points under this activity. Only one community, the city of Burlington, has received credit within Washington State. Credits are prorated based on the level of protection provided and the number of buildings protected

as a percentage of floodprone buildings in the community. Projects that remove land from the floodplain are not credited under this activity.

Currently, flood control structures must meet the following environmental requirements:

- All required permits must have been issued for the project or the local permit officer must state in writing that the project complies with all Federal, State, and local codes and regulations.
- The project must meet minimum environmental protection criteria. If the project is constructed since January 1, 1990 they must show that all state and federal permits were obtained (including Section 404). The presumption is that if this is done an environmental review will have been conducted. If the project was completed prior to 1990, the community must demonstrate that the project would be approved if it went through environmental review.

A third requirement will be added as follows:

> If a project was constructed on or after listing of a species under the Endangered Species Act and the project impacts on Critical Habitat or other habitat of that species, the community must demonstrate compliance with the Act. They can do this by submitting evidence of a completed consultation with National Marine Fisheries Service or Fish and Wildlife Service on the project if a federal agency was involved or an incidental take permit or documentation that none was required.

Based upon the limited number of communities that currently receive credit (1) and the various requirements for demonstrating compliance with environmental laws and regulations, the impact this activity has on listed is species or critical habitat would be a negligible indirect effect.

6.4.4.7 Drainage System Maintenance (540)

CRS credit is given to those communities that regularly inspect and maintain their detention basins and conveyance channels to ensure they are properly functioning.
Following a recent review, FEMA has modified these guidelines to more clearly define the activities for which a community can receive credit and to remove provisions that encouraged activities that could cause adverse effects to salmon. In addition, language has been added to clarify that removal of woody debris in natural channels is not necessary to receive CRS credit. These revisions include provisions for excluding natural watercourses, prorating credit based on the percentage of the total drainage system the community inspects and maintains, and for the protection of portions of the drainage system that supports listed fish. These new provisions will encourage the protection of listed fish and critical habitat in communities that seek the drainage system maintenance credit. Thus, the overall provision provides minor beneficial effects for listed salmon and steelhead.

6.4.4.8 Levee Safety (620)

A final credit affecting listed salmonid species is the Levee Safety credit. This credit allocates points to the local jurisdiction for the maintenance of smaller, non-Corps levees and floodwalls. These structures do not meet the base flood protection criteria of the NFIP

standard, but are assumed to provide protection from smaller flooding incidents. Points are allocated by the "flood protection level" of the structure, as determined by the Corps. This only applies to levees built prior to the communities joining the NFIP; most are likely more than 30 years old. While maintenance of these small structures is a public safety concern and does not include the construction of new structures, the maintenance of existing levees can contribute to on-going effects to stream morphology, reduction in riparian vegetation, and resulting effects to fish. This criterion may, therefore, have an adverse, indirect on Washington's listed salmonids species through alteration of channel conditions and dynamics. However, only one community, the City of Burlington, receives such credit in Washington.

6.5 INTERDEPENDENT AND INTERRELATED ACTIONS

An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification or "associated with" the proposed action. An interdependent activity is an activity that has no independent utility apart from the action under consultation or "because of" the proposed action (NOAA Undated).

Floodplain management by County and local jurisdictions begins with the implementation of the requirements of the NFIP for participating communities. Jurisdictions then build upon the NFIP requirements, based on their available resources and perceived needs. While these actions are related to the NFIP, they are not totally dependent on it. The Washington State floodplain regulations and the GMA also include requirements for floodplain protection. Thus, additional floodplain protections provided by State and local regulations provide some measure of benefit to anadromous salmonids throughout the state. Because of the complexity and interrelated aspects, it is not possible to precisely separate out these actions, and they are grouped with and discussed above under Indirect Effects.

6.6 CUMULATIVE EFFECTS

Under the ESA Cumulative Effects should include effects from all "non-Federal" actions that are reasonably certain to occur in the foreseeable future. This includes State, local, private, and Tribal actions. Washington's population, particularly in the Puget Sound watershed, is expected to continue growing. The additional development, supporting infrastructure, and related activities associated with this increase in population are likely to contribute to adverse cumulative effects to salmon and steelhead.

The potential list of cumulative effects occurring in floodplains throughout the state is innumerable. Direct cumulative impacts will occur from any development activity initiated by State or local jurisdictions, Tribal entities, or private landowners. These activities range from residential and business development; expanding and building new infrastructure such as buildings, roads, utilities, or more water-related projects such as flood control projects; continued irrigation withdrawals; bank protection; and general land clearing. All these factors will inevitably affect surface waters and salmon and steelhead habitat. On the other hand, there are numerous State, local, and Tribal efforts to reduce and minimize ongoing cumulative effects to listed salmonids. These range of WRIA subbasin planning efforts, the

Washington State policy for salmon restoration, local CAOs that provide greater protection for surface waters that support salmonids, and increasingly stringent stormwater regulations.

7.0 ESSENTIAL FISH HABITAT

7.1 INTRODUCTION

In 1996, Congress added new habitat conservation provisions to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (Public Law 104-267), the Federal law that governs U.S. marine fisheries management. Congress asserted the following in the Findings section of the Magnuson-Stevens Act:

> The Magnuson-Stevens Act mandated the identification of Essential Fish Habitat (EFH) for managed species as well as measures to conserve and enhance the habitat necessary to fish to carry out their life cycles. The Magnuson-Stevens Act requires cooperation among NOAA Fisheries, Fisheries Management Councils, fishing participants, Federal and State agencies, and others in achieving EFH protection, conservation, and enhancement. Congress defined EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)).

Federal agencies are required to consult with NOAA Fisheries on any action authorized, funded, or undertaken that may adversely impact EFH. This consultation process is usually integrated into existing environmental review procedures in accordance with the National Environmental Policy Act (NEPA), ESA, or Fish and Wildlife Coordination Act, for instance, to provide the greatest level of efficiency. NOAA Fisheries must provide the Federal agency with EFH Consultation Recommendations for any action that would adversely affect EFH. These recommendations are advisory in nature. The Pacific Fishery Management Council (PFMC) has designated EFH for the Pacific salmon fishery and Federally managed ground fish and coastal pelagic fisheries (NMFS 1999, PFMC 1999).

7.2 EFH IN WASHINGTON

EFH for groundfish and coastal pelagic species includes those waters and substrate necessary to ensure the production needed to support a long-term sustainable fishery. EFH includes those waters from the nearshore and tidal submerged environment within State territorial waters out to the exclusive economic zone (231.5 miles) offshore.

EFH for Pacific salmon includes all streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon, except above the impassible barriers identified by PFMC. In estuarine and marine areas, proposed designated EFH for salmon extends from nearshore and tidal submerged environments within State territorial waters out to the full extent of the exclusive economic zone.

Seven EFHs for Pacific coast groundfish have been described by the PFMC:

- **Estuarine –** Waters, substrates, and associated biological communities within bays and estuaries of the coasts of Washington, Oregon, and California seaward from the high tide line (Mean Higher High Water [MHHW]) or extent of upriver saltwater intrusion.

- **Rocky Shelf –** Waters substrates, and associated biological communities living on or within 10 meters overlying the rocky areas, including reefs, pinnacles, boulders, and cobble along the continental shelf, excluding canyons, from the MHHW line to the shelf break.

- **Non-Rocky Shelf –** Waters, substrates, and associated biological communities living on or within 10 meters overlying the substrates of the continental shelf, excluding the rocky shelf and canyon composites, from the MHHW mark to the shelf break.

- **Canyon** – Waters, substrates, and associated biological communities living within submarine canyons, including the walls, beds, seafloor, and any outcrops or landslide morphology such as slump scarps and debris fields.

- **Continental Slope/Basin** – Waters, substrates, and biological communities living on or within 20 meters overlying the substrates of the continental slope and basin below the shelf break and extending to the westward boundary of the Exclusive Economic Zone (EEZ).

- **Neritic Zone** – Waters, substrates, and biological communities living in the water column more than 10 meters above the continental shelf.

- **Oceanic Zone** – Waters and biological communities living in the water column more than 20 meters above the continental slope and abyssal plain, extending to the westward boundary of the EEZ.

The west coast groundfish management unit includes 83 species that typically live on or near the bottom of the ocean. Species groups include skates and sharks, rockfish, flatfish, and groundfish. Table 7.2-1 lists the general groundfish distribution in Washington.

Table 7.2-1. Distribution of Groundfish in Washington State.

Composite Habitat	Number of Species in Puget Sound	Number of Species in Coastal Waters
Estuarine	18	18
Rocky Shelf	27	35
Non-Rocky Shelf	33	40
Neritic	-	29
Continental Slope	-	44
Oceanic	-	24
Canyon	-	9

Source: PFMC Website

Coastal pelagic species are schooling fish that migrate in coastal waters. These coastal pelagic species (CPS) finfish generally occur above the thermocline and are considered pelagic (occurring near the water surface rather than near the bottom substrate). Regarding EFH, four species of finfish (Pacific sardine, Pacific mackerel, northern anchovy, and Jack mackerel) are treated as a single species complex because of similarities in their life habits. Market squid are also treated in this same complex. Northern anchovy, Pacific sardine, Pacific mackerel, and market squid occur in the waters of Puget Sound. Most life stages of

Pacific sardine, Pacific mackerel, and market squid occur only in the non-rocky shelf EFH in Puget Sound. Adults of all pelagic species and squid potentially occur in all composite EFH for all coastal waters and estuarine habitat. The Pacific salmon management unit includes chinook, coho, and Puget Sound pink salmon. Foreign waters off Canada are not included in the salmon EFH because they are outside U.S. jurisdiction.

7.3 EFH EFFECTS TO SALMONIDS AND GROUNDFISH

Effects are described in detail in Chapter 6 for the components of FEMA's NFIP and would apply to potential effects to EFH. It is difficult to assess the relative contribution of the NFIP to floodplain development because land use regulation occurs on the local scale, intermixed with a number of State and Federal floodplain and wetland regulations. Following the discussion in Chapter 6, it appears that the NFIP has a mix of effects to floodplain development and thus, indirect effects to EFH freshwater systems. The NFIP appears to often discourage floodplain development or steer it out of the floodplain while in minor instances indirectly contributing to floodplain development.

7.4 EFH EFFECT DETERMINATION

Following the analysis of potential effects in Chapter 6 and inclusion of Conservation Measures (Chapter 5), FEMA's NFIP program in Washington *May Adversely Affect* EFH habitat. These effects are indirect and minor adverse and beneficial, as described in Chapter 6.

8.0 CONCLUSIONS

FEMA has a limited range of discretion in how portions of the NFIP implemented. In some components of the NFIP, FEMA has no discretion and is bound by the requirements of its implementing regulations (Chapter 1), while in other areas FEMA has more flexibility, within statutory limits. Those areas where FEMA does have some discretion include mapping, minimum requirements, and the CRS. FEMA and the NFIP do not authorize any land management decisions, which are made on a County and local level. The NFIP in Washington State interacts with, and is often overshadowed by, more stringent regulations on floodplain use at the County or City level. However, the NFIP does appear to have indirect effects on listed salmon and steelhead, and designated Critical Habitat.

The three components of the NFIP – mapping, minimum requirements, and the CRS – appear to have a mix of adverse and beneficial effects to listed salmonids (as summarized in Table 8.0-1). While there are some adverse effects, these are indirect and minor; overall, the effect has been beneficial. FEMA's recent modification of the CRS criteria and an increased emphasis on outreach, education, monitoring, and enforcement, as highlighted in their Conservation Measures, will ensure that effects to list fish and Critical Habitat are minimized. Given these elements and the analysis provided in Chapter 6, FEMA concludes that the NFIP in Washington State *May Affect, but is Not Likely to Adversely Affect* listed species and their Critical Habitat.

Table 8.0-1. Summary of Effects of NFIP Components in Washington State.

Program Elements	Applicable Conservation Measures	Effect
Mapping		
Level of Floodplain Analysis	No Conservation Measures necessary.	Less populous jurisdictions may have less precise mapping that could allow more floodplain development. Often associated with level of development pressure and available resources on local level. Minor adverse effect.
1% Annual Chance Flood	FEMA following Congressional mandates, not discretionary.	Has generally reduced development in the floodplain in most hazardous areas, and those areas closest to aquatic habitat. Beneficial effect.
Map Modernization	No Conservation Measures necessary; incorporate those under Map Changes.	Increases the amount and accuracy of data available for mapping which will increase floodplain protection. Beneficial effect.
Map Changes	FEMA has strengthened existing process for review of map changes to ensure that communities are complying with Federal and State environmental laws and permits, including the ESA. Element added to CAV checklist.	FEMA has no control over local land use issues. FEMA is charged with accurate mapping of any changes. Number of LOMR-Fs over past 30 years in Washington is negligible. No effect.

Table 8.0-1. Summary of Effects of NFIP Components in Washington State.		
Program Elements	**Applicable Conservation Measures**	**Effect**
Minimum Floodplain Criteria		
Ordinance Requirements	No Conservation Measures necessary.	Significantly reduced development Post-FIRM in SFHAs throughout the state. Evidence that NFIP has dampened floodplain development. Beneficial indirect effect.
Federal and State Permit Provision	Monitoring of floodplain development permits to ensure compliance with Section 9, ESA. Element added to CAV checklist.	Requirement to acquire all Federal and State permits. Beneficial indirect effect.
Planning Considerations	No Conservation Measures necessary but now emphasize the importance of coordination on ESA issues.	Overlaps with previous requirement. Negligible beneficial indirect effect.
Cumulative Rise	No Conservation Measures necessary.	Prevents development in floodway prior to formal designation of a floodway. Beneficial indirect effect; negligible adverse indirect effect.
Regulatory Floodway Standards	No Conservation Measures necessary.	Prevents development in floodway unless no increase in flood stages (>1-foot rise). Prevents more substantial development but could allow minor structures. Beneficial indirect effect; negligible adverse indirect effect.
Building Performance	No Conservation Measures necessary.	Pertains to engineering of building. No effect.
CRS		
Introduction	States that CRS only credits those activities that are consistent with ESA and other environmental regulations.	Requires participating community to demonstrate compliance with environmental regulations.
Open Space Preservation (420)	Changes in provision to remove credit for parking lots and added provisions for protection of water quality.	Recent changes made to exclude parking lots, encourage green open space. Beneficial indirect effect.
Higher Regulatory Standards (430)	No Conservation Measures necessary.	Encourage a variety of measures that limit development in floodplains and promotes consideration of ecological functions leading to reduced development. Beneficial indirect effect.
Stormwater Management (450)	No Conservation Measures necessary.	Increases effectiveness of stormwater management. Beneficial indirect effect.
Floodplain Management Plan (510)	Credit for Habitat Conservation Plans.	Requires comprehensive coordinating planning approach. Beneficial indirect effect.
Acquisition and Relocation (520)	No Conservation Measures necessary.	Beneficial indirect effect from community removal of structures within the floodplain.
Flood Protection (530)	Modifications in language to include a third environmental requirement to comply with ESA, Section 7 or 10.	Ensures that credited projects comply with ESA. Minor indirect beneficial effect.

Table 8.0-1. Summary of Effects of NFIP Components in Washington State.		
Program Elements	**Applicable Conservation Measures**	**Effect**
Drainage System Maintenance (540)	Clarifies that woody debris removal from natural channels is not necessary for CRS credit.	Increases effectiveness of stormwater management plans and programs in controlling water quality and quantity. Beneficial indirect effect.
Levee Safety (620)	No Conservation Measures necessary.	Encourages maintenance of small levees, built before 1991. Minor indirect adverse effects.

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APPENDICES

APPENDICES

- Appendix A Protocol Agreement
- Appendix B List of NFIP Participants in Washington
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Appendix A

Protocol Agreement

PROTOCOL AGREEMENT

BETWEEN

THE FEDERAL EMERGENCY MANAGEMENT AGENCY
AND
THE NATIONAL MARINE FISHERIES SERVICE

GOVERNING SECTION 7 CONSULTATION OF THE ENDANGERED SPECIES ACT

WHEREAS, the Federal Emergency Management Agency (FEMA) proposes to administer the Federal disaster Public Assistance (PA) Program, the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and Flood Mitigation Assistance (FMA) pursuant to the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §5121 et seq. and its implementing regulations and the National Flood Insurance Reform Act of 1994 and its implementing regulations, with the intent to repair, prevent or mitigate the effects of damages from future disasters and/or to eliminate long-term risks to people and property from natural and man made hazards and their effects; and,

WHEREAS, projects under these programs are usually partially or entirely funded by FEMA and FEMA is often the designated lead Federal agency for eligible projects; and,

WHEREAS, interagency consultation is required by Section 7 of the Endangered Species Act of 1973 (ESA) for those Federal projects and programs that might affect species listed or proposed for listing as threatened or endangered, and the National Marine Fisheries Service (NOAA Fisheries) is the Federal agency with which FEMA must consult under ESA section 7 for marine and anadromous species; and

WHEREAS, this Protocol Agreement describes a framework for addressing FEMA's responsibilities for interagency consultation under ESA Section 7, including describing, at the programmatic level, proposed FEMA-funded actions and the likely effects of those actions on listed species or species proposed to be listed and their designated or proposed critical habitat; and

WHEREAS, FEMA and NOAA Fisheries acknowledge that the implementation of FEMA programs will be more effective if a Protocol Agreement governing consultation is in place to allow consultations to proceed in advance of funding in order to identify 1) the avoidance and minimization measures appropriate to categories of work that may be funded, 2) appropriate monitoring and reporting guidelines for proposed actions 3) identify which categories of activities are not likely to adversely affect and therefore not require written interaction beyond the ordinary concurrence process, and 4) to ensure that any action authorized is not likely to jeopardize the continued existence of Federally-listed threatened, endangered, and proposed to

be listed species, or result in the destruction or adverse modification of designated or proposed critical habitat (as defined by the ESA); and,

WHEREAS, this Protocol Agreement will improve FEMA's environmental review and compliance process required by allowing streamlined interagency consultations for FEMA-funded actions, and will improve review efficiency and reduce delays to FEMA's delivery of assistance, enabling FEMA to focus on those issues that need greater attention, and reducing the workload for all agencies concerned; and,

NOW, THEREFORE, FEMA and NOAA Fisheries agree that these disaster assistance programs shall be administered in accordance with the Protocol Agreement and FEMA will satisfy its ESA responsibilities for the programmatic activities described in this agreement.

STIPULATIONS

To the extent of its legal authority and in coordination with NOAA Fisheries, FEMA shall require that the following measures be carried out:

I. APPLICABILITY

A. This agreement applies to any and all Presidential declared disasters in Idaho, Oregon, and Washington State, following its execution. It applies to communities receiving FEMA funding, including Public Assistance, HMGP, PDM, and FMA programs. FEMA will not authorize release of funding for applicable projects until the requirements of this Agreement have been met.

B. Time designations expressed in this agreement constitute calendar days, unless otherwise specified.

II. INITIAL COORDINATION FOLLOWING DECLARATION OF A DISASTER

A. Upon the declaration by the President of a disaster in Idaho, Oregon, or Washington State, FEMA shall consult with other Federal agencies having jurisdiction for the activities covered in this Protocol Agreement to ensure compliance with applicable laws and regulations and to mutually determine lead Federal agency status for specific undertakings.

B. Immediately after declaration of the disaster, FEMA shall contact NOAA Fisheries to establish points of contacts for the disaster.

1. **FEMA shall:**

a) Ensure that FEMA and NOAA Fisheries have a unified list of points of contact in the disaster field office that includes counterpart names, addresses, telephone and fax numbers, and e-mail addresses;

b) Provide NOAA Fisheries with a list of the counties in which the disaster has been declared ("declared counties");

2. **NOAA Fisheries shall:**

a) Inform FEMA regarding the delivery of official species lists that fulfill the requirements of 50 C.F.R. 402.12(d) by confirming, in writing, the accuracy of the list provided on the NOAA Fisheries website; or

b) Concur with the accuracy of any species list prepared by FEMA; or

c) Verify the accuracy of species lists prepared by FEMA more than 90 days prior to the declaration of the disaster.

C. Within 10 days of the initial contact, FEMA and NOAA Fisheries will hold a scoping meeting where:

1. **FEMA shall:**

a) Provide NOAA Fisheries with a summary of types of damages identified in the Preliminary Damage Assessment (PDA) conducted by FEMA and provide a list of anticipated project types that will be implemented to respond to the declared disaster, and a reference of those project types to activities covered under the Protocol agreement.

b) Provide any identified environmental effects derived from the PDA that require immediate attention;

c) Brief NOAA Fisheries on the disaster recovery organization and objectives;

d) Establish timelines for providing periodic updates to NOAA Fisheries on the active disaster recovery process.

2. **NOAA Fisheries shall:**

a) Identify NOAA Fisheries staff available to assist FEMA in carrying out its ESA responsibilities;

b) Assist FEMA in identifying individuals or entities likely to possess site-specific information regarding listed or proposed species and their habitat in the area affected by the disaster that will likely be affected by activities covered in the Protocol Agreement. Their knowledge would contribute to carrying out FEMA-funded activities in ways that would reduce the effects of those activities on affected species and habitat. Such individuals may include staff biologists and other technicians employed by local Indian Tribes, the applicable State's Department of Fish and Wildlife, and other knowledgeable entities. FEMA and NOAA Fisheries shall jointly contact these interested parties to discuss the implementation of this Agreement and to request supplementary information about listed or proposed species and designated or proposed habitat.

III. EMERGENCY PROJECT REVIEW

A. **Applicability of Emergency Review Procedures**: In response to Presidentially-declared disasters, FEMA anticipates that it will be required to perform or fund performance of emergency actions when conditions represent an immediate threat to the preservation of human life and/or property. FEMA anticipates that such emergency actions may affect listed or proposed species or their designated or proposed critical habitat. The emergency review period will begin when FEMA determines an emergency action is required, and will remain in effect until completed, but for no more than 30 days from when the emergency was discovered.

The Federal Coordinating Officer (FCO), responsible for coordinating all Federal disaster assistance programs administered by FEMA, shall certify in writing to NOAA Fisheries the need for FEMA to conduct emergency project review for individual actions. Should FEMA determine it necessary to extend the emergency review period beyond 30 days, FEMA shall consult with NOAA Fisheries.

B. **Emergency Review Procedures for FEMA Direct Actions**: If the FCO determines that the emergency review procedures apply, FEMA may fund the emergency action after it completes the following emergency review:

1. FEMA shall review the list of threatened, endangered, or proposed species and their designated or proposed critical habitat prepared in accord with Stipulation II.B.2 and proceed to 2 below.

2. For emergency actions that FEMA determines may affect a listed species or habitat on the NOAA Fisheries-provided list during the emergency review period, FEMA shall initiate emergency consultation, as defined in 50 C.F.R. 402.05. FEMA will initiate such consultation telephonically, providing NOAA Fisheries specific information about the emergency, the proposed response action, justification for the expedited consultation, any known information regarding the status of the species in the action area, and a brief description of expected impacts to the affected species and their critical habitat. During telephonic consultation, NOAA Fisheries will indicate appropriate methods to avoid and minimize impacts. FEMA will provide followup documents memorializing and supporting the telephonic information, to NOAA Fisheries as soon as practicable in order to establish an administrative record. NOAA Fisheries, within fifteen working days of receipt of the followup documents, will respond in writing with a concurrence or noncurrence that the action was NLAA. If NOAA Fisheries responds that the action was LAA, then formal consultation will proceed after the fact in accordance with 50 CFR 402.05, and NOAA Fisheries will identify appropriate mitigation.

C. **Emergency Review Procedures for After-the-Fact Actions:** During the initial aftermath of a disaster, it is sometimes necessary for local entities to initiate emergency actions and take immediate steps to contain, limit, or alleviate an emergency in order to protect life and property prior to initiating any form of consultation. FEMA may find these actions eligible for funding under its disaster assistance programs.

In these instances, FEMA will conduct after-the-fact consultation, as defined in 50 C.F.R. 405, and will contact NOAA Fisheries as soon as practicable.

1. If it is determined an applicant is eligible for after-the-fact funding and if the action may have affected endangered or threatened species or their habitat, FEMA will consult to determine if there is appropriate mitigation.

2. FEMA will condition funding on implementation of mitigation measures agreed upon through informal emergency consultation. (Mitigation measures may or may not be eligible for funding under FEMA's programs and therefore may be borne by the applicant.)

3. FEMA will document any required mitigation measures in the project file and indicate to NOAA Fisheries whether mitigation measures were carried out.

4. If additional permanent repair work is required that is not of an emergency nature, FEMA shall proceed as identified in Section IV of this Agreement.

IV. PROCEDURES FOR PROJECT REVIEW

Both NOAA Fisheries and FEMA recognize the importance of completing coordination and informal and formal consultations in a consistent, efficient, and effective manner. Initial coordination between agencies will be completed within ten days following the declaration of a disaster. As actions and projects are identified, they will be reviewed for ESA compliance.

In the ESA review process, FEMA will determine if a listed or proposed species or their listed or proposed critical habitat may be present in an action area and, if so, assess the impacts of the action and determine the effects. At a minimum, protective measures will be required for any actions that have the potential to impact any listed species or critical habitat identified.

FEMA will conduct project reviews under a 3 Effect-level approach, as defined in this Agreement. For each project category identified as Level 2 or Level 3, a Categorical Biological Assessment (CBA) performed by FEMA and the documented response from NOAA Fisheries will be on file. For project categories that fall within Level 2, informal ESA review process with NOAA Fisheries will be concluded without subsequent project level review.

The following Effect levels will be used to facilitate project review under this Agreement:

A. **No Effect - Level 1**: Actions for which there is adequate information for FEMA to determine and for NOAA Fisheries to concur at the categorical level, that the projects will have *no effect* on listed or proposed species or their designated or proposed critical habitat, and no further consultation is required.

Due to the strict definition of *no effect* and the interrelated nature of instream and watershed conditions, this determination would only be used for projects that do not have any listed or proposed species or their designated or proposed critical habitat in the watershed or downstream from the watershed, or when proposed actions implement terms and conditions established in this document to achieve the *no effect* determination. This includes any project lying inside designated critical habitat determined to have no effect on covered species, provided all effects are considered.

After documenting this decision in writing in the project files, FEMA may conclude the environmental review required by this Agreement and no further consultation is needed at the project level. A list of project categories which FEMA identifies as, and NOAA Fisheries has reviewed and agrees is, *no effect,* will be documented in Appendix A.

B. **Not Likely To Adversely Affect – Level 2**: Actions for which there is adequate information for FEMA to conclude and NOAA Fisheries to concur that the proposed category of action *may affect, but is not likely to adversely affect* listed or proposed species or their designated or proposed critical habitat. *Adverse effects* include short or

long-term, direct or indirect, action-related impacts of an individual action or aggregate set of actions. Adverse effects include, among others, mortality, reduced growth, or other adverse physiological changes; harassment of fish, physical disturbance of redds, reduced reproductive success, delayed or premature migration, reduced prey-base availability, or other negative behavioral changes to listed anadromous salmonids at any life stage. Adverse effects to designated critical habitat include effects to any of the essential features of critical habitat that would diminish the value of the habitat for the survival and recovery of listed anadromous salmonids.

NOAA Fisheries and FEMA shall develop guidance, guidelines, and technical assistance for the use of participants in FEMA-funded programs for the planning and implementation of projects, so that those projects may be determined to be *not likely to adversely affect*. Projects under this category should clearly and consistently address any potential adverse effects on listed or proposed species and their designated or proposed critical habitat. FEMA shall mandate, in stipulations of the grant award, appropriate protective measures to ensure that the determination of *not likely to adversely affect* is appropriate for any action authorized or funded by FEMA. No incidental take, as defined under Section 9 of the ESA, would be anticipated or authorized for Level 2 actions.

After documenting a *not likely to adversely affect* decision in writing and in accord with this agreement and 50 C.F.R. 402.09, Subpart B, Consultation Procedures, FEMA may conclude the environmental review required by this Agreement and no further consultation with NOAA Fisheries will be required. A list of project categories that FEMA has identified as, and NOAA Fisheries has informally consulted on and concurred are, *not likely to adversely affect,* will be identified in Appendix B.

C. **Likely to Adversely Affect - Level 3**: Actions that *may affect, and are likely to adversely affect*, listed or proposed species or their designated or proposed critical habitat. These actions require formal consultation with NOAA Fisheries and include proposed actions that will further degrade baseline conditions in a watershed, even if the proposed action is designed to improve baseline conditions, and the intent is to improve degraded conditions over the long term. If any short-term impacts, for example temporary turbidity and sedimentation will cause *take* (adverse effects), then the determination is *likely to adversely affect.* A list of project categories that FEMA has identified as *likely to adversely affect*, and NOAA Fisheries has formally consulted on and concluded are *No Jeopardy*, will be identified in Appendix C.

V. FEMA and NOAA Fisheries RESPONSIBILITIES

A. **For Level 1 (No Effect) Actions:**

1. **FEMA shall:**

a) Determine if the action is listed in Appendix A. If so, no further consultation with NOAA Fisheries is required;

b) If not in Appendix A, determine if the subject action is a Level 1 *no effect* action. FEMA shall submit documentation supporting the determination of *no effect* to NOAA Fisheries;

c) If NOAA Fisheries does not respond within 14 days, the project category will be attached to Appendix A;

d) If NOAA Fisheries notifies FEMA that it does not concur with FEMA's determination, FEMA will implement Level 2 Actions.

2. **NOAA Fisheries shall:**

a) Review FEMA's submission for new actions proposed for inclusion in Level 1 determinations;

b) For actions that NOAA Fisheries concurs with the *no effect* determination, attach the project category to Appendix A of this Agreement;

c) If NOAA Fisheries does not concur with the *no effect* determination, notify FEMA within 14 days with the reasons for the nonconcurrence.

B. **For Level 2 (NLAA) Actions:**

1. **FEMA shall:**

a) Determine if the action is listed in Appendix B. If so, implement any conditions required. No further consultation with NOAA Fisheries is required;

b) If not in Appendix B, prepare a determination that the subject action is a Level 2 *may affect, not likely to adversely affect* action. FEMA shall submit any necessary documentation supporting the determination of effect to NOAA Fisheries;

d) Documentation of FEMA's Level 2 determination shall include, but not be limited to, a purpose of the proposed action, a description of specific activities, identification of listed species in the action area, a description of the action area, effects of the proposed action on listed species or critical habitat, incorporated minimization measures to reduce or eliminate the effects, and FEMA's determination of effect;

e) If NOAA Fisheries concurs in writing with FEMA's determination, FEMA will include the action type in Appendix B and document the concurrence in the Protocol Agreement files;

f) If NOAA Fisheries does not concur with FEMA's determination, FEMA will implement Level 3 actions.

2. **NOAA Fisheries shall:**

a) Review FEMA's submission for actions prepared for inclusion as a Level 2 determination to confirm that the action is a Level 2 action;

b) Provide written concurrence (within 14 days if during a disaster declared event) for actions that NOAA Fisheries confirms are Level 2 actions;

c) Attach the project type to Appendix B of this Agreement;

d) If NOAA Fisheries does not concur with the *may affect, not likely to adversely affect* determination, notify FEMA in writing within 14 days with the reasons for the nonconcurrence.

C. **For Level 3 (LAA) Actions:**

1. **FEMA shall:**

a) Consult with NOAA Fisheries once an initial or subsequent determination is made that the category of actions is likely to adversely affect to identify if avoidance and mitigation can reduce impacts to a level not likely to adversely affect; and

b) Initiate formal consultation per 50 CFR Part 402.14 if NOAA Fisheries indicates that such avoidance and minimization measures are insufficient to reduce the level of effect to such a degree that they are not likely to adversely affect.

2. **NOAA Fisheries shall:**

a) Engage in formal consultation per 50 CFR Part 402.14, at the categorical level, and provide a biological opinion with reasonable and prudent measures, and terms and conditions, to minimize effects for those categories that are not likely to jeopardize listed salmonids.

b) Assist FEMA in tiered-down review of projects actually undertaken and seeking FEMA reimbursement; and

c) Issue incidental take statements authorizing take at the project level.

VI. MONITORING

NOAA Fisheries may monitor and review any activities carried out pursuant to this Agreement. FEMA will cooperate with NOAA Fisheries by carrying out compliance monitoring and FEMA will create and maintain records that document compliance for all projects reviewed under the terms of this Agreement. Site-specific effectiveness monitoring requirements will be addressed in the individual Categorical Biological Assessments (CBAs) for each project type. The applicable state's Emergency Management Division may also carry out monitoring activities as part of their responsibilities in administering FEMA grants.

VII. REVIEW OF CHANGES TO APPROVED SCOPE OF WORK, AND UNEXPECTED DISCOVERIES

A. **Reinitiation:** Reinitiation of ESA review for FEMA-funded or assisted undertakings is required, in accordance with 50 C.F.R. 402.16, if any of the following conditions arise:

1. If new information reveals effects of the action may affect listed species or critical habitat in a manner or to an extent not previously considered;

2. If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the initial consultation and review process;

3. If a new species is listed or critical habitat designated that may be affected by the identified action;

4. If the amount or extent of take specified in the incidental take statement is exceeded.

C. The applicant will be required to cease any actions or operations in the vicinity of the discovery and to take all reasonable measures to avoid or minimize impact to the listed species or species proposed to be listed, and their habitat, until such time as FEMA can complete the ESA review

D. If FEMA discovers any terms, conditions, or protective measures mandated for an action have not been followed, FEMA will review its ESA responsibilities with NOAA Fisheries, notify EMD of the violation, and withhold approval of the project or deobligate funding until such time that FEMA can fulfill its ESA review. This may entail reinitiating consultation with NOAA Fisheries separate to this agreement.

VIII. REVIEW AND RENEWAL OF PROTOCOL AGREEMENT

A. FEMA will create and maintain records of all activities undertaken pursuant to this Agreement and will provide a report to NOAA Fisheries that summarizes activities carried out under the terms of the Agreement one year from the date of execution. Thereafter, FEMA shall provide an annual report, no later than November 1st of each year, to NOAA Fisheries that will include information regarding projects approved for funding under the Agreement and their Effect level determinations. NOAA Fisheries may request to review project files or visit project sites.

B. FEMA will meet with NOAA Fisheries once every calendar year, no later than February 1st, to review project types included in this Agreement for applicability and record keeping consistency between agencies.

C. FEMA will ensure that the signatories will review the provisions and requirements of this Agreement within four years of the date of the initial execution to determine the effectiveness of continuing the terms contained herein or whether it should be revised, amended, or terminated. If the parties agree that changes are not warranted, FEMA will notify the parties in writing that the terms of the Agreement will be extended for a subsequent four-year period.

IX. TERMINATION

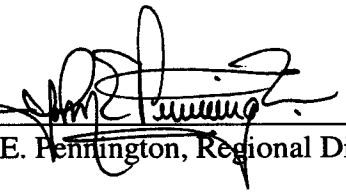
FEMA or NOAA Fisheries may terminate this Agreement by providing 30 days written notice to the other parties. This Agreement may be terminated by the execution of a subsequent Agreement that explicitly terminates or supersedes its terms. Within the 30 day notice period, the parties may confer with each other to identify amendments to the Agreement, thereby avoiding termination of the Agreement.

X. EXECUTION OF PROTOCOL AGREEMENT

This Agreement may be executed in counterparts, with a separate page for each signatory, and FEMA will ensure that each party is provided with a fully executed copy. This Agreement shall become effective on the date of the last signature to this Agreement.

The following agency agrees to execute and implement the Section 7 Protocol Agreement between the Federal Emergency Management Agency and the National Marine Fisheries Service.

The Federal Emergency Management Agency (FEMA), Region X

By:  Date: 5/16/03

John E. Pennington, Regional Director

The following agency agrees to execute and implement the Section 7 Protocol Agreement between the Federal Emergency Management Agency and the National Marine Fisheries Service.

National Marine Fisheries Service (NOAA Fisheries), Northwest Region

By: D. Robert Lohn

D. Robert Lohn, Regional Administrator

Date: 4/18/03

Appendix B

List of NFIP Participants in Washington

Community Name	Initial FIRM Date
ALGONA, CITY OF	19780525
ANACORTES, CITY OF	20030917
ARLINGTON, CITY OF	19831116
AUBURN, CITY OF	19810601
BAINBRIDGE ISLAND, CITY OF	19860205
BELLEVUE, CITY OF	19781201
BELLINGHAM, CITY OF	19820902
BLACK DIAMOND, TOWN OF	19791030
BLAINE, CITY OF	19790716
BONNEY LAKE, CITY OF	19830426
BOTHELL, CITY OF	19820601
BREMERTON, CITY OF	19790815
BRIER, CITY OF	19840924
BUCKLEY, CITY OF	19800501
BUCODA, TOWN OF	19810902
BURIEN, CITY OF	19940930
BURLINGTON, CITY OF	19850103
CARNATION, CITY OF	19800304
CLALLAM COUNTY *	19801105
CONCRETE, TOWN OF	19820802
COUPEVILLE, TOWN OF	19950816
COVINGTON, CITY OF	20010419
DARRINGTON, TOWN OF	19850819
DES MOINES, CITY OF	19800515
DUVALL, TOWN OF	19800604
EDGEWOOD, CITY OF	19870819
EDMONDS, CITY OF	19780808
ENUMCLAW, CITY OF	19890929
EVERETT, CITY OF	19780403
EVERSON, CITY OF	19820802
FEDERAL WAY, CITY OF	19950516
FERNDALE, TOWN OF	19830601
FIFE, CITY OF	19801105
FIRCREST, CITY OF	19820203
GIG HARBOR, TOWN OF	19810902
GOLD BAR, TOWN OF	19831201
HAMILTON, TOWN OF	19811201
INDEX, TOWN OF	19831201
ISLAND COUNTY *	19811201
ISSAQUAH, CITY OF	19800501
JEFFERSON COUNTY *	19820719
KENMORE, CITY OF	19780929
KENT, CITY OF	19810401
KING COUNTY*	19780929
KIRKLAND, CITY OF	19810615
KITSAP COUNTY *	19800515
LACEY, CITY OF	19800716
LAKE FOREST PARK, CITY OF	19800215
LAKE STEVENS, CITY OF	19890417

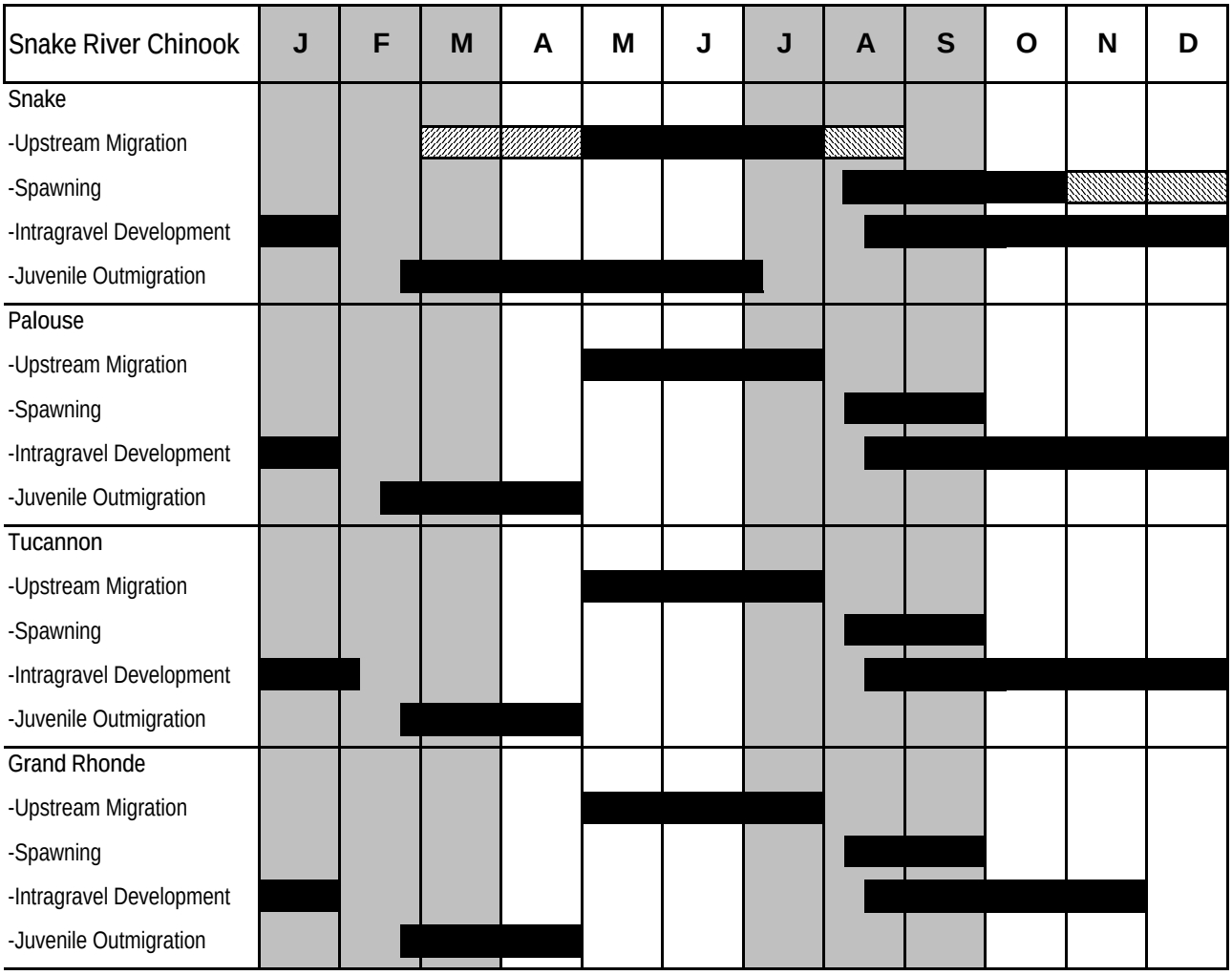
LAKEWOOD, CITY OF	19870819
LANGLEY, CITY OF	19840924
LYMAN, TOWN OF	19820719
LYNDEN, CITY OF	19821103
LYNNWOOD, CITY OF	19850605
MARYSVILLE, CITY OF	19840215
MASON COUNTY*	19880517
MEDINA, CITY OF	19790316
MERCER ISLAND, CITY OF	19970630
MILTON, CITY OF	19820426
MONROE, CITY OF	19831201
MORTON, CITY OF	19791204
MOUNT VERNON, CITY OF	19850103
MOUNTLAKE TERRACE, CITY OF	19850819
MUKILTEO, CITY OF	19860219
NOOKSACK, CITY OF	19820902
NORMANDY PARK, CITY OF	19771102
NORTH BEND, CITY OF	19840801
OAK HARBOR, CITY OF	19800115
OAKVILLE, TOWN OF	19850619
OLYMPIA, CITY OF	19820217
ORTING, TOWN OF	19850927
PACIFIC, CITY OF	19801202
PIERCE COUNTY*	19870819
PORT ANGELES, CITY OF	19800801
PORT ORCHARD, CITY OF	19791115
PORT TOWNSEND, CITY OF	19820315
POULSBO, CITY OF	19790702
PUYALLUP, CITY OF	19800815
REDMOND, CITY OF	19790201
RENTON, CITY OF	19810505
ROY, TOWN OF	19820426
SAMMAMISH, CITY OF	19991108
SAN JUAN COUNTY*	19910301
SEATTLE, CITY OF	19770719
SEDRO WOOLLEY, CITY OF	19820705
SEQUIM, CITY OF	19760211
SHELTON, CITY OF	19831201
SHORELINE, CITY OF	19780929
SKAGIT COUNTY *	19850103
SKYKOMISH, TOWN OF	19810702
SNOHOMISH COUNTY *	19840315
SNOHOMISH, CITY OF	19831116
SNOQUALMIE, CITY OF	19840705
SOUTH PRAIRIE, TOWN OF	19811215
STANWOOD, CITY OF	19831116
STEILACOOM, TOWN OF	19820719
SULTAN, CITY OF	19830930
SUMAS, CITY OF	19850515
SUMNER,CITY OF	19801216
TACOMA, CITY OF	19831201
TENINO, CITY OF	19800604

THURSTON COUNTY *	19821201
TUKWILA, CITY OF	19810803
TUMWATER, CITY OF	19800801
UNIVERSITY PLACE, CITY OF	19870819
WHATCOM COUNTY *	19770930
WILKESON, TOWN OF	19820301
WOODINVILLE, CITY OF	19950516
YELM, CITY OF	19990616

Appendix C

ESU Lifecycle Timetables

Table C-1. Lifecycle Timing of Snake River Chinook.



Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1998 NMFS Status Review for Chinook Salmon (Myers et al. 1998)

Spring/Summer-run Only

Fall-run Only

Table C-2. Lifecycle Timing of Puget Sound Chinook.

Puget Sound Chinook	J	F	M	A	M	J	J	A	S	O	N	D
Samish/Nooksack												
-Upstream Migration												
-Spawning												
-Intragravel Development												
-Juvenile Outmigration												
Upper Skagit & Tribs												
-Upstream Migration												
-Spawning												
-Intragravel Development												
-Juvenile Outmigration												
Lower Skagit & Tribs												
-Upstream Migration												
-Spawning												
-Intragravel Development												
-Juvenile Outmigration												
Lower Sauk												
-Upstream Migration												
-Spawning												
-Intragravel Development												
-Juvenile Outmigration												
Upper Sauk												
-Upstream Migration												
-Spawning												
-Intragravel Development												
-Juvenile Outmigration												
Skagit/Suiattle/Cascade												
-Upstream Migration												
-Spawning												
-Intragravel Development												
-Juvenile Outmigration												

Table continues on next page

Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1998 NMFS Status Review for Chinook Salmon (Myers et al. 1998)

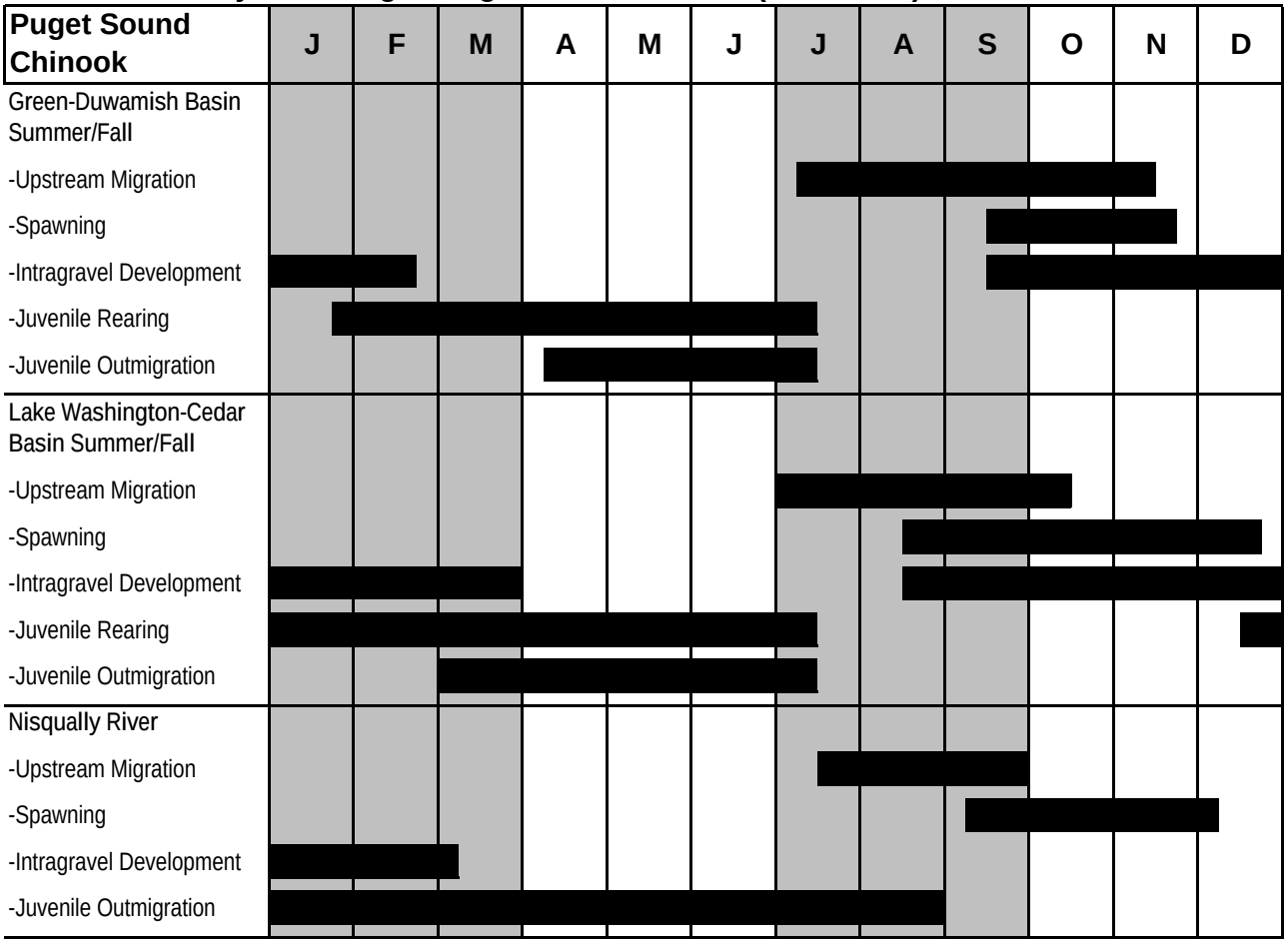
Table C-2. Lifecycle Timing of Puget Sound Chinook (Continued).

Puget Sound Chinook	J	F	M	A	M	J	J	A	S	O	N	D
Stillaguamish												
-Upstream Migration						■	■	■				
-Spawning								■	■	■		
-Intragravel Development	■	■						■	■	■	■	■
-Juvenile Outmigration			■	■	■	■						
Elwha/Morse Creek												
-Upstream Migration							■	■	■			
-Spawning									■	■		
-Intragravel Development	■	■							■	■	■	■
-Juvenile Outmigration		■	■	■	■							
White River (Puyallup)												
-Upstream Migration					■	■	■	■	■			
-Spawning									■	■		
-Intragravel Development	■	■							■	■	■	■
-Juvenile Outmigration			■	■	■							
Wallace												
-Upstream Migration						■	■					
-Spawning							■	■				
-Intragravel Development	■						■	■	■	■	■	■
-Juvenile Outmigration		■	■	■	■	■						
Snohomish												
-Upstream Migration							■	■	■			
-Spawning									■	■	■	
-Intragravel Development	■								■	■	■	■
-Juvenile Outmigration		■	■	■	■							

Table continues on next page

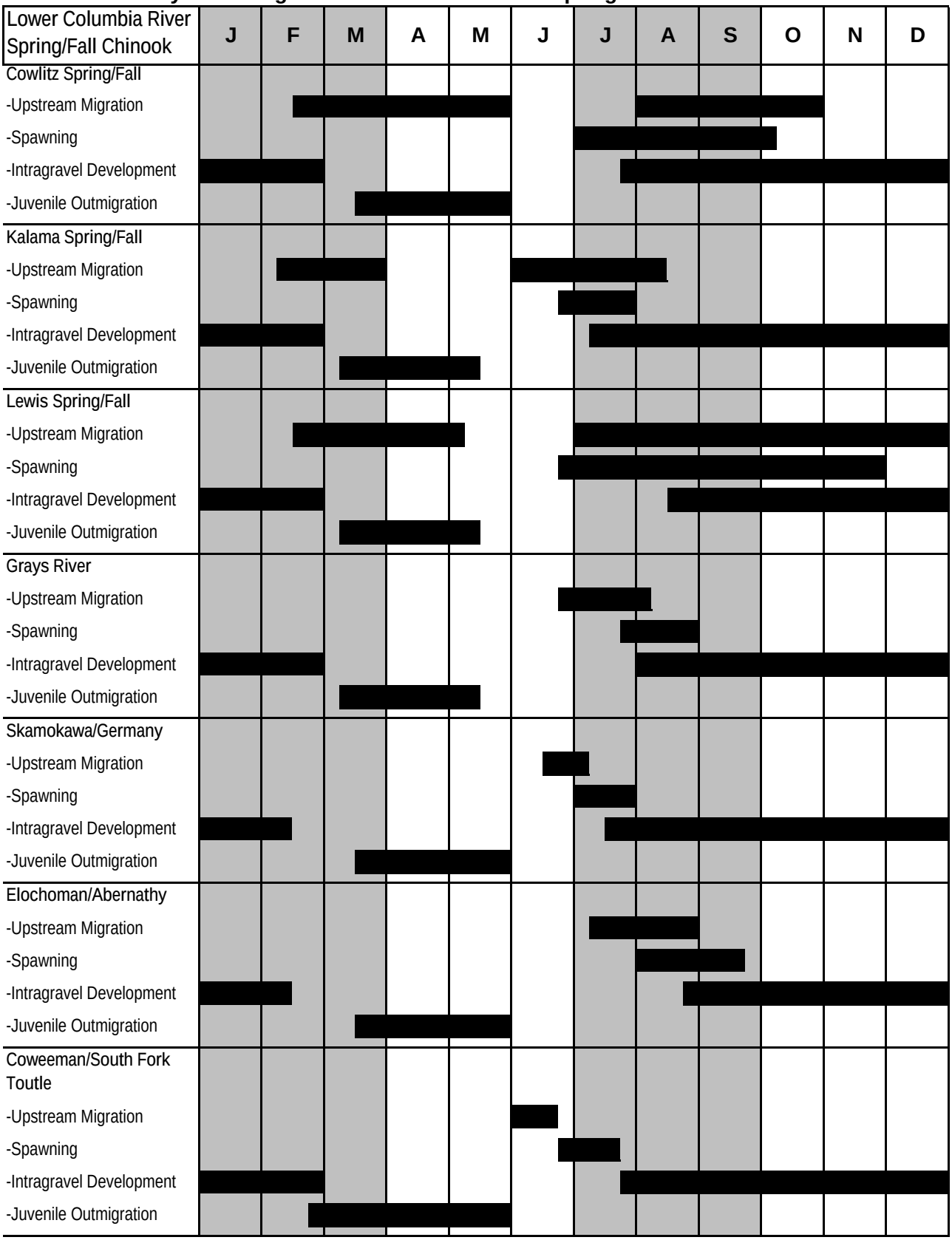
Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1998 NMFS Status Review for Chinook Salmon (Myers et al. 1998)

Table C-2. Lifecycle Timing of Puget Sound Chinook (Continued).



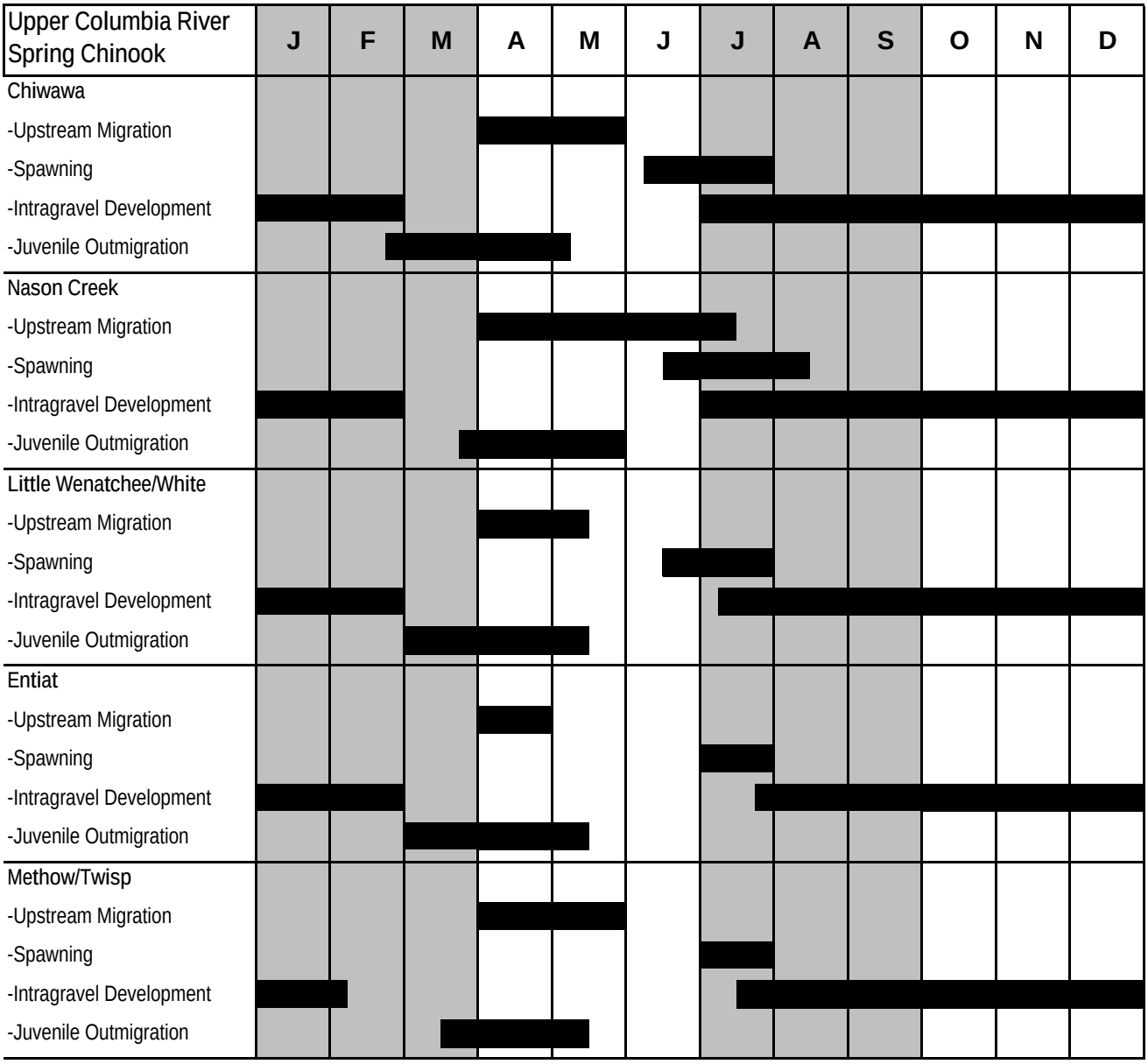
Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1998 NMFS Status Review for Chinook Salmon (Myers et al. 1998)

Table C-3. Lifecycle Timing of Lower Columbia River Spring/Fall Chinook.



Souce: Regional Road Maintenance Technical Working Group (2003)

Table C-4. Lifecycle Timing of Upper Columbia River Spring Chinook.



Souce: Regional Road Maintenance Technical Working Group (2003)

Table C-5. Lifecycle Timing of Upper Willamette River Chinook.

Upper Willamette River Chinook	J	F	M	A	M	J	J	A	S	O	N	D
-Upstream Migration					■	■						
-Spawning									■			
-Intragravel Development					data unavailable							
-Juvenile Outmigration					data unavailable							

Souce: Regional Road Maintenance Technical Working Group (2003)

Table C-6. Lifecycle Timing of Hood Canal Summer-Run Chum

Hood Canal Summer-Run Chum	J	F	M	A	M	J	J	A	S	O	N	D
-Upstream Migration							■	■	■	■		
-Spawning									■	■		
-Intragravel Development	■	■						■	■	■	■	■
-Juvenile Outmigration		■	■	■								

Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1997 NMFS Status Review for Chum Salmon (Johnson et al. 1997)

Table C-7. Lifecycle Timing of Columbia River Chum.

Columbia River Chum	J	F	M	A	M	J	J	A	S	O	N	D
-Upstream Migration									■	■	■	■
-Spawning	■										■	■
-Intragravel Development	■	■	■									
-Juvenile Outmigration			■	■								

Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1997 NMFS Status Review for Chum Salmon (Johnson et al. 1997)

Table C-8. Lifecycle Timing of Ozette Lake Sockeye.

Ozette Lake Sockeye	J	F	M	A	M	J	J	A	S	O	N	D
-Upstream Migration			■	■	■	■						
-Spawning									■	■	■	■
-Intragravel Development										■	■	■
-Juvenile Rearing	■	■	■	■	■	■	■	■	■	■	■	■
-Juvenile Outmigration			■	■								

Souce: Regional Road Maintenance Technical Working Group (2003)

Table C-9. Lifecycle Timing of Snake River Sockeye

Snake River Sockeye	J	F	M	A	M	J	J	A	S	O	N	D
-Upstream Migration			■	■	■	■	■					
-Spawning									■	■		
-Intragravel Development	■	■	■	■								
-Juvenile Rearing	■	■	■	■	■	■	■	■	■	■	■	■
-Juvenile Outmigration			■	■	■	■						

Souce: Regional Road Maintenance Technical Working Group (2003)

Table C-10. Lifecycle Timing of Upper Columbia River Steelhead

Upper Columbia River Steelhead	J	F	M	A	M	J	J	A	S	O	N	D
-Upstream Migration						■	■	■	■			
-Spawning		■	■	■	■	■						
-Intragravel Development		■	■	■	■	■	■					
-Juvenile Rearing	■	■	■	■	■	■	■	■	■	■	■	■
-Juvenile Outmigration		■	■	■	■							

Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1996 NMFS Status Review for Steelhead (Busby et al. 1996)

Table C-11. Lifecycle Timing of Snake River Basin Steelhead

Snake River Basin Steelhead	J	F	M	A	M	J	J	A	S	O	N	D
-Upstream Migration	■	■	■			■	■	■	■	■	■	■
-Spawning			■	■	■							
-Intragravel Development		■	■	■	■	■	■	■				
-Juvenile Rearing	■	■	■	■	■	■	■	■	■	■	■	■
-Juvenile Outmigration												

Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1996 NMFS Status Review for Steelhead (Busby et al. 1996)

Table C-12. Lifecycle Timing of Lower Columiba River Steelhead

Lower Columbia River Steelhead	J	F	M	A	M	J	J	A	S	O	N	D
Cowlitz to Toutle												
-Upstream Migration	■	■	■	■								■
-Spawning			■	■	■	■						
-Intragravel Development		■	■	■	■	■	■					
-Juvenile Rearing	■	■	■	■	■	■	■	■	■	■	■	■
-Juvenile Outmigration		■	■	■	■							
Kalama to Washougal												
-Upstream Migration					■	■	■	■	■	■	■	
-Spawning	■	■	■	■	■	■	■					
-Intragravel Development	■	■	■	■	■	■	■					
-Juvenile Rearing	■	■	■	■	■	■	■	■	■	■	■	■
-Juvenile Outmigration		■	■	■								

Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1996 NMFS Status Review for Steelhead (Busby et al. 1996)

Table C-13. Lifecycle Timing of Middle Columbia River Steelhead

Middle Columiba River Steelhead	J	F	M	A	M	J	J	A	S	O	N	D
Wind to Klickitat												
-Upstream Migration					■	■	■	■	■	■	■	
-Spawning			■	■	■							
-Intragravel Development			■	■	■	■	■					
-Juvenile Rearing	■	■	■	■	■	■	■	■	■	■	■	■
-Juvenile Outmigration			■	■	■							
Walla Walla to Touchet												
-Upstream Migration	■	■	■						■	■	■	■
-Spawning			■	■	■							
-Intragravel Development		■	■	■	■	■	■					
-Juvenile Rearing	■	■	■	■	■	■	■	■	■	■	■	■
-Juvenile Outmigration		■	■	■								

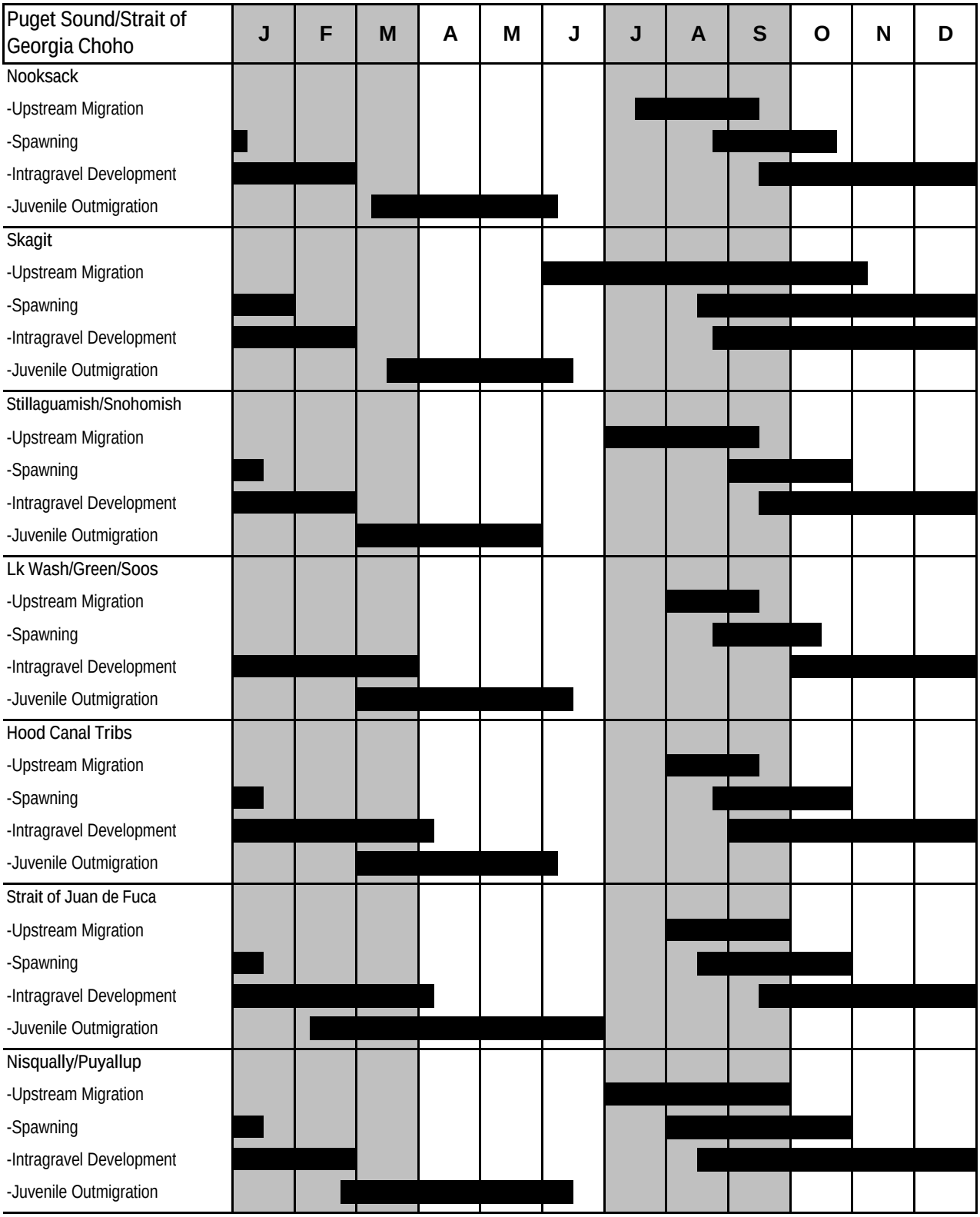
Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1996 NMFS Status Review for Steelhead (Busby et al. 1996)

Table C-14. Lifecycle Timing of Upper Willamette River Steelhead.

Upper Willamette River Steelhead	J	F	M	A	M	J	J	A	S	O	N	D
-Upstream Migration												
-Spawning												
-Intragravel Development					data unavailable							
-Juvenile Rearing												
-Juvenile Outmigration					data unavailable							

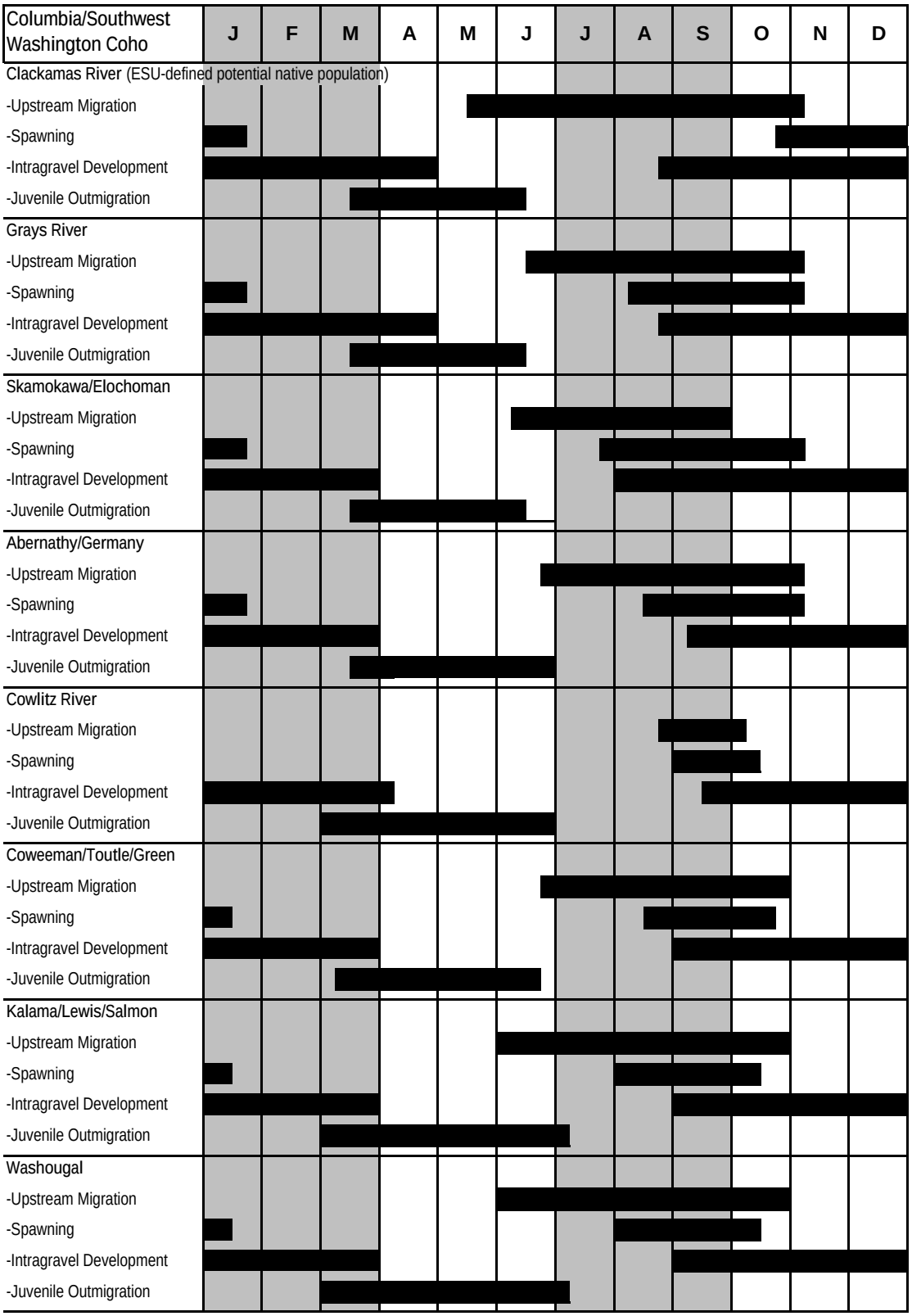
Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1996 NMFS Status Review for Steelhead (Busby et al. 1996)

Table C-15. Lifecycle Timing of Puget Sound/Strait of Georgia Coho



Souce: Regional Road Maintenance Technical Working Group (2003)

Table C-16. Lifecycle Timing of Lower Columbia/Southwest Washington Coho



Souce: Regional Road Maintenance Technical Working Group (2003)
Edited per 1995 NMFS Status Review for Coho (Weitkamp et al. 1995)

Appendix D

FEMA Model Floodplain Ordinance

REGION X FLOOD DAMAGE PREVENTION ORDINANCE
WASHINGTON MODEL (REVISED 5/13/2004)

Close to 300 towns, cities, counties, and tribes within the State of Washington participate in the National Flood Insurance Program (NFIP). As a condition of participation in the NFIP, communities are required to adopt and enforce a flood hazard reduction ordinance that meets the minimum requirements of the NFIP; however, there are occasionally additional requirements identified by State law that are more restrictive. In these cases, FEMA will require that communities meet those standards as well.

Although there is no specific prescribed ordinance that can be adopted across the country that meets all requirements for floodplain development, this model identifies the basic requirements, and cross references them to appropriate Federal CFR or State WAC citations (RCW 86.16 WA Floodplain Management law). It also encourages Community Officials to consider the direct insurance implications of certain building standards that, if adopted, can reduce (or increase) annual flood insurance premiums for local citizens. This ordinance, as developed by FEMA and the WA Department of Ecology, supercedes previous versions and includes all the minimum standards required as a condition of participation in the NFIP. It will be used by FEMA and State staff as the basis for providing technical assistance and compliance reviews during the Community Assistance Contact (CAC) and Community Assistance Visit (CAV) process to ensure that federal and state law are met.

The model identifies the basic minimum federal regulation requirements that must be contained in a local flood ordinance as well as suggestions for stronger measures, but notes that these measures are *recommended*, not required. Additionally, it outlines several specific floodplain development practices and regulations that can reduce insurance premiums (highlighted). Adopting this model flood hazard reduction ordinance verbatim can ensure compliance with FEMA; however, *it should be emphasized that its adoption is not a mandatory requirement per NFIP regulation.* Some sections of this document are included for clarity and are not required by federal or state law. For instance, as indicated in SECTION 1: STATUTORY AUTHORIZATION, FINDINGS OF FACT, PURPOSE AND OBJECTIVES, it is not mandatory to adopt this entire section, but by doing so, it will make your ordinance more legally enforceable.

This document can also serve as a foundation upon which communities can craft their own additional measures. The ordinance can be modified to accommodate local standards, provided they are not less restrictive than the minimum standards identified on this model. Areas on the model that exceed those minimum standards are clearly marked. The model ordinance is in a modular format. The basic model is available separately, and the following attachments can be provided if they fit a community's status, or if they are requested:

APPENDIX A: ORDINANCE STANDARDS FOR COMMUNITIES WITH SHALLOW FLOODING IDENTIFIED AS AN AO ZONES ON FLOOD INSURANCE RATE MAPS (FIRM)

APPENDIX B: ORDINANCE STANDARDS FOR COMMUNITIES WITH COASTAL FLOODING IDENTIFIED AS A V ZONE AND AN ORDINANCE COMPLIANT WITH 44 CFR 60.3(E)

APPENDIX C: FLOOD HAZARD PREVENTION AND FISH HABITAT PROTECTION ORDINANCE *(Not yet complete)*

APPENDIX D: OTHER HIGHER REGULATORY STANDARDS *(Not yet complete)*

If you have any questions concerning this ordinance or participation in the NFIP, please contact the Department of Homeland Security, Federal Emergency Management Agency (FEMA) at our Regional Office at (425) 487-4678.

SECTION 1.0 - STATUTORY AUTHORIZATION, FINDINGS OF FACT, PURPOSE, AND OBJECTIVES *(Not mandatory to adopt section 1.0)*

1.1 STATUTORY AUTHORIZATION

The Legislature of the State of Washington has delegated the responsibility to local governmental units to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry. Therefore, the _____ of _____, does ordain as follows:

1.2 FINDINGS OF FACT

1) The flood hazard areas of _____ are subject to periodic inundation which results in loss of life and property, health, and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.
2) These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazards which increase flood heights and velocities, and when inadequately anchored, damage uses in other areas. Uses that are inadequately floodproofed, elevated, or otherwise protected from flood damage also contribute to the flood loss.

1.3 STATEMENT OF PURPOSE

It is the purpose of this ordinance to promote the public health, safety, and general welfare; reduce the annual cost of flood insurance; and minimize public and private losses due to flood conditions in specific areas by provisions designed:

1) To protect human life and health;
2) To minimize expenditure of public money and costly flood control projects;
3) To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
4) To minimize prolonged business interruptions;
5) To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in areas of special flood hazard;
6) To help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas;
7) To ensure that potential buyers are notified that property is in an area of special flood hazard;
8) To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

1.4 METHODS OF REDUCING FLOOD LOSSES

In order to accomplish its purposes, this ordinance includes methods and provisions for:

1) Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
2) Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
3) Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
4) Controlling filling, grading, dredging, and other development which may increase flood

damage; and

5) Preventing or regulating the construction of flood barriers that unnaturally divert floodwaters or may increase flood hazards in other areas.

SECTION 2.0 – DEFINITIONS *(44 CFR 59.1, not mandatory to adopt all definitions as shown)*

Terms with 1 asterisk trigger a specific building requirement and must be adopted. Terms with 2 asterisks are directly related to insurance and are not mandatory to adopt. Unless specifically defined below, terms or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance its most reasonable application.

APPEAL: a request for a review of the interpretation of any provision of this ordinance or a request for a variance.

AREA OF SHALLOW FLOODING: designated as AO, or AH Zone on the Flood Insurance Rate Map (FIRM). AO zones have base flood depths that range from one to three feet above the natural ground; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and, velocity flow may be evident. AO is characterized as sheet flow; AH indicates ponding, and is shown with standard base flood elevations.

AREA OF SPECIAL FLOOD HAZARD: is the land in the flood plain within a community subject to a one percent or greater chance of flooding in any given year. Designation on maps always includes the letters A or V.

BASE FLOOD: the flood having a 1% chance of being equaled or exceeded in any given year (also referred to as the "100-year flood"). Designated on Flood Insurance Rate Maps by the letters A or V.

*** BASEMENT:** means any area of the building having its floor sub-grade (below ground level) on all sides.

BREAKAWAY WALL: means a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.

COASTAL HIGH HAZARD AREA: means an area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources. The area is designated on the FIRM as Zone V1-30, VE or V.

CRITICAL FACILITY: means a facility for which even a slight chance of flooding might be too great. Critical facilities include (but are not limited to) schools, nursing homes, hospitals, police, fire and emergency response installations, and installations which produce, use, or store hazardous materials or hazardous waste.

*** DEVELOPMENT:** means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials located within the area of special flood hazard.

**** ELEVATION CERTIFICATE:** means the official form (FEMA Form 81-31) used to track development, provide elevation information necessary to ensure compliance with community floodplain management ordinances, and determine the proper insurance premium rate with Section B completed by Community Officials.

ELEVATED BUILDING: means for insurance purposes, a non-basement building that has its lowest elevated floor raised above ground level by foundation walls, shear walls, post, piers, pilings, or columns.

EXISTING MANUFACTURED HOME PARK OR SUBDIVISION: means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the adopted floodplain management regulations.

EXPANSION TO AN EXISTING MANUFACTURED HOME PARK OR SUBDIVISION: means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

FLOOD or **FLOODING:** means a general and temporary condition of partial or complete inundation of normally dry land areas from:

1) The overflow of inland or tidal waters and/or
2) The unusual and rapid accumulation of runoff of surface waters from any source.

FLOOD INSURANCE RATE MAP (FIRM): means the official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

FLOOD INSURANCE STUDY (FIS): means the official report provided by the Federal Insurance Administration that includes flood profiles, the Flood Insurance Rate Maps, and the water surface elevation of the base flood.

FLOODWAY: means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.

*** LOWEST FLOOR:** means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access, or storage in an area other than a basement area, is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this ordinance found at Section 5.2-1(2), (i.e. provided there are adequate flood ventilation openings).

MANUFACTURED HOME: means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle."

MANUFACTURED HOME PARK OR SUBDIVISION: means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

NEW CONSTRUCTION: means structures for which the "start of construction" commenced on or after the effective date of this ordinance.

NEW MANUFACTURED HOME PARK OR SUBDIVISION: means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of adopted floodplain management regulations.

RECREATIONAL VEHICLE: means a vehicle,

1) Built on a single chassis;
2) 400 square feet or less when measured at the largest horizontal projection;
3) Designed to be self-propelled or permanently towable by a light duty truck; and
4) Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

START OF CONSTRUCTION: includes substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, placement or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent

construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

STRUCTURE: a walled and roofed building, including a gas or liquid storage tank that is principally above ground.

*** SUBSTANTIAL DAMAGE:** means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

*** SUBSTANTIAL IMPROVEMENT:** means any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either:

1) Before the improvement or repair is started; or
2) If the structure has been damaged and is being restored, before the damage occurred. For the purposes of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.

The term can exclude:

1) Any project for improvement of a structure to correct pre-cited existing violations of state or local health, sanitary, or safety code specifications which have been previously identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions, or
2) Any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

VARIANCE: means a grant of relief from the requirements of this ordinance that permits construction in a manner that would otherwise be prohibited by this ordinance.

WATER DEPENDENT: means a structure for commerce or industry that cannot exist in any other location and is dependent on the water by reason of the intrinsic nature of its operations.

SECTION 3.0 – GENERAL PROVISIONS *(Mandatory adoption requirements are listed per sub-section)*

3.1 LANDS TO WHICH THIS ORDINANCE APPLIES *(44 CFR 59.22(a))*

This ordinance shall apply to all areas of special flood hazards within the jurisdiction of _____.

3.2 BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD *(44 FR60.3(c)(1)(d)(2))*

The areas of special flood hazard identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance Study for (__*community name*__) " dated (___), (*20*__), and any revisions thereto***,** with an accompanying Flood Insurance Rate Map (FIRM), and any revisions thereto*****, are hereby adopted by reference and declared to be a part of this ordinance. The Flood Insurance Study and the FIRM are on file at (__*community address*__). The best available information for flood hazard area identification as outlined in Section 4.3-2 shall be the basis for regulation until a new FIRM is issued that incorporates data utilized under Section 4.3-2.

****** *In some communities, the phrase "and any revisions thereto" is not considered legally binding and should not be adopted.*

3.3 PENALTIES FOR NONCOMPLIANCE *(Not mandatory)*

No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this ordinance and other applicable regulations. Violations of the provisions of this ordinance by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions), shall constitute a misdemeanor. Any person who violates this ordinance or fails to comply with any of its requirements shall upon conviction thereof be fined not more than _____ or imprisoned for not more than __ days, or both, for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the _____ from taking such other lawful action as is necessary to prevent or remedy any violation.

3.4 ABROGATION AND GREATER RESTRICTIONS *(Not mandatory)*

This ordinance is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance and another ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

3.5 INTERPRETATION *(Not mandatory)*

In the interpretation and application of this ordinance, all provisions shall be:

1) Considered as minimum requirements;
2) Liberally construed in favor of the governing body; and,
3) Deemed neither to limit nor repeal any other powers granted under State statutes.

3.6 WARNING AND DISCLAIMER OF LIABILITY *(Not mandatory)*

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This ordinance shall not create liability on the part of _____, any officer or employee thereof, or the Federal Insurance Administration, for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made hereunder.

SECTION 4.0 – ADMINISTRATION

4.1 ESTABLISHMENT OF DEVELOPMENT PERMIT

4.1-1 DEVELOPMENT PERMIT REQUIRED *(44 CFR 60.3(b)(1))*

A development permit shall be obtained before construction or development begins within any area of special flood hazard established in Section 3.2. The permit shall be for all structures including manufactured homes, as set forth in the "Definitions," and for all development including fill and other activities, also as set forth in the "Definitions."

4.1-2 APPLICATION FOR DEVELOPMENT PERMIT *(Not Mandatory; however example permits are available from FEMA/DOE for review or use)*

Application for a development permit shall be made on forms furnished by the _____ and may include, but not be limited to, plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities, and the location of the foregoing. Specifically, the following

information is required:

1) Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures recorded on a current elevation certificate (FF 81-31) with Section B completed by the local official.
2) Elevation in relation to mean sea level to which any structure has been floodproofed;
3) Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet floodproofing criteria in Section 5.2-2;
4) Description of the extent to which a watercourse will be altered or relocated as a result of proposed development.

4.2 DESIGNATION OF THE LOCAL ADMINISTRATOR *(44 CFR 59.22(b)(1))*
(*Local Administrator*) is hereby appointed to administer and implement this ordinance by granting or denying development permit applications in accordance with its provisions.

4.3 DUTIES & RESPONSIBILITIES OF THE LOCAL ADMINISTRATOR *(Not mandatory)*
Duties of the (*Local Administrator*) shall include, but not be limited to:

4.3-1 PERMIT REVIEW

1) Review all development permits to determine that the permit requirements of this ordinance have been satisfied. *(Not mandatory)*
2) Review all development permits to determine that all necessary permits have been obtained from those Federal, State, or local governmental agencies from which prior approval is required. *(44 CFR 60.3(a)(2))*
3) Review all development permits to determine if the proposed development is located in the floodway. If located in the floodway, assure that the encroachment provisions of Section 5.4(1) are met. *(Not mandatory, but essential to enforce Washington's floodway law.)*

4.3-2 USE OF OTHER BASE FLOOD DATA (IN A AND V ZONES) *(44 CFR 60.3(b)(4))*
When base flood elevation data has not been provided (in A or V Zones) in accordance with Section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD, the (*Local Administrator*) shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source, in order to administer Sections 5.2, SPECIFIC STANDARDS, *and 5.4 FLOODWAYS.*

4.3-3 INFORMATION TO BE OBTAINED AND MAINTAINED *(The following language is required and should be adopted verbatim per 44 CFR)*

1) Where base flood elevation data is provided through the Flood Insurance Study, FIRM, or required as in Section 4.3-2, obtain and record the actual (as-built) elevation (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement. *(44 CFR 60.3(b)(5)(i))* Recorded on a current elevation certificate (FF 81-31) with Section B completed by the local official.
2) For all new or substantially improved floodproofed nonresidential structures where base flood elevation data is provided through the FIS, FIRM, or as required in Section 4.3-2:
   i) Obtain and record the elevation (in relation to mean sea level) to which the structure was floodproofed *(44 CFR 60.3(b)(5)(ii))*
   ii) Maintain the floodproofing certifications required in Section 4.1-2(3) *(44 CFR*

60.3(b)(5)(iii))

3) Maintain for public inspection all records pertaining to the provisions of this ordinance. *(44 CFR 60.3(b)(5)(iii))*

4.3-4 ALTERATION OF WATERCOURSES *(44 CFR 60.3(b)(6))*

1) Notify adjacent communities and the Department of Ecology prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration.

2) Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.

4.3-5 INTERPRETATION OF FIRM BOUNDARIES *(This section is not required, but if the Local Administrators are performing this task on a regular basis, it should be adopted.)*

Make interpretations where needed, as to exact location of the boundaries of the areas of special flood hazards (e.g. where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation. Such appeals shall be granted consistent with the standards of Section 60.6 of the Rules and Regulations of the National Flood Insurance Program (44 CFR 59-76).

4.4 CONDITIONS FOR VARIANCES *(Excerpts summarized from 44 CFR 60.6(a)(1-7)*

Communities are encouraged to adopt standards equal to or more restrictive than 44 CFR 60.6(a)(1-7) or use existing codes that meet or exceed these standards. FEMA may review a community's findings justifying the granting of variances, and if that review indicates a pattern inconsistent with the objectives of sound floodplain management, FEMA may take appropriate action under 44 CFR 59.24(b).

1) Generally, the only condition under which a variance from the elevation standard may be issued is for new construction and substantial improvements to be erected on a small or irregularly shaped lot contiguous to and surrounded by lots with existing structures constructed below the base flood level. As the lot size increases the technical justification required for issuing the variance increases.

2) Variances shall not be issued within a designated floodway if any increase in flood levels during the base flood discharge would result.

3) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

4) Variances shall only be issued upon:

   i) A showing of good and sufficient cause;

   ii) A determination that failure to grant the variance would result in exceptional hardship to the applicant;

   iii) A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.

5) Variances as interpreted in the National Flood Insurance Program are based on the general zoning law principle that they pertain to a physical piece of property; they are not personal in nature and do not pertain to the structure, its inhabitants, economic or financial circumstances. They primarily address small lots in densely populated residential neighborhoods. As such, variances from flood elevations should be quite rare.

6) Variances may be issued for nonresidential buildings in very limited circumstances to allow a lesser degree of floodproofing than watertight or dry-floodproofing, where it can be determined that such action will have low damage potential, complies with all other variance criteria except 4.4-2(1), and otherwise complies with Sections 5.1-1, 5.1-3, and 5.1-4 of the GENERAL STANDARDS.

7) Any applicant to whom a variance is granted shall be given written notice that the permitted structure will be built with its lowest floor below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk.

SECTION 5.0 – PROVISIONS FOR FLOOD HAZARD REDUCTION

5.1 GENERAL STANDARDS *(Section 5.0 is required)*

In all areas of special flood hazards, the following standards are required:

5.1-1 ANCHORING *(44 CFR 60.3(a)(b))*

1) All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure. *(44 CFR 60.3(a)(3)(i))*

2) All manufactured homes shall be anchored to prevent flotation, collapse, or lateral movement, and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors. *(44 CFR 60.3(b)(8)). For more detailed information, refer to guidebook, FEMA-85, "Manufactured Home Installation in Flood Hazard Areas."*

5.1-2 CONSTRUCTION MATERIALS AND METHODS *(44 CFR 60.3(a)(3)(ii-iv))*

1) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

2) All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

3) Electrical, heating, ventilation, plumbing, and air-conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding. Locating such equipment below the base flood elevation may cause annual flood insurance premiums to be increased.

5.1-3 UTILITIES *(44 CFR 60.3(a)(5)(6))*

1) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the systems;

2) Water wells shall be located on high ground that is not in the floodway*****

3) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters;

4) Onsite waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

****** *FEMA endorses the more restrictive WA floodway standard identified in WAC 173-160-171*

5.1-4 SUBDIVISION PROPOSALS *(44 CFR 60.3(a)(4)(b)(3))*

1) All subdivision proposals shall be consistent with the need to minimize flood damage;
2) All subdivision proposals shall have public utilities and facilities, such as sewer, gas, electrical, and water systems located and constructed to minimize or eliminate flood damage;
3) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage;
4) Where base flood elevation data has not been provided or is not available from another authoritative source, it shall be generated for subdivision proposals and other proposed developments which contain at least 50 lots or 5 acres (whichever is less).

5.1-5 REVIEW OF BUILDING PERMITS *(44 CFR 60.3(a)(3))*

Where elevation data is not available either through the Flood Insurance Study, FIRM, or from another authoritative source (Section 4.3-2), applications for building permits shall be reviewed to assure that proposed construction will be *reasonably safe from flooding*. The test of reasonableness is a local judgment and includes use of historical data, high water marks, photographs of past flooding, etc., where available. Failure to elevate at least two feet above the highest adjacent grade in these zones may result in higher insurance rates.

5.2 SPECIFIC STANDARDS *(44 CFR 60.3(c)(1))*

In all areas of special flood hazards where base flood elevation data has been provided as set forth in Section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD, or Section 4.3-2, USE OF OTHER BASE FLOOD DATA. Additional standards were clarified in FEMA Technical Bulletin 11-01 to allow crawlspace construction for buildings located in the special flood hazard areas; however, adopting this provision can result in a 20% increase in flood insurance premiums. The following provisions are required:

5.2-1 RESIDENTIAL CONSTRUCTION *(44 CFR 60.3(c)(2)(5))*

1) New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated one foot or more***** above the base flood elevation (BFE).

   ****** *Minimum FEMA standards require the lowest floor to be elevated "to or above" the BFE; however, adding an additional foot of freeboard increases safety and can reduce insurance premiums by as much as 30%. Adopting additional freeboard is strongly encouraged by FEMA. This note applies throughout the model ordinance.*

2) Fully enclosed areas below the lowest floor that are subject to flooding are prohibited, or shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria:
   i) A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.
   ii) The bottom of all openings shall be no higher than one foot above grade.
   iii) Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

   Foundation vent standards required by the IBC/IRC outside the floodplain do not meet this standard and are often inadvertently permitted. Insurance rates reflect an "all or nothing" standard, meaning, partially ventilated crawlspaces may be subject to an additional loading fee of 20-25% attached to the annual insurance premium.

5.2-2 NONRESIDENTIAL CONSTRUCTION *(44 CFR 60.3(c)(3)(4))*

New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall either have the lowest floor, including basement, elevated one foot or more***** above the base flood elevation; or, together with attendant utility and sanitary facilities, shall:

1) Be floodproofed so that below one foot or more above the base flood level the structure is watertight with walls substantially impermeable to the passage of water;
2) Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;
3) Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this subsection based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the official as set forth in Section 4.3-3(2);
4) Nonresidential structures that are elevated, not floodproofed, must meet the same standards for space below the lowest floor as described in 5.2-1(2);

* *Applicants who are floodproofing nonresidential buildings should be notified that flood insurance premiums will be based on rates that are one foot below the floodproofed level (e.g. a building floodproofed to the base flood level will be rated as one foot below). Floodproofing the building an additional foot will reduce insurance premiums significantly.*

5.2-3 MANUFACTURED HOMES *(44 CFR 60.3(c)(6)(12))*

1) All manufactured homes in the floodplain to be placed or substantially improved on sites shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated one foot or more above* the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement.

5.2-4 RECREATIONAL VEHICLES *(44 CFR 60.3(c)(14))*

Recreational vehicles placed on sites are required to either:

1) Be on the site for fewer than 180 consecutive days, *(or)*
2) Be fully licensed and ready for highway use, on wheels or jacking system, attached to the site only by quick disconnect type utilities and security devices, and have no permanently attached additions; or
3) Meet the requirements of 5.2-3 above and the elevation and anchoring requirements for manufactured homes.

5.3 AE AND A1-30 ZONES WITH BASE FLOOD ELEVATIONS BUT NO FLOODWAYS *(44 CFR 60.3(c)(10))*

In areas with base flood elevations (but a regulatory floodway has not been designated), no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.

5.4 FLOODWAYS *(Note the more restrictive language for floodway development per RCW 86.16)*

Located within areas of special flood hazard established in Section 3.2 are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of floodwaters that can carry debris, and increase erosion potential, the following provisions apply:

1) Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless certification by a registered professional engineer is provided demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels during the occurrence of the base flood discharge. *(44 CFR 60.3(d)(3))*

2) Construction or reconstruction of residential structures is prohibited within designated floodways*****, except for (i) repairs, reconstruction, or improvements to a structure which do not increase the ground floor area; and (ii) repairs, reconstruction or improvements to a structure, the cost of which does not exceed 50 percent of the market value of the structure either, (A) before the repair, or reconstruction is started, or (B) if the structure has been damaged, and is being restored, before the damage occurred. Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions, or to structures identified as historic places, may be excluded in the 50 percent.

   ***** *FEMA endorses the more restrictive WA floodway standard adopted in WAC 173-158-070.*

3) If Section 5.4(1) is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Section 5.0, PROVISIONS FOR FLOOD HAZARD REDUCTION.

5.7 CRITICAL FACILITY *(Not mandatory)*

Construction of new critical facilities shall be, to the extent possible, located outside the limits of the Special Flood Hazard Area (SFHA) (100-year floodplain). Construction of new critical facilities shall be permissible within the SFHA if no feasible alternative site is available. Critical facilities constructed within the SFHA shall have the lowest floor elevated three feet above BFE or to the height of the 500-year flood, whichever is higher. Access to and from the critical facility should also be protected to the height utilized above. Floodproofing and sealing measures must be taken to ensure that toxic substances will not be displaced by or released into floodwaters. Access routes elevated to or above the level of the base flood elevation shall be provided to all critical facilities to the extent possible.

Appendix E

FEMA Mapping Requirements

Floodplain Management Criteria Associated with Each Level of Community-based Analysis

Chapter and Section	Level of Analysis Performed (Summary)	Minimum Criteria
44 CFR §60.3 (a)	No SFHA defined No water surface elevation data No regulatory floodway or coastal high hazard area Community has indicated the presence of such hazards	▪ Require permits for all proposed construction or other development in the community, including the placement of manufactured homes, so that it may determine whether such construction or other development is proposed within flood-prone areas; ▪ Review proposed development to assure that all necessary permits have been received from those governmental agencies from which approval is required by Federal and State law, including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334; ▪ Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall (i) be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including effects on buoyancy, (ii) be constructed with materials resistant to flood damage, (iii) be constructed by methods and practices that minimize flood damages, and (iv) be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding. ▪ Review subdivision proposals and other proposed new development, including manufactured home parks or subdivisions to determine whether such proposals will be reasonably safe from flooding. If a subdivision proposal or other proposed new development is in a flood-prone area, any such proposals shall be reviewed to assure that (i) all such proposals are consistent with the need to minimize flood damage within the flood-prone area, (ii) all public utilities and facilities, such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damage, and (iii) adequate drainage is provided to reduce hazards; ▪ Require within flood-prone areas new and replacement water supply systems to be designed to minimize or eliminate infiltration of flood waters into the systems; and ▪ Require within flood-prone areas (i) new and replacement sanitary sewage systems to

Floodplain Management Criteria Associated with Each Level of Community-based Analysis

Chapter and Section	Level of Analysis Performed (Summary)	Minimum Criteria
		be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters and (ii) onsite waste disposal systems to be located to avoid impairment to them or contamination from them during flooding.
44 CFR §60.3 (b)	SFHA (A zones) designated, by publication of FHBM or FIRM No water surface elevation data No regulatory floodway or coastal high hazard area	▪ Require permits for all proposed construction and other development including the placement of manufactured homes, within Zone A on the community's FHBM or FIRM; ▪ Require the application of the standards in paragraphs (a) (2), (3), (4), (5), and (6) of this section to development within Zone A on the community's FHBM or FIRM; ▪ Require that all new subdivision proposals and other proposed development (including proposals for manufactured home parks and subdivisions) greater than 50 lots or 5 acres, whichever is lesser, include within such proposals base flood elevation (BFE) data; ▪ Obtain, review and reasonably utilize any BFE and floodway data available from a Federal, State, or other source, including data developed pursuant to paragraph (b)(c) of this section, as criteria for requiring that new construction, substantial improvements, or other development in Zone A on the community's FHBM or FIRM meet the standards in paragraphs (c)(2), (c)(3), (c)(5), (c)(6), (c)(12), (c)(14), (d)(2), and (d)(3) of this section; ▪ Where BFE data are utilized, within Zone A on the community's FHBM or FIRM: o (i) Obtain the elevation (in relation to mean sea level) of the lowest floor (including basement) of all new and substantially improved structures, and o (ii) Obtain, if the structure has been flood-proofed in accordance with the paragraph (c)(3)(ii) of this section, the elevation (in relation to mean sea level) to which the structure was flood-proofed, and o (iii) Maintain a record of all such information with the official designated by the community under §59.22 in (a)(9)(iii); ▪ Notify, in riverine situations, adjacent communities and the State Coordinating Officer prior to any alteration or relocation of a watercourse, and submit copies of such

Floodplain Management Criteria Associated with Each Level of Community-based Analysis

Chapter and Section	Level of Analysis Performed (Summary)	Minimum Criteria
		notifications to the Administrator; ▪ Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained; ▪ Require that all manufactured homes to be placed within Zone A on a community's FHBM or FIRM shall be installed using methods and practices to minimize flood damage. For the purposes of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.
44 CFR §60.3 (c)	Final flood elevation for one or more SFHA on the community's FIRM Other SFHAs without BFEs designated on the FIRM No regulatory floodway or coastal high hazard area	▪ Require the standards of paragraph (b) of this section within all A1-30 zones, AE zones, A zones, AH zones, and AO zones, on the community's FIRM; ▪ Require that all new construction and substantial improvements of residential structures within Zones A1-30, AE and AH zones on the community's FIRM have the lowest floor (including basement) elevated to or above the base flood level , unless the community is granted an exception by the Administrator for the allowance of basements in accordance with §60.6 (b) or (c); ▪ Require that all new construction and substantial improvement of non-residential structures within Zones A1-30, AE, and AH zones on the community's firm (i) have the lowest floor (including basement) elevated to or above the base flood level or, (ii) together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; ▪ Provide that where a non-residential structure is intended to be made watertight below the base flood level, (i) a registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with

Floodplain Management Criteria Associated with Each Level of Community-based Analysis

Chapter and Section	Level of Analysis Performed (Summary)	Minimum Criteria
		accepted standards of practice for meeting the applicable provisions of paragraph (c)(3)(ii) or (c)(8)(ii) of this section, and (ii) a record of such certificates which includes the specific elevation (in relation to mean sea level) to which such structures are flood-proofed shall be maintained with the official designated by the community under §59.22(a)(9)(iii); ▪ Require, for all new construction and substantial improvements, that fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria: A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters. ▪ Require that manufactured homes are placed or substantially improved within Zones A1-30, AH, and AE on the community's FIRM on sites o (i) Outside of a manufactured home park or subdivision, o (ii) In a new manufactured home park or subdivision, o (iii) In an expansion to an existing manufactured home park or subdivision, or o (iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist floatation collapse and lateral movement.

Floodplain Management Criteria Associated with Each Level of Community-based Analysis

Chapter and Section	Level of Analysis Performed (Summary)	Minimum Criteria
		▪ Require within any AO zone on the community's FIRM that all new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified); ▪ Require within any AO zone on the community's FIRM that all new construction and substantial improvements of nonresidential structures (i) have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified), or (ii) together with attendant utility and sanitary facilities be completely flood-proofed to that level to meet the flood-proofing standard specified in §60.3(c)(3)(ii); ▪ Require within any A99 zone on a community's FIRM the standards of paragraphs (a)(1) through (a)(4)(i) and (b)(5) through (b)(9) of this section; ▪ Require until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's FIRM unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community. ▪ Require within Zones AH and AO, adequate drainage paths around structures on slopes, to guide floodwaters around and away from proposed structures. ▪ Require that manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A1-30, AH, and AE on the community's FIRM that are not subject to the provisions of paragraph (c)(6) of this section be elevated so that either o (i) The lowest floor of the manufactured home is at or above the BFE, or o (ii) The manufactured home chassis is supported by reinforced piers or other

Floodplain Management Criteria Associated with Each Level of Community-based Analysis

Chapter and Section	Level of Analysis Performed (Summary)	Minimum Criteria
		foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement. ▪ Notwithstanding any other provisions of §60.3, a community may approve certain development in Zones A1-30, AE, and AH, on the community's FIRM which increase the water surface elevation of the base flood by more than one foot, provided that the community first applies for a conditional FIRM revision, fulfills the requirements for such a revision as established under the provisions of §65.12, and receives the approval of the Administrator. ▪ Require that recreational vehicles placed on sites within Zone A1-30, AH, and AE on the community's FIRM either o Be on the site for fewer than 180 consecutive days, o Be fully licensed and ready for highway use, or o Meet the permit requirements of paragraph (b)(1) of this section and the elevation and anchoring requirements for "manufactured homes" in paragraph (c)(6) of this section.
44 CFR §60.3 (d)	Final BFEs within Zones A1-30 and/or AE zones If appropriate, designated AO zones, AH zones, A99 zones, and A zones Regulatory floodway designated	▪ Meet the requirements of paragraphs (c)(1) through (14) of this section; ▪ Select and adopt a regulatory floodway based on the principle that the area chosen for the regulatory floodway must be designed to carry the waters of the base flood without increasing water surface elevation of that flood more than one foot at any point; ▪ Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment will not result in any increase in flood levels within the community during the occurrence of the base flood discharge; ▪ Notwithstanding any other provisions of §60.3, a community may permit encroachments within the adopted regulatory floodway that would result in an increase

Floodplain Management Criteria Associated with Each Level of Community-based Analysis

Chapter and Section	Level of Analysis Performed (Summary)	Minimum Criteria
		in base flood elevations, provided that the community first applies for a conditional FIRM and floodway revision, fulfills the requirements for such revisions as established under the provisions of §65.12, and receives approval from the Administrator.
44 CFR §60.3 (e)	Final BFEs within Zones A1-30 and/or AE zones If appropriate, designated AO zones, AH zones, A99 zones, and A zones Coastal high hazard areas designated (Zones V1-30, VE, and/or V)	▪ Meet the requirements of paragraphs (c)(1) through (14) of this section; ▪ Within Zones V1-30, VE, and V on a community's FIRM, (i) obtain the elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings and columns) of all new and substantially improved structures, and whether or not such structures contain a basement, and (ii) maintain a record of all such information with the official designated by the community under §59.22(a)(9)(iii); ▪ Provide that all new construction within Zones V1-30, VE, and V on the community's FIRM is located landward of the reach of mean high tide; ▪ Provide that all new construction and substantial improvements in Zones V1-30 and VE, and also Zone V is BFE data is available, on the community's FIRM, are elevated on pilings and columns so that (i) the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level; and (ii) the pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction used are in accordance with accepted standards of practice for meeting the provisions of paragraphs (e)(4)(i) and (ii) of this section. ▪ Provide that all new construction and substantial improvements within Zones V1-30, VE, and V on the community's FIRM have the space below the lowest floor either

Floodplain Management Criteria Associated with Each Level of Community-based Analysis

Chapter and Section	Level of Analysis Performed (Summary)	Minimum Criteria
		free of obstruction or constructed with non-supporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads without collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system. For the purposes of this section, a breakaway wall shall have a design safe loading resistance of not less than 10 and no more than 20 pounds per square foot. (either by design or when so required by local or State codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions: o (i) Breakaway wall collapse shall result from a water load less than that which would occur during the base flood; and, o (ii) The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and non-structural). [See conditions for wind and water loads in (e)(4).] ▪ Prohibit the use of fill for structural support of buildings within Zones V1-30, VE, and V on the community's FIRM; ▪ Prohibit man-made alterations of sand dunes and mangrove stands within Zones V1-30, VE, and V on the community's FIRM which would increase potential flood damage. ▪ Require that manufactured homes placed or substantially improved within Zones V1-30, V, and VE on the community's FIRM on sites o (i) Outside of a manufactured home park or subdivision, o (ii) In a new manufactured home park or subdivision, o (iii) In an expansion to an existing manufactured home park or subdivision, o (iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, meet the standards of paragraphs (e)(2) through (7) of this section and that

Floodplain Management Criteria Associated with Each Level of Community-based Analysis

Chapter and Section	Level of Analysis Performed (Summary)	Minimum Criteria
		manufactured homes placed or substantially improved on other sites in an existing manufactured home park or subdivision within Zones V1-30, V, and VE on the community's FIRM meet the requirements of paragraphs (c)(12) of this section. ▪ Require that recreational vehicles placed on sites within Zones V1-30, V, and VE on the community's FIRM either o Be on the site for fewer than 180 consecutive days, o Be fully licensed and ready for highway use, or o Meet the requirements in paragraphs (b)(1) and (e)(2) through (7) of this section.

Appendix F

Matrix of Pathways and Indicators

NOAA Fisheries Matrix of Pathways and Indicators for Freshwater Systems

Pathway	Indicator	Properly Functioning	At Risk	Not Properly Functioning
Water Quality	Temperature	50 to 57 °F	Spawning 57 to 60 °F Migration/Rearing 57 to 64 °F	Spawning > 60 °F Migration/rearing >64 °F
	Sediment/Turbidity (spawning habitat)	<12% fines (<0.85mm) in gravel Turbidity low	12 to 17% west side 12 to 20% east side Turbidity moderate	>17% west side >20% east side, fines at surface or depth in spawning habitat Turbidity high
	Chemical Contamination and Nutrients	Low levels of chemical contamination from agriculture, stormwater runoff, industrial, etc., no excess nutrients, no CWA 303d designated reaches.	Moderate levels of chemical contamination from agriculture, stormwater runoff, industrial, etc., some excess nutrients, one CWA 303d designated reaches	High levels of chemical contamination from agriculture, stormwater runoff, industrial, etc., high levels of excess nutrients, more than one CWA 303d designated reach.
Habitat Access	Physical Barriers	Manmade barriers in watershed don not restrict upstream and downstream fish passage at all flows.	Manmade barriers in watershed do not allow upstream and/or downstream fish passage at base/low flows.	Manmade barriers in watershed do not allow upstream and/or downstream fish passage at a range of flows.
	Substrate	Dominant substrate is gravel or cobble (interstitial spaces clear) or embeddedness <20%.	Gravel or cobble is subdominant or if dominant, embeddedness is 20 – 30%.	Gravel or cobble is subdominant or if dominant, embeddedness >30%.

NOAA Fisheries Matrix of Pathways and Indicators for Freshwater Systems

Pathway	Indicator	Properly Functioning	At Risk	Not Properly Functioning
Habitat Access (cont.)	Large Woody Debris	Coastal WA: >80 pieces/mile >24 in dia. >50 ft length. East side: >20 pieces/mile >12 in. dia. > 35 ft length and adequate sources of woody debris recruitment in riparian areas.	Currently meets standards for properly functioning, but lacks potential sources from riparian areas of woody debris recruitment to maintain that standard.	Does not meet standards for properly functioning and lacks potential large woody material recruitment.
	Pool Frequency	Meets LWM standards Pool frequency in a reach closely approximates: Channel width (ft) / # pools/mi 5 / 184 10 / 96 15 / 70 20 / 56 25 / 47 50 / 26 75 / 23 100 / 18	Meets pool frequency standards but large woody material recruitment inadequate to maintain pools over time.	Does not meet pool frequency standards

NOAA Fisheries Matrix of Pathways and Indicators for Freshwater Systems

Pathway	Indicator	Properly Functioning	At Risk	Not Properly Functioning
	Pool Quality	Pools> 1m deep (holding pools) with good cover and cool water, minor reduction of pool volume by fine sediment.	Few deeper pools >1m deep present or inadequate cover/temperature, moderate reduction of pool volume by fine sediment	No deep pools >1m and inadequate cover/temperature, major reduction of pool volume by fine sediment.
	Off Channel Habitat	Numerous ponds, oxbows and backwater areas with cover and low energy off-channel areas (ponds oxbows, etc.)	Some ponds, oxbows, and backwater areas with cover but side channels with high energy.	Few or no ponds, oxbows or backwaters, no off-channel ponds.
	Refugia	Habitat refugia exist and are buffered by intact riparian reserves. Existing refugia are sufficient in size, number and connectivity to maintain viable populations or sub-populations.	Habitat refugia exists but are not adequately buffered (by intact riparian reserves) existing refugia are insufficient in size, number, and connectivity to maintain viable populations or sub-populations.	Adequate habitat refugia do not exist.
Channel Conditions and Dynamics	Width/Depth Ratio	<10	10 to 12	>12
	Streambank Condition	>90% stable (on average <10% of banks are eroding)	80 to 90% stable.	<80% stable.

NOAA Fisheries Matrix of Pathways and Indicators for Freshwater Systems

Pathway	Indicator	Properly Functioning	At Risk	Not Properly Functioning
	Floodplain Connectivity	Off-channel areas are frequently hydrologically linked to main channel, over bank flows occur and maintain wetland functions, riparian vegetation and succession.	Reduced linkage of wetland, floodplains and riparian areas to main channel; overbank flows are reduced relative to historic frequency as evidenced by moderate Degradation of wetland function, riparian vegetation and succession.	Severe reduction in hydrological connectivity between off-channel wetland, floodplains, and riparian areas; wetland extent drastically reduced and riparian vegetation/succession altered significantly.
Flow/Hydrology	Change in Peak/Base Flows	Watershed hydrograph indicates peak flow, base flow and flow timing characteristics comparable to an undisturbed watershed of similar size, geology, and geography.	Some evidence of altered peak flow, baseflow, and/or flow timing relative to an undisturbed watershed of similar size, geology, and geography.	Pronounced changes in peak flow, baseflow, and flow timing relative to an undisturbed watershed of similar size geology and geography.
	Increase in Drainage Network	Zero or minimum increase in drainage network density due to roads or human caused disturbance.	Low to moderate increased in drainage network density due to human caused disturbance.	Greater than moderate increase in drainage network density doe to human caused disturbance (e.g., >20 to 25% increase).

NOAA Fisheries Matrix of Pathways and Indicators for Freshwater Systems

Pathway	Indicator	Properly Functioning	At Risk	Not Properly Functioning
Watershed Conditions	Road Density and Location	<2mi/mi^2, no valley bottom roads.	2 to 3 mi/mi^2, some valley bottom roads.	>3 mi/mi^2, many valley bottom roads.
	Disturbance History	<15% (entire watershed) with no concentration of disturbance in unstable areas, and/or refugia and/or riparian area and for NWFP area (except AMA), =15% retention of LSOG in watershed.	<15% (entire watershed) but disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian area and for NWFP area (except AMA), =15% retention of LSOG in watershed.	>15% (entire watershed) and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian area, does not meet NWFP standard for LSOG retention.
	Riparian Reserve	Riparian corridor provides adequate shade, large woody material recruitment, habitat protection and connectivity in all sub-watersheds and buffers. Riparian corridor is at least 80% intact. Greater than 50% of riparian vegetation is composed of endemic spp.	Riparian corridor has a moderate loss of connectivity or function affecting shade, large woody material recruitment, etc. (70 – 80% intact). Between 25 and 50% of riparian vegetation is endemic.	Riparian corridor is narrow, fragmented, poorly connected or provides inadequate protection of habitat (<70% intact). Less than 25% of riparian vegetation is endemic.

Matrix of Pathways and Indicators for Salmonid Estuarine and Marine Habitat

Pathway	Indicator	Properly Functioning	At Risk	Not Properly Functioning
Water Quality	Turbidity	Low	Moderate > 300 mg/l	High >4,000 mg/l
	Dissolved Oxygen	>6 mg/l	6 – 4.25 mg/l	<4.25 mg/l
	Water Contamination/Nutrients			
	Sediment Contamination			
Physical Habitat Elements	Substrate/Armoring	Natural conditions, mud or sand nearshore habitat	Minor amounts of shoreline armoring.	Extensive shoreline armoring.
	Depth and Slope	Juveniles: shallow nearshore habitat, gentle slope. Adults: prefer deeper water	Some bank steeping, loss of nearshore habitat.	Steep banks and lack of shallow nearshore habitat.
	Extent of Estuarine Fill	Extensive areas of estuarine wetland, limited fill.	Moderate amounts of estuarine fill.	Large amounts of estuarine fill.
	Physical Barriers (bridges, piers, floating structures, etc.)	Natural conditions dominate, limited barriers to nearshore migration.	Moderate amount of barriers to nearshore migration.	Large areas of barriers to nearshore salmon migration.
	Current and Estuarine Mixing Patterns	Dominated by natural conditions	Alteration of natural conditions, effects on water quality, and habitat.	Significant alternation of natural conditions.
Biological Habitat Elements	Juvenile Salmon Prey Availability (Benthic and Epibenthic)	Diverse epibenthic community including Harpacticoid copepods	Moderately diverse epibenthic community	Low diversity of epibenthic community, lack of Harpacticoid copepods.
	Forage Fish Community	Natural community including herring, sand lance, and perch.	Moderate diversity of forage fish.	Low abundance and diversity of forage fish.
	Aquatic Vegetation	Diverse communities eelgrass, algae, and kelp	Moderate diversity and abundance.	Low diversity and abundance, lack of estuarine vegetation.

Source: Beauchamp et al. 1983, Healy 1991, Healy 1982, and Reiser and Bjornn 1979.

Appendix G

History of the 1% Chance Flood Standard

HISTORY OF THE 1 PERCENT CHANCE FLOOD STANDARD

By Michael F. Robinson, DHS/FEMA

The following discussion is based on information obtained from publications and documents in Department of Homeland Security/Federal Emergency Management Agency files. Only limited information is available in those files on the history of the 1 percent chance flood prior to the establishment of the National Flood Insurance Program (NFIP). I used the term "100-year flood standard" in place of "1 percent chance flood standard" where appropriate to reflect the terminology that was in use at the time.

Evolution of the 100-year Flood Standard

Prior to the 1950's and 1960's the primary governmental response to floods was structural flood control and the only flood standards in use were the design standards for those projects. The Tennessee Valley Authority (TVA) used the "maximum probable flood" and the U.S. Army Corps of Engineers (USACE) used the "standard project flood" as their design standards. As these agencies began moving toward nonstructural floodplain management, there was a recognized need for a different standard that conveyed a level of flood risk that was more appropriate for land use planning and regulation by communities and more meaningful for individuals.

Flood information was initially provided to communities and individuals based on the historical flood of record. However, it was generally recognized that this flood was more a matter of chance and did not adequately reflect the risk of flooding for an area. When TVA began its nonstructural community flood damage prevention program in 1953 it adopted as its standard a "regional flood" which was estimated to be on the order of a 50-year flood or greater. As USACE began to provide floodplain management assistance to communities under the Flood Control Act of 1960 it adopted an intermediate regional flood that approximated the 100-year flood as its standard for nonstructural activities. By the early 1960's, both USACE and TVA recognized the need for a uniform standard and agreed on the 100-year standard. The few state floodplain management programs that had been established by the late 1960's generally also adopted the 100-year standard.

Several other standards were also in use during this period. The Connecticut Resources Commission began to use 5-7 times the mean annual flood as a standard. This equated to between a 35- and 150 year level of protection, depending on the watershed. Their reason for adopting this standard instead of the 100-year flood or some other frequency-based standard was that there was no uniform method for determining flood frequencies. Other standards that were in use at this time include the Soil Conservation Services (SCS) watershed protection program that used the 25-year flood in rural areas and the 100-year flood in urban areas and the U.S. Geological Survey that provided flood data based on the 50-year flood. USGS was initially reluctant to provide information on the 100-year flood because it required extrapolating data beyond experience.

By the late 1960's government agencies seemed to be coalescing around the 100-year standard as the standard for floodplain management. However, other standards were still in use and there was still no national standard that was agreed to by all agencies.

Executive Order 11296

In August 1966, the President issued Executive Order 11296 on *Evaluation of Flood Hazard in Locating Federally Owned or Financed Buildings, Roads, and Other Facilities and Disposing of Federal Lands and Properties*. E.O. 11296 directs Federal agencies to take flooding into account when making decisions, but contains no standard level of protection. Federal agencies were to develop joint implementing procedures and regulations. This was a several year process and U.S. Water Resources Council did not issue final guidelines for evaluating flood hazards until May of 1972. These guidelines recommended that agencies use the 100-year flood as the "basic flood" to identify and evaluate flood hazards, but provided for the use of smaller and larger floods as appropriate.

Adoption of the 100-year Standard by the National Flood Insurance Program

The National Flood Insurance Act of 1968 that established the National Flood Insurance Program (NFIP) directed U.S. Department of Housing and Urban Development (HUD) to establish floodplain management criteria and to designate flood hazard areas, but was silent on the standard that was to be used. HUD contracted with the University of Chicago's Center for Urban Studies to conduct a seminar to make recommendations on the floodplain management criteria that HUD was to develop. This meeting, chaired by Gilbert White, was held from December 16-18, 1968 and is commonly referred to as the Chicago Seminar. The report recommends that the regulations apply in "that portion of the flood plain subject to inundation by the 100-year flood".

One of the work groups at the seminar had the responsibility of developing hydrologic standards for the identification of floodprone areas and for regulations. Nick Lally included his recollections of this group's deliberations in a paper prepared for FEMA in1982.

> "The group deliberated about 1 ½ days and finally recommended that the 100-year flood would be a reasonable level to use in identifying flood prone areas. ...The recommended level was a compromise that all of those present were comfortable with and could support. There was no attempt to make any economic analysis due to the constraints of time."

One member of the group supported the 100-year standard, but felt that local deviations should be allowed. The consensus of the group was that, since the NFIP was a new program that was badly needed, it should not be made more complicated by allowing deviations from the 100-year standard.

On February 27, 1969, HUD's Federal Insurance Administration (FIA) published a proposed rule that contains the first floodplain management criteria developed for the NFIP. This proposed rule does not mention the 100-year flood or any other standard (it may have been too soon after the Chicago meeting for a decision on a standard to be made). The June 18, 1969 Final Rule defines "Floodplain having special flood hazards" as the 100-year floodplain for mapping purposes, but only requires that communities "should take into account the relation between first floor elevations and the anticipated level of the 100-year flood" in developing their floodplain management measures. It was not until the June 9, 1971 proposed rule and September 10,1971 final rule that the NFIP specifically tied the regulatory requirements of the program to the 100-year flood standard.

With its adoption and use by the NFIP, the 100-year flood standard became the de facto national standard for floodplain management. Since most floodplain mapping was now being done in support of the NFIP and communities had to meet NFIP minimum requirements to be eligible for flood insurance, the 100-year flood standard soon replaced any other standards that were still in use.

Senate Hearings on the Flood Disaster Protection Act of 1973

The key issue at the U.S. Senate Committee on Banking, Housing, and Urban Affairs hearing on the Flood Disaster Protection Act of 1973 was the NFIP's adoption of the 100-year standard and not the imposition of the prohibitions on federal assistance in designated floodplains or the mandatory flood insurance purchase requirement. Much of the opposition to the standard came from communities. Most cited the perceived devastating economic impacts on communities of using this large of a flood to designate floodplains and as a basis for mandatory purchase and floodplain management regulations. For example the City of Savannah testified that they had only sustained $10 million in damages since 1900, yet it would cost $100 million to $700 million to meet floodplain management requirements based on the 100-year standard.

Alternatives that were discussed at the hearing include the 50-year standard, the historical flood of record, and a flexible standard that would recognize the differences in damages that would occur under a variety of flooding condition. FIA and USACE both prepared papers supporting of the 100-year standard that were submitted for the record. These papers both argued that the 100-year standard was a reasonable standard that provided the proper balance between the competing needs for economic development and flood protection and that there was a need for a uniform standard to administer the NFIP. Gilbert White, Jon Kusler and James Wright testified on a panel in support of the standard with Jon Kusler raising the additional concern that the 100-year standard may not be restrictive enough.

In the Committee Report, the Committee "agreed that the 100-year standard or the flood that has a one percent chance of occurrence is reasonable and consistent with Nationwide standards for flood protection". In retrospect this endorsement by the Senate Committee settled the issue of the 100-year standard even though there continued to be challenges to its use. For example, the issue was again raised in hearings on amendments to the National Flood Insurance Act in 1974. The 1974 amendments also are the first time the 100-year flood is specifically mentioned in NFIP legislation although only in the context of limiting flood insurance premiums where adequate progress had been made on constructing Federal flood control projects.

Base Flood

During this period concerns were raised that the term 100-year flood was misleading and that other terminology should be used. In an October 15, 1976 letter the Water Resources Council's Hydrology Committee recommended that Federal agencies use descriptive terminology for future flood events that would convey to the public their probabilistic character. In keeping with the discussion that preceded this recommendation, HUD/FIA's March 26, 1975 proposed rule and October 26, 1976 final rule introduced the terms "base flood" and "base flood elevation" and began to phase out the use of the term "100-year flood". Base flood was defined was defined as "the flood having a one percent chance of

being equaled or exceeded in any given year." The term 100-year flood is still used in the NFIP as a colloquial term and is still used on flood hazard maps, but does not appear in the floodplain management regulations.

In the national hearings and comment period held during the development of the October 26, 1976 final rule, there was again discussion on the NFIP's use of the 100-year standard. Comments were divided, some wanting a less restrictive standard, others advocating elevating structures to a height exceeding the base flood elevation, and still others wanting to allow no new construction in the floodplain. In the final rule the FIA Administrator stated that he continued to believe that elevating to above the base flood elevation was reasonable and no changes were made to the standard.

Executive Order 11988, Floodplain Management

On May 24, 1977, President Carter issued Executive Order 11988, *Floodplain Management.* The Executive Order directs Federal agencies to use HUD (now FEMA) maps to determine if an action will occur in the floodplain and to adopt regulations and procedures consistent with those promulgated under the National Flood Insurance Program. This in effect established the 100-year standard as the minimum for evaluation of all Federal actions. The U.S. Water resources Council *Floodplain Management Guidelines for Implementing E.O. 11988* introduced the concept of providing 500-year protection to "critical actions". "Critical actions" include those actions for which even a slight chance of flooding would be too great. Examples include hazardous materials, hospitals, and emergency services.

The Presidents Commission on Housing, the Vice Presidents Task Force on Regulatory Relief, and FEMA's Report on the 100-year Base Flood Standard

The Presidents Commission on Housing was established in June of 1981 and charged with reviewing all existing Federal housing policy and programs and assessing factors that contribute to the cost of housing. Much of the focus of the commission was on removing regulatory barriers and not on issues such as providing adequate flood protection to housing. The Commission provided a forum for HUD and others to again raise issues associated with the 100-year standard. The Commission recommended reevaluating and revising the 100-year standard to "take into account water height, velocity of flow, frequency of flooding, quality of floodwater (sediment and debris), historical flood-loss experience, socioeconomic costs (both in terms of damage and of removal of land from development), and maximum average annual damages…" They suggested substituting a risk-based approach based on an acceptable level of flood damage to structures for the 100-year standard.

Based on the recommendations of the Presidents Commission on Housing, the Vice Presidents Task Force on Regulatory Relief included the 100-year standard and Executive Order 11988, *Floodplain Management* on its list of Federal regulations and policies that might impose severe hardships on States, local entities, and citizens.

The Office of Management and Budget (OMB) then directed FEMA to undertake a review of the 100-year base flood standard and Executive Order 11988. FEMA reviewed the history and usage of the standard and conducted a formal solicitation of comments from Federal agencies, the Governors and others. Again, no effort was made to analyze the standard in terms of costs and benefits. Federal and State agencies, communities, and individuals

submitted 105 comments on the 100-year Base Flood Standard. The responses were overwhelmingly in support of retaining the 100-year base flood standard. FEMA submitted its report to OMB in September of 1983. Findings and conclusions were:

- The 100-year base flood standard was strongly supported and being applied successfully by all levels of government.
- No alternatives were identified that were superior to it, and there was no evidence to justify the expenditure of funds that would be necessary to convert to another standard.
- Improvements or refinements in application of the 100-year base flood standard to unique flooding situations could further effect flood loss reduction.

FEMA recommended to OMB that the base flood standard be retained. In a January 6, 1984 letter, OMB agreed with FEMA's conclusions and concluded that "the 100-year base flood standard appears to be working well and, given it's widespread use, it does not appear to be in the public interest to adopt another methodology."

Discussions on the 1 Percent Chance Flood Standard Since 1983

Since 1983, there has been very little discussion on changing the 1 percent chance flood standard to an alternative standard. The standard has been incorporated into policies and programs at all levels of government and any change would be exceedingly costly and disruptive. The need to provide protection to at least the 1 percent chance flood has become almost universally accepted. Communities seldom argue that implementation of floodplain management regulations that use the 1 percent chance flood standard will cause severe economic harm.

Most of the discussion has instead focused on how the standard is applied and, in particular, whether current NFIP minimum requirements are achieving a 1 percent chance flood level of protection. A major concern has been how that the level of protection can deteriorate over time due to factors such as urbanization, coastal erosion, and floodplain encroachment that tend to increase flood risk. The Association of State Floodplain Managers' (ASFPM) "No Adverse Impact" initiative in part is intended to address many of these issues.

Examples of actions that can be taken beyond NFIP minimum requirements to prevent future increases in flood damages include:

- Use of future conditions hydrology, particularly in rapidly urbanizing areas,
- Stormwater management and regulation to reduce increases in run-off,
- Preservation of floodplain storage,
- Designation of zero rise floodways, and
- Use of Freeboard

In addition, there are special hazards that are not adequately addressed by current NFIP mapping and minimum floodplain management standards, such as:

- Areas subject to coastal erosion.
- Coastal AE zones. These are areas outside of the Coastal High Hazard Area (V Zone) that are subject to wave impacts.
- Alluvial fans and similar arid regions flooding.

These issues are not related to adequacy of 1 percent chance flood standard, but instead relate to how the standard is applied.

Finally, there are two situations where there is general agreement that protection to the 1 percent chance flood may not provide an adequate level of flood protection:

- Recognition of levees providing protection to urban development.
- Protection of critical facilities.

These issues were addressed in *Sharing the Challenge: Floodplain Management into the 21st Century* (Interagency Floodplain Management Review Committee, June 1994) written in response to the 1993 Midwest Floods. That report expressed concerns over the residual risk behind levees credited with providing100-year protection. It recommended that the Standard Project Flood be used as the minimum level of protection for urban development and that flood insurance be required behind all levees that provide less than that level of protection. The report also recommended providing a similar level of protection to critical facilities. Residual risk behind levees was also a major issue in the on-going controversy related to the American River levee system in Sacramento, California. This resulted in the report *Flood Risk Management and the American River Basin: An Evaluation* published in 1995 by the National Academy of Science.

NFIP Community Rating System (CRS)

FEMA's strategy to address many of the issues identified in the previous section has been to provide incentives through the National Flood Insurance Program's Community Rating System (CRS) for communities that voluntarily map or regulate to a higher standard than NFIP minimum requirements. Many of the approaches recommended in ASFPM's *No Adverse Impact: A Toolkit for Common Sense Floodplain Management* (2003) are already credited under CRS. In addition, most FEMA guidance that has been issued in recent years not only explains minimum requirements, but also recommends that communities consider adopting more restrictive requirements where appropriate.

NFIP Evaluation

In 1999 FEMA began a comprehensive evaluation of the National Flood Insurance Program (NFIP). The evaluation is being coordinated for FEMA by the American Institutes for Research (AIR). Proposals are currently being solicited for a subcontractor to conduct a study on the 1-Percent Chance Flood Standard. This study will build on the results of the ASFPM Forum and provide an opportunity to follow-up on any issues that are identified. Other studies already underway that may provide information on the adequacy of the 1 percent chance flood standard include studies on:

- Mapping Anticipated Development
- Minimum Building standards
- Environmental and Developmental Impacts of the NFIP
- Actuarial Soundness
- Risk Perception
- Costs and Consequences of Flooding

Sources:

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Appendix H

Summary of NFIP Jurisdictions and ESUs

ESU

		Chinook				**Chum**		**Coho**	**Sockeye**	**Steelhead**			
Jurisdiction	**County**	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
	Adams			x								x	x
	Asotin			x									x
	Benton										x	x	
	Chelan				x							x	
	Clallam		x				x		x				
	Clark	x				x		x		x			
	Columbia			x							x		x
	Cowlitz	x				x		x		x			
	Douglas				x							x	
	Ferry												
	Franklin			x							x	x	x
	Garfield			x									x
	Grant											x	
	Grays Harbor							x					
	Island		x										
	Jefferson		x				x						
	King		x										
	Kitsap		x				x						
	Kittitas										x	x	
	Klickitat	x				x		x		x	x		
	Lewis	x	x			x		x		x			
	Lincoln												
	Mason		x				x	x					
	Okanogan				x							x	
	Pacific	x				x		x					
	Pend Oreille												
	Pierce		x										
	San Juan		x										
	Skagit		x										
	Skamania	x				x		x		x	x		
	Snohomish		x										
	Spokane												
	Stevens												
	Thurston		x					x					
	Wahkiakum	x				x		x					
	Walla Walla			x							x		x
	Whatcom		x										
	Whitman			x									x
	Yakima										x	x	
	Reservation												
	Lummi		x										
	Lower Elwha		x										

Critical Habitat

		Chinook				**Chum**			**Coho**	**Sockeye**	**Steelhead**			
Jurisdiction	**County**	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Near Shore*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
	Adams												x	
	Asotin													x
	Benton				x							x	x	x
	Chelan				x								x	
	Clallam		x				x	x		x				
	Clark	x			x	x					x	x	x	x
	Columbia											x		x
	Cowlitz	x			x	x					x	x	x	x
	Douglas				x								x	
	Ferry													
	Franklin				x							x	x	x
	Garfield													x
	Grant				x								x	
	Grays Harbor													
	Island		x					x						
	Jefferson		x				x	x						
	King		x					x						
	Kitsap		x				x	x						
	Kittitas				x							x	x	
	Klickitat	x			x	x					x	x	x	x
	Lewis	x				x					x			
	Lincoln													
	Mason		x				x	x						
	Okanogan				x								x	
	Pacific	x				x								
	Pend Oreille													
	Pierce		x					x						
	San Juan		x					x						
	Skagit		x					x						
	Skamania	x			x	x					x	x	x	x
	Snohomish		x					x						
	Spokane													
	Stevens													
	Thurston		x					x						
	Wahkiakum	x			x	x					x	x	x	x
	Walla Walla				x							x	x	x
	Whatcom		x					x						
	Whitman													x
	Yakima				x							x	x	
	Reservation													
	Lummi		x					x						
	Lower Elwha		x					x						

ESU

Jurisdiction		Chinook				Chum		Coho	Sockeye	Steelhead			
	Cities and Towns	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
	Aberdeen							x					
	Albion												
	Almira												
	Anacortes		x										
	Arlington		x										
	Asotin			x									x
	Auburn		x										
	Bainbridge Island		x										
	Battle Ground	x				x		x		x			
	Bellevue		x										
	Bellingham		x										
	Benton City										x		
	Bingen					x		x			x		
	Black Diamond		x										
	Blaine		x										
	Bonney Lake		x										
	Bothell		x										
	Bremerton		x										
	Brewster				x							x	
	Bridgeport				x							x	
	Brier		x										
	Buckley		x										
	Bucoda							x					
	Burien		x										
	Burlington		x										
	Camas	x				x		x		x			
	Carnation		x										
	Cashmere				x							x	
	Castle Rock	x				x		x		x			
	Cathlamet	x				x		x					
	Centralia							x					
	Chehalis							x					
	Chelan												
	Cheney												
	Chewelah												
	Cle Elum										x		

	Chinook				Chum		Coho	Sockeye	Steelhead			
Cities and Towns	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
Colfax												
College Place										x		
Colville												
Conconully				x							x	
Concrete		x										
Connell											x	
Cosmopolis							x					
Coupeville		x										
Covington		x										
Cusick												
Darrington		x										
Dayton										x		
Des Moines		x										
Duvall		x										
East Wenatchee				x							x	
Eatonville		x										
Edgewood		x										
Edmonds		x										
Ellensburg										x		
Elma							x					
Endicott												
Enumclaw		x										
Ephrata												
Everett		x										
Everson												
Farmington												
Federal Way		x										
Ferndale		x										
Fife		x										
Fircrest		x										
Fircrest												
Forks												
Garfield												
Gig Harbor		x										
Gold Bar		x										
Goldendale										x		
Granite Falls		x										

	Chinook				Chum		Coho	Sockeye	Steelhead			
Cities and Towns	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
Hamilton		x										
Harrington												
Hoquiam							x					
Ilwaco	x				x		x					
Index		x										
Ione												
Issaquah		x										
Kahlotus											x	
Kalama	x				x		x		x			
Kelso	x				x		x		x			
Kenmore		x										
Kennewick										x		
Kent		x										
Kirkland		x										
Kittitas										x		
La Center	x				x		x		x			
La Conner		x										
Lacey		x										
Lake Forest Park		x										
Lake Stevens		x										
Lakewood		x										
Langley		x										
Leavenworth				x							x	
Lind												
Long Beach							x					
Longview	x				x		x					
Lower Elwha		x										
Lyman		x										
Lynden		x										
Lynnwood		x										
Marysville		x										
McCleary							x					
Medina		x										
Mercer Island		x										
Mill Creek		x										
Milton		x										
Monroe		x										

	Chinook				Chum		Coho	Sockeye	Steelhead			
Cities and Towns	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
Montesano							x					
Moses Lake												
Mount Vernon		x										
Mountlake Terrace		x										
Mukilteo		x										
Naches										x		
Newport												
Nooksack												
Nooksack												
Normandy Park		x										
North Bend												
North Bonneville	x				x		x		x			
Oak Harbor		x										
Oakesdale												
Oakville							x					
Ocean Shores							x					
Odessa												
Okanogan				x					x			
Olympia		x										
Omak				x							x	
Oroville				x							x	
Orting		x										
Pacific		x										
Palouse												
Pasco										x		
Pomeroy			x									x
Port Angeles		x										
Port Orchard		x										
Port Townsend		x				x						
Poulsbo		x										
Prescott										x		
Pullman												
Puyallup		x										
Quincy												
Raymond							x					
Redmond		x										
Renton		x										

	Chinook				Chum		Coho	Sockeye	Steelhead			
Cities and Towns	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
Richland										x		
Ridgefield	x				x		x		x			
Ritzville												
Riverside				x							x	
Rockford												
Rosalia												
Roslyn										x		
Roy		x										
Saint John												
Sammamish		x										
SeaTac		x										
Seattle		x										
Sedro-Woolley		x										
Selah										x		
Sequim		x				x						
Shelton		x										
Shoreline		x										
Skykomish		x										
Snohomish		x										
Snoqualmie		x										
South Bend							x					
South Cle Elum										x		
South Prairie		x										
Spangle												
Spokane												
Sprague												
Springdale												
Stanwood		x										
Starbuck			x									x
Steilacoom		x										
Stevenson	x				x		x		x			
Sultan		x										
Sumas												
Sumner		x										
Tacoma		x										
Tenino							x					
Tieton										x		

	Chinook				Chum		Coho	Sockeye	Steelhead			
Cities and Towns	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
Toledo	x				x		x		x			
Tonasket				x							x	
Toppenish										x		
Tukwila		x										
Tumwater		x										
Twisp				x							x	
Union Gap										x		
Uniontown												
University Place		x										
Vancouver	x				x		x		x			
Waitsburg										x		
Walla Walla										x		
Wapato										x		
Washougal	x				x		x		x			
Washtucna											x	
Wenatchee				x							x	
West Richland										x		
Westport							x					
White Salmon					x		x			x		
Wilbur												
Wilkeson		x										
Wilkeson												
Wilson Creek												
Winlock	x				x		x		x			
Winthrop				x							x	
Woodinville		x										
Woodland	x				x		x		x			
Yacolt	x				x		x		x			
Yakima										x		
Yelm		x										

Critical Habitat

Jurisdiction	Towns and Cities	Chinook				Chum			Coho	Sockeye	Steelhead			
		Lower Columbia	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Near Shore*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
	Aberdeen													
	Albion													
	Almira													
	Anacortes		x					x						
	Arlington													
	Asotin													x
	Auburn		x											
	Bainbridge Island		x					x						
	Battle Ground										x			
	Bellevue		x											
	Bellingham		x					x						
	Benton City											x		
	Bingen											x	x	x
	Black Diamond		x											
	Blaine		x											
	Bonney Lake													
	Bothell		x											
	Bremerton		x				x							
	Brewster													
	Bridgeport													
	Brier		x											
	Buckley		x											
	Bucoda													
	Burien		x					x						
	Burlington		x											
	Camas	x			x	x					x	x	x	x
	Carnation		x											
	Cashmere				x								x	
	Castle Rock	x				x					x			
	Cathlamet	x				x								
	Centralia													
	Chehalis													
	Chelan													
	Cheney													
	Chewelah													
	Cle Elum											x		

Critical Habitat

	Chinook				Chum			Coho	Sockeye	Steelhead			
Towns and Cities	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Near Shore*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
Colfax													
College Place											x		
Colville													
Conconully													
Concrete		x											
Connell													
Cosmopolis													
Coupeville		x					x						
Covington													
Cusick													
Darrington													
Dayton											x		
Des Moines		x					x						
Duvall		x											
East Wenatchee				x								x	
Eatonville		x											
Edgewood													
Edmonds		x					x						
Ellensburg											x		
Elma													
Endicott													
Enumclaw		x											
Ephrata													
Everett		x					x						
Everson		x											
Farmington													
Federal Way		x					x						
Ferndale		x											
Fife		x					x						
Fircrest													
Fircrest													
Forks													
Garfield													
Gig Harbor		x					x						
Gold Bar		x											
Goldendale											x		

Critical Habitat

	Chinook				Chum			Coho	Sockeye	Steelhead			
Towns and Cities	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Near Shore*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
Granite Falls		x											
Hamilton		x											
Harrington													
Hoquiam													
Ilwaco													
Index		x											
Ione													
Issaquah		x											
Kahlotus													
Kalama										x			
Kelso	x				x					x			
Kenmore		x											
Kennewick				x							x	x	
Kent		x											
Kirkland		x											
Kittitas													
La Center	x				x					x			
La Conner		x					x						
Lacey		x					x						
Lake Forest Park		x											
Lake Stevens													
Lakewood													
Langley							x						
Leavenworth				x								x	
Lind													
Long Beach													
Longview	x				x					x			
Lower Elwha													
Lyman		x											
Lynden		x											
Lynnwood													
Marysville		x					x						
McCleary													
Medina													
Mercer Island													
Mill Creek		x											

Critical Habitat

	Chinook				Chum			Coho	Sockeye	Steelhead			
Towns and Cities	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Near Shore*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
Milton		x											
Monroe		x											
Montesano													
Moses Lake													
Mount Vernon		x											
Mountlake Terrace													
Mukilteo		x					x						
Naches											x		
Newport													
Nooksack													
Nooksack													
Normandy Park		x					x						
North Bend													
North Bonneville	x			x	x					x		x	x
Oak Harbor		x					x						
Oakesdale													
Oakville													
Ocean Shores													
Odessa													
Okanogan												x	
Olympia		x					x						
Omak												x	
Oroville												x	
Orting		x											
Pacific		x											
Palouse													
Pasco				x							x	x	
Pomeroy													x
Port Angeles		x					x						
Port Orchard		x					x						
Port Townsend		x					x						
Poulsbo		x					x						
Prescott											x		
Pullman													
Puyallup		x											
Quincy													

Critical Habitat

	Chinook				Chum			Coho	Sockeye	Steelhead			
Towns and Cities	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Near Shore*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
Raymond													
Redmond		x											
Renton		x											
Richland				x							x	x	
Ridgefield	x				x					x			
Ritzville													
Riverside												x	
Rockford													
Rosalia													
Roslyn													
Roy													
Saint John													
Sammamish		x											
SeaTac													
Seattle		x					x						
Sedro-Woolley													
Selah											x		
Sequim		x					x						
Shelton		x					x						
Shoreline		x					x						
Skykomish		x											
Snohomish		x											
Snoqualmie		x											
South Bend													
South Cle Elum											x		
South Prairie		x											
Spangle													
Spokane													
Sprague													
Springdale													
Stanwood		x					x						
Starbuck													x
Steilacoom		x					x						
Stevenson	x									x			
Sultan		x											
Sumas													

Critical Habitat

	Chinook				Chum			Coho	Sockeye	Steelhead			
Towns and Cities	*Lower Columbia*	*Puget Sound*	*Snake River*	*Upper Columbia River-Spring*	*Columbia River*	*Hood Canal - Summer*	*Near Shore*	*Lower Columbia River/ Southwest Washington Coast*	*Ozette Lake*	*Lower Columbia River*	*Middle Columbia River*	*Upper Columbia River*	*Snake River*
Sumner													
Tacoma		x					x						
Tenino													
Tieton													
Toledo													
Tonasket												x	
Toppenish													
Tukwila		x					x						
Tumwater													
Twisp				x								x	
Union Gap											x		
Uniontown													
University Place		x					x						
Vancouver	x		x	x	x					x	x	x	x
Waitsburg											x		
Walla Walla											x		
Wapato											x		
Washougal	x				x					x			
Washtucna													
Wenatchee													
West Richland											x		
Westport													
White Salmon											x		
Wilbur													
Wilkeson													
Wilkeson		x											
Wilson Creek													
Winlock	x									x			
Winthrop				x								x	
Woodinville		x											
Woodland	x				x					x			
Yacolt										x			
Yakima											x		
Yelm													

Appendix I

Summary of LOMR-Fs and CLOMR-Fs Since 1999 by Jurisdiction

Community	State	Flooding Source	LOMC Type	Received Date	Determination Date	Project ID.
BELLINGHAM, CITY OF	WA	WHATCOM CREEK	LOMR-F	9/17/2001 00:00:00	3/20/2002 00:00:00	HASKELL BUSINESS PARK, LOTS A, E, F, K, L, M, N, Q, U, V, Y, & BB -- MEADOR AVENUE
BELLINGHAM, CITY OF	WA	WHATCOM CREEK	LOMR-F	1/13/2004 00:00:00	1/21/2004 00:00:00	HASKELL BUSINESS PARK, LOTS A, K, L, M, N, & BB
BOTHELL, CITY OF	WA	SAMMAMISH RIVER	LOMR-F	10/28/2003 00:00:00	12/16/2003 00:00:00	VALHALLA DIV 1A, BLOCK 1, LOT 15 -- 16435 BALDER LANE
BURLINGTON, CITY OF	WA	SKAGIT RIVER	LOMR-F	1/9/2002 00:00:00	4/19/2002 00:00:00	BURLINGTON HILL BUSINESS PARK PHASE II, LOT 18 -- 258 NORTH HILL BLVD
BURLINGTON, CITY OF	WA	SKAGIT RIVER DELTA	LOMR-F	4/4/2002 00:00:00	11/13/2002 00:00:00	1801-1823 & 1831-1853 BOUSLOG ROAD -- PORTION OF SECTION 7, T34N, R4E, W.M.
BURLINGTON, CITY OF	WA	SKAGIT RIVER DELTA OVERBANK FLOWPATH 1	LOMR-F	4/5/2002 00:00:00	5/29/2002 00:00:00	BURLINGTON ACREAGE, TRACT 47, LOTS 2-3 -- 1003 & 1101 PETERSON ROAD
BURLINGTON, CITY OF	WA	SKAGIT RIVER DELTA OVERBANK FLOWPATH 1	LOMR-F	1/17/2003 00:00:00	6/25/2003 00:00:00	BURLINGTON HILLS BUSINESS PARK, TRACT 5 -- 1535 WALTON DRIVE
BURLINGTON, CITY OF	WA	OVERBANK FLOW PATH NO. 1	CLOMR-F	2/4/2004 00:00:00	10/13/2004 00:00:00	NEWMAN RETAIL CENTER, PORTION OF GOVT LOT 8, SECTION 7, T34N, R4E, W.M.
BURLINGTON, CITY OF	WA	OVERBANK FLOW PATH NO. 1	LOMR-F	11/9/2004 00:00:00	1/12/2005 00:00:00	NEWMAN RETAIL CENTER -- 2001 MARKET PLACE DRIVE
CARNATION, CITY OF	WA	TOLT RIVER	LOMR-F	6/11/2001 00:00:00	8/30/2001 00:00:00	3660 TOLT AVENUE -- SHORT PLAT 91-002, LOT 1, PORTION OF SECTION 21, T25N, R7E, W.M.
CENTRALIA, CITY OF	WA	CHEHALIS RIVER	LOMR-F	6/4/2003 00:00:00	6/11/2003 00:00:00	2400 COOKS HILL ROAD -- PARCEL A, PORTION OF SECTION 12, T14N, R3W, W.M.
CHELAN COUNTY *	WA	CHUMSTICK CREEK	LOMR-F	1/13/2003 00:00:00	3/13/2003 00:00:00	12585 CHUMSTICK HIGHWAY -- SHORT PLAT 2966, LOT 1, PORTION OF SECTION 19, T25N, R18E, H.M.
CLALLAM COUNTY *	WA	MORSE CREEK	LOMR-F	6/21/2002 00:00:00	7/24/2002 00:00:00	FOUR SEASON PARK DIV 3, LOTS 17-18 -- 63 SOUTH ALDER LANE
CLARK COUNTY *	WA	UNNAMED TRIB. TO CURTIN CREEK	LOMR-F	9/30/2003 00:00:00	5/7/2004 00:00:00	BROOKSIDE KNOLL, LOTS 1-8, & 13-14
CLARK COUNTY *	WA	PONDING	CLOMR-F	11/25/2003 00:00:00	4/8/2004 00:00:00	MORGAN FIELDS SUBDIV, LOTS 11-22, 24-34
CLARK COUNTY *	WA	UNNAMED FLOODING SOURCE	LOMR-F	4/5/2004 00:00:00	4/28/2004 00:00:00	6709 NE 63RD STREET -- PORTION OF SECTION 7, T2N, R2E, W.M.
CLARK COUNTY *	WA	UNNAMED TRIB TO CURTIN CREEK	LOMR-F	5/14/2004 00:00:00	5/21/2004 00:00:00	FIR ACRES, LOTS 5-23
CLARK COUNTY *	WA	PADDEN CREEK	CLOMR-F	3/22/2005 00:00:00	8/2/2005 00:00:00	PROPOSED LOTS 73-75, MERRITT'S HIDEAWAY
CLARK COUNTY *	WA	PONDING	LOMR-F	5/14/1999 00:00:00	6/11/1999 00:00:00	HERON HILLS SUBDIV, LOTS 22-42, 45-49, 54-68
CLARK COUNTY *	WA	MILL CREEK DRAIN	LOMR-F	7/16/1999 00:00:00	11/22/1999 00:00:00	BATTLE GROUND MARKET CENTER, LOT 3 OF SHORT PLAT
CLE ELUM, CITY OF	WA	YAKIMA RIVER	LOMR-F	3/12/2002 00:00:00	5/15/2002 00:00:00	SOUTH CLE ELUM, BLOCK 3, LOTS 1-5 -- 303 GRANT STREET
COWLITZ COUNTY *	WA	KALAMA RIVER	CLOMR-F	8/29/2000 00:00:00	4/2/2001 00:00:00	151 MODROW ROAD -- PORTION OF SECTION 32, T7N, R1W, W.M. (PROPOSED WATER TREATMENT PLANT)
ELLENSBURG, CITY OF	WA	SHALLOW FLOODING	LOMR-F	11/1/2002 00:00:00	12/18/2002 00:00:00	ELLENSBURG INDUSTRIAL PARK, LOT 5 -- 801 PROSPECT STREET
ELLENSBURG, CITY OF	WA	REECER CREEK	LOMR-F	1/29/2004 00:00:00	5/26/2004 00:00:00	DOLARWAY SHORT PLAT CSP 82-03, LOT 2 -- 1206 DOLARWAY ROAD
FERNDALE, TOWN OF	WA	NOOKSACK RIVER	LOMR-F	1/20/2000 00:00:00	6/22/2000 00:00:00	1904 MAIN STREET -- PORTION OF GOVT LOTS 1 & 2, SECTION 29, T39N, R2E, W.M.
FERNDALE, TOWN OF	WA	NOOKSACK RIVER	LOMR-F	8/13/1999 00:00:00	9/10/1999 00:00:00	1904 MAIN STREET -- PORTIONS OF GOVT LOTS 1 & 2, SECTION 29, T39N, R2E, W.M.
FERNDALE, TOWN OF	WA	NOOKSACK RIVER	LOMR-F	9/23/1999 00:00:00	11/22/1999 00:00:00	1904 MAIN STREET -- PORTIONS OF GOVT LOTS 1 & 2, SECTION 29, T39N, R2E, W.M.
FIFE, CITY OF	WA	FIFE DITCH TRIBUTARY	LOMR-F	9/3/2003 00:00:00	3/19/2004 00:00:00	5407 & 5417 12TH STREET EAST -- SHORT PLAT, LOT 1, PORTION OF GOVT LOT 6, SECTION 6, T20N, R4E, W.M.
GOLD BAR, TOWN OF	WA	MAY CREEK	LOMR-F	1/7/2003 00:00:00	3/3/2003 00:00:00	GARRETT ADDITION DIV NO. 2, LOT 10 -- 808 1ST STREET WEST
HOQUIAM, CITY OF	WA	HOQUIAM RIVER/GRAYS HARBOR	LOMR-F	8/21/2000 00:00:00	12/20/2000 00:00:00	CAMPBELL'S ADDITION, BLOCK 27, LOTS 4-9 -- 2202 BAY AVENUE
ISLAND COUNTY *	WA	HOLMES HARBOR	LOMR-F	11/8/2005 00:00:00	1/10/2006 00:00:00	BEVERLY BEACH, LOT 98 -- 4294 MAPLE AVENUE
KENT, CITY OF	WA	SPRINGBROOK CREEK	LOMR-F	12/3/2001 00:00:00	2/22/2002 00:00:00	SILVER SPRINGS APARTMENTS, BLDGS. A-H, J-N, P-R -- 22416 88TH AVENUE SOUTH
KENT, CITY OF	WA	SHALLOW FLOODING	LOMR-F	3/26/2002 00:00:00	8/1/2002 00:00:00	WELLINGTON TOWNHOMES, BLDGS A-H, J, K, & L -- 23519, 23501, 23425, 23405, 23321, 23311, 23316, 23402, 23420, 23502, & 23522 62ND AVENUE SOUTH
KENT, CITY OF	WA	MILL CREEK	LOMR-F	4/26/2002 00:00:00	8/15/2002 00:00:00	19430 68TH AVENUE SOUTH -- SHORT PLAT 79-111, LOT 1
KENT, CITY OF	WA	MILL CREEK	LOMR-F	10/23/2002 00:00:00	11/20/2002 00:00:00	ALDERBROOK APARTMENTS, BUILDINGS A-H, J-L
KENT, CITY OF	WA	MILL CREEK	CLOMR-F	5/28/1999 00:00:00	9/1/1999 00:00:00	ALDERBROOK APARTMENTS, BLDGS. A-H & J-L -- 1059 CENTRAL AVE. NORTH
KING COUNTY*	WA	CEDAR RIVER	CLOMR-F	2/3/2000 00:00:00	9/6/2000 00:00:00	ORCHARD GROVE, LOTS 41-42 -- 23927 SE 238TH STREET
KING COUNTY*	WA	SNOQUALMIE RIVER	LOMR-F	7/11/2000 00:00:00	11/20/2000 00:00:00	2728 WEST SNOQUALMIE RIVER ROAD NE -- PORTION OF SECTION 20, T25N, R7E, W.M.
KING COUNTY*	WA	SNOQUALMIE RIVER	LOMR-F	3/19/2001 00:00:00	6/8/2001 00:00:00	37327 SE FISH HATCHERY ROAD -- PORTION OF SECTION 19, T24N, R8E, W.M.
KING COUNTY*	WA	SNOQUALMIE RIVER	LOMR-F	10/26/2001 00:00:00	1/4/2002 00:00:00	35218 SE DAVID POWELL ROAD -- PORTION OF GOVT LOT 7, SECTION 23, T24N, R7E, W.M.
KING COUNTY*	WA	SOUTH FORK SKYKOMISH RIVER	LOMR-F	2/26/2002 00:00:00	4/12/2002 00:00:00	RIVERWOOD PARK NO. 2, LOT 68 -- 17918 644TH AVENUE NE
KING COUNTY*	WA	SOUTH FORK SKYKOMISH RIVER	LOMR-F	4/11/2002 00:00:00	7/17/2002 00:00:00	MONTAGNA PARK ADDITION, LOT 20 -- 63032 NE 196TH STREET
KING COUNTY*	WA	CEDAR RIVER	LOMR-F	5/21/2002 00:00:00	1/23/2003 00:00:00	DORRE DON CAMP SITES, LOTS 130-131 -- 23241 LOWER DORRE DON WAY SE
KING COUNTY*	WA	CEDAR RIVER	LOMR-F	6/5/2002 00:00:00	7/10/2002 00:00:00	15036 135TH AVENUE SE -- PORTION OF GOVT LOT 10, SECTION 22, T23N, R5E, W.M.
KING COUNTY*	WA	TOLT RIVER	LOMR-F	9/19/2002 00:00:00	9/20/2002 00:00:00	3904 331ST AVENUE NE -- SHORT PLAT 1185054, LOT 4
KING COUNTY*	WA	CEDAR RIVER	LOMR-F	10/28/2002 00:00:00	12/4/2002 00:00:00	DORRE DON CAMP SITES, LOTS 147-148 -- 23329 DORRE DON WAY SE
KING COUNTY*	WA	SOUTH FORK SKYKOMISH RIVER	LOMR-F	1/30/2003 00:00:00	4/16/2003 00:00:00	19125 641ST AVENUE NE -- PORTION OF SECTION 2, T26N, R10E, W.M.
KING COUNTY*	WA	MIDDLE FORK SNOQUALMIE RIVER	LOMR-F	9/22/2003 00:00:00	9/24/2003 00:00:00	10106 422ND LANE SE -- PORTION OF SECTION 3, T23N, R8E, W.M.
KING COUNTY*	WA	SNOQUALMIE RIVER	LOMR-F	1/29/2004 00:00:00	2/25/2004 00:00:00	4015 FALL CITY DUVALL ROAD SE -- PORTION OF GOVT LOT 1, SECTION 15, T24N, R7E, W.M.
KIRKLAND, CITY OF	WA	SHALLOW FLOODING	LOMR-F	5/10/2005 00:00:00	8/9/2005 00:00:00	THE POINT ON YARROW BAY, PHASE 1-3, BUILDINGS 1-9
KITTITAS COUNTY *	WA	YAKIMA RIVER	LOMR-F	1/18/2000 00:00:00	3/21/2000 00:00:00	PORTION OF SECTION 31, T20N, R16E, W.M. -- 480 RIVER RANCH LANE
KITTITAS COUNTY *	WA	YAKIMA RIVER	LOMR-F	1/24/2000 00:00:00	3/29/2000 00:00:00	166 HUMMINGBIRD LANE -- PORTION OF SECTION 23, T20N, R14E, W.M.
KITTITAS COUNTY *	WA	YAKIMA RIVER	LOMR-F	1/17/2001 00:00:00	3/2/2001 00:00:00	PINE VALLEY RANCH, LOTS 15 & 16
KITTITAS COUNTY *	WA	YAKIMA RIVER	LOMR-F	1/29/2002 00:00:00	3/6/2002 00:00:00	1660 RIVERBOTTOM ROAD (RESIDENCE/BARN) -- PORTION OF SECTION 14, T17N, R18E, W.M.
KITTITAS COUNTY *	WA	YAKIMA RIVER	LOMR-F	3/1/2002 00:00:00	3/15/2002 00:00:00	1660 RIVERBOTTOM ROAD -- PORTION OF SECTION 14, T17N, R18E, W.M.
KITTITAS COUNTY *	WA	YAKIMA RIVER	LOMR-F	3/18/2005 00:00:00	5/5/2005 00:00:00	PINE VALLEY RANCH, BLOCK 2, LOT 13
LEWIS COUNTY *	WA	SALZER CREEK	LOMR-F	7/18/2000 00:00:00	10/25/2000 00:00:00	GOODNOUGH'S SUBDIV, BLOCK 2, LOTS 14-15 -- 1014 KRESKY AVENUE
LEWIS COUNTY *	WA	CHEHALIS RIVER	LOMR-F	7/29/2002 00:00:00	9/27/2002 00:00:00	2400 COOKS HILL ROAD -- PORTION OF SECTION 12, T14N, R3W, W.M.
LYNDEN, CITY OF	WA	NOOKSACK RIVER	LOMR-F	8/5/2004 00:00:00	10/29/2004 00:00:00	HAWLEY & LAWRENCE ADDITION, BLOCK 6 -- 504 EAST FRONT STREET
MOUNT VERNON, CITY OF	WA	SKAGIT RIVER	LOMR-F	4/23/2002 00:00:00	8/7/2002 00:00:00	MOUNT VERNON BINDING SITE PLAN NO. BSP MV-1-98, LOTS 4-7 -- 1500 CONTINENTAL PLACE
MOUNT VERNON, CITY OF	WA	SKAGIT RIVER	LOMR-F	9/8/2003 00:00:00	11/5/2003 00:00:00	1416 RIVERSIDE DRIVE -- SHORT PLAT MV-6-79, PARCEL C, BLDGS A-G, PORTION OF SECTION 17, T34N, R4E, W.M.
OKANOGAN, CITY OF	WA	OKANOGAN RIVER	LOMR-F	2/9/1999 00:00:00	3/9/1999 00:00:00	GREGORY TRACTS, TRACTS 15-17 -- 2217 ELMWAY
PIERCE COUNTY*	WA	SWAN CREEK	CLOMR-F	5/28/1999 00:00:00	8/11/1999 00:00:00	SUMMIT APARTMENTS, BLDGS A-H, J & K -- 2815 112TH STREET EAST
PIERCE COUNTY*	WA	WHITE RIVER	LOMR-F	7/30/1999 00:00:00	10/29/1999 00:00:00	LARGE LOT DIV, PARCELS B (BLDGS 1 & 2) & C (BLDG 1) -- 602 142ND AVE EAST & 400 142ND AVENUE

Community	State	Flooding Source	LOMC Type	Received Date	Determination Date	Project ID.
PUYALLUP, CITY OF	WA	CLARK'S CREEK	LOMR-F	3/17/2000 00:00:00	10/11/2000 00:00:00	CREEKSIDE, LOTS 6-8 -- 1610, 1614, & 1702 12TH AVENUE SW
PUYALLUP, CITY OF	WA	SHEETFLOW	LOMR-F	1/2/2001 00:00:00	3/23/2001 00:00:00	SUNRIDGE II, LOT 2 -- 1207 11TH STREET PLACE SW
PUYALLUP, CITY OF	WA	PUYALLUP RIVER	LOMR-F	2/3/2005 00:00:00	5/2/2005 00:00:00	1617 EAST MAIN AVENUE
RAYMOND, CITY OF	WA	WILLAPA RIVER	LOMR-F	8/19/2002 00:00:00	9/18/2002 00:00:00	RAYMOND 1ST ADDITION, BLOCK 23, LOTS 1-3 -- 580 COMMERCIAL STREET
REDMOND, CITY OF	WA	SAMMAMISH RIVER	LOMR-F	3/14/2000 00:00:00	3/15/2000 00:00:00	SAMMAMISH WATERWAY CONDOMINIUMS, BLDG 2 -- 7370 NORTH LAKE SAMMAMISH PKWY NE
RENTON, CITY OF	WA	BLACK RIVER SPRINGBROOK CREEK	LOMR-F	3/2/2001 00:00:00	7/18/2001 00:00:00	WASHINGTON TECHNICAL CENTER, TRACT B -- 600, 602, 604 & 606 OAKESDALE AVENUE SW; 1300 7TH STREET SW; AND 500 POWELL AVENUE SW -- PORTION OF S
RENTON, CITY OF	WA	SPRINGBROOK CREEK	LOMR-F	8/23/2004 00:00:00	10/18/2004 00:00:00	OAKDALE BUSINESS PARK, PORTION OF SECTION 36, T23N, R4E, W.M.
RIDGEFIELD, TOWN OF	WA	LAKE RIVER/COLUMBIA RIVER	CLOMR-F	9/17/2002 00:00:00	10/30/2002 00:00:00	111 WEST DIVISION STREET -- PORTION OF SECTION 24, T4N, R1W, W.M.
SNOHOMISH COUNTY *	WA	CANYON CREEK	LOMR-F	1/21/2000 00:00:00	6/26/2000 00:00:00	RIVER 'N FOREST, BLOCK 5, LOT 16 -- 21929 SOUTH RIVER DRIVE
SNOHOMISH COUNTY *	WA	SKYKOMISH RIVER	LOMR-F	10/31/2000 00:00:00	12/27/2000 00:00:00	17925 & 17917 183RD AVENUE SE -- PORTION OF SECTION 12, T27N, R6E, W.M.
SNOHOMISH COUNTY *	WA	CANYON CREEK	LOMR-F	2/2/2001 00:00:00	4/27/2001 00:00:00	HIDDEN VALLEY TRACT NO. 1, LOTS 17-20 -- 23123 135TH STREET NE
SNOHOMISH COUNTY *	WA	CANYON CREEK	CLOMR-F	10/2/2001 00:00:00	3/20/2002 00:00:00	HIGHWAY 92 -- PORTION OF SECTION 23, T30N, R6E, W.M.
SNOHOMISH COUNTY *	WA	CANYON CREEK	LOMR-F	10/21/2002 00:00:00	12/4/2002 00:00:00	20021 CANYON DRIVE -- PORTION OF SECTION 6, T30N, R7E, W.M.
SNOHOMISH COUNTY *	WA	PILCHUCK RIVER	LOMR-F	11/20/2003 00:00:00	12/23/2003 00:00:00	8321 STATE ROUTE 92 -- SHORT PLAT SP-266(5-78), LOT B, PORTION OF SECTION 23, T30N, R6E, W.M.
SNOHOMISH COUNTY *	WA	SWAMP CREEK	LOMR-F	4/8/2005 00:00:00	7/1/2005 00:00:00	STARLITE CREEK CONDOMINIUM, LOTS 11 & 12 -- 14604 & 14608 24TH AVENUE
SNOHOMISH COUNTY *	WA	SKYKOMISH RIVER	LOMR-F	4/27/1999 00:00:00	8/19/1999 00:00:00	SKYVIEW RIVER TRACTS, LOT 39 -- 15801 NORTH SKYVIEW DRIVE
SPOKANE COUNTY*	WA	TRIBUTARY TO SPOKANE RIVER	LOMR-F	2/19/1999 00:00:00	5/21/1999 00:00:00	PASADENA RIDGE II -- 4710, 4818, 4941, 4936 & 4930 NORTH PASADENA LANE
SPOKANE, CITY OF	WA	MARSHALL CREEK	LOMR-F	2/7/2005 00:00:00	10/6/2005 00:00:00	SUNNY CREEK RESIDENTIAL COMMUNITY, LOTS 1-25, 30-45 -- 1111 WEST QUALCHAN DRIVE
SPOKANE, CITY OF	WA	SPOKANE RIVER	LOMR-F	6/20/2005 00:00:00	8/23/2005 00:00:00	RIVERPOINT VILLAGE CONDO, LOT 4 -- 639 NORTH RIVERPOINT BLVD 4W
SULTAN, CITY OF	WA	SULTAN RIVER	LOMR-F	1/10/2000 00:00:00	5/12/2000 00:00:00	WILLOW TRACE, LOTS 1-2, & 7-9
SULTAN, CITY OF	WA	SULTAN RIVER	LOMR-F	1/29/2001 00:00:00	2/21/2001 00:00:00	WILLOW TRACE, LOTS 3-6
SULTAN, CITY OF	WA	SULTAN RIVER	LOMR-F	10/30/2003 00:00:00	11/21/2003 00:00:00	DATE STREET A CONDOMINIUM, UNIT 14 -- 705 LOIS LANE
SULTAN, CITY OF	WA	SULTAN RIVER	CLOMR-F	12/30/2003 00:00:00	3/5/2004 00:00:00	13905 310TH AVENUE SE -- PORTION OF SECTION 32, T28N, R8E, W.M.
SULTAN, CITY OF	WA	SULTAN RIVER	LOMR-F	8/23/2004 00:00:00	9/24/2004 00:00:00	STEVENS 1ST ADDITION, BLOCK 1, LOTS 4-5 & 14-15 -- 509 ALDER STREET
SULTAN, CITY OF	WA	SULTAN RIVER	CLOMR-F	6/1/2005 00:00:00	8/2/2005 00:00:00	STRATFORD PLACE, LOTS 1-20
SULTAN, CITY OF	WA	SULTAN RIVER	LOMR-F	10/7/2005 00:00:00	11/10/2005 00:00:00	STRATFORD PLACE, LOTS 1-20
SULTAN, CITY OF	WA	SULTAN RIVER	LOMR-F	2/23/1999 00:00:00	5/18/1999 00:00:00	DATE STREET CONDOMINIUM, UNITS 1-13, 15-38
SULTAN, CITY OF	WA	SULTAN RIVER	LOMR-F	6/30/1999 00:00:00	7/15/1999 00:00:00	DATE STREET CONDOMINIUM, UNIT 14 -- 645 LOIS LANE
SUMNER,CITY OF	WA	WHITE RIVER	LOMR-F	1/12/2002 00:00:00	8/26/2002 00:00:00	SUMNER, LOTS A, B, C, & D -- 1509, 1525, 1607, 1627 45TH STREET EAST
SUMNER,CITY OF	WA	WHITE RIVER	LOMR-F	7/8/2002 00:00:00	4/25/2003 00:00:00	THE VILLAGE AT RIVERGROVE PHASE 1, LOTS 1-15, 20; PHASE 2, LOTS 52-59 & 62-66
TACOMA, CITY OF	WA	UNNAMED TRIBUTARY	LOMR-F	7/6/2001 00:00:00	12/5/2001 00:00:00	KIRKWOOD, LOT 12 -- 1736 SOUTH 85TH STREET COURT
TUKWILA, CITY OF	WA	GREEN RIVER	LOMR-F	3/5/2001 00:00:00	5/2/2001 00:00:00	7100/7200/7300 FUN CENTER WAY -- PORTION OF SECTION 24, T23N, R4E, W.M.
VANCOUVER, CITY OF	WA	BURNT BRIDGE CREEK DRAINAGE	CLOMR-F	12/6/2002 00:00:00	12/13/2002 00:00:00	THE PARKWAY, PHASE 4, LOTS 1-38
VANCOUVER, CITY OF	WA	BURNT BRIDGE CREEK DRAINAGE	LOMR-F	9/9/2003 00:00:00	1/30/2004 00:00:00	THE PARKWAY PHASE 4, LOTS 1-38
WHATCOM COUNTY *	WA	NOOKSACK RIVER	LOMR-F	3/14/2002 00:00:00	5/22/2002 00:00:00	4773 DEMING ROAD -- PORTION OF SECTION 36, T39N, R4E, W.M.
WHATCOM COUNTY *	WA	NOOKSACK RIVER	LOMR-F	11/4/2002 00:00:00	1/15/2003 00:00:00	5901 LIND ROAD -- PORTION OF SECTION 21, T39N, R4E, W.M.
WHATCOM COUNTY *	WA	NOOKSACK RIVER	LOMR-F	10/27/2004 00:00:00	1/10/2005 00:00:00	7766 RATHBONE ROAD -- PORTION OF SECTION 26, T40N, R2E, W.M.
WHATCOM COUNTY *	WA	SUMAS RIVER	LOMR-F	12/20/2004 00:00:00	2/9/2005 00:00:00	P. GILLIES SR HOME ADDITION, LOTS 3 & 4 -- 8235 GILLES ROAD
WOODINVILLE, CITY OF	WA	SAMMAMISH RIVER	LOMR-F	7/3/2002 00:00:00	8/13/2002 00:00:00	REDHOOK ALE BREWERY, LOT 1 -- 14300 NE 145TH STREET; 12280 NE WOODINVILLE DRIVE, PARCEL 2
YELM, CITY OF	WA	YELM CREEK	CLOMR-F	2/9/1999 00:00:00	5/21/1999 00:00:00	PRAIRIE CREEK SUBDIV, LOTS 19-20, & 22-24 -- 16132, 16134, 16138, 16140 & 16142 PRAIRIE CREEK LOOP