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Title:	FEMA Model Ordinance for Flood Loss Reduction & Fish Habitat
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Abstract

This model ordinance provides a framework for flood loss reduction regulations for use by any state in conjunction with affected counties or municipalities. Section one explicitly delegates State authority to local governmental bodies to adopt regulations to protect the public health, safety, and welfare of residents. Flood losses occur because of the cumulative effect of obstructions in special flood hazard areas. The purpose of the model ordinance is to promote the public health, safety, and welfare by reducing losses due to flooding by maintaining streams, to the maximum extent possible, in their natural state. The section also provides a list of methods for reducing flood losses. Section two defines the terms used throughout the model ordinance.

General provisions are listed in section three. This section identifies the areas to which the ordinance shall apply and its general requirement, i.e., that no land or structure be constructed, located, extended, converted, or altered without compliance with the ordinance and associated regulations. The Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) for affected areas are automatically incorporated in the ordinance through this section. The penalties for noncompliance are identified. A disclaimer is included that asserts areas outside the special flood hazard area are not immune from flooding and that the State, its employees, or Federal Insurance Administration are not liable.

Paragraph 4.1-1 states a permit shall be obtained before construction or development begins within any special flood hazard identified in Section 3.2. The remaining paragraphs in Section 4 set forth the requirements and procedures for obtaining a permit and identify the program administrator, her duties for permit review, and requirements for the granting of variances. Section 5 sets forth general flood hazard reduction standards for anchoring, construction materials and methods, utilities, subdivision proposals, and review of building permits. Specific standards are listed for

residential and nonresidential construction, manufactured homes, and recreational vehicles. Additional standards for riparian ecosystem protection are also included.

Resource

Flood Damage Prevention and Fish Habitat Protection Model Ordinance

Developed by FEMA Region 10

Version 3 – Revised November 6, 2001

Note: This ordinance combines the minimum NFIP requirements found in the FEMA model Flood Hazard Prevention Ordinance (normal font) with other regulatory provisions designed to protect aquatic and riparian habitat (*italicized font*).

SECTION 1: STATUTORY AUTHORIZATION, FINDINGS OF FACT, PURPOSE, AND METHODS OF REDUCING FLOOD LOSSES

1.1. STATUTORY AUTHORIZATION.

The Legislature of the State of _____ 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.

A. 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.

B. These flood losses are caused by placing capital development and infrastructure on areas prone to inundation 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 flood proofed, elevated, or otherwise protected from flood damage also contribute to the flood loss.

C. *Floodplain and stream connectivity is a major element in maintaining healthy riparian habitat and off-channel habitats for the survival of fish species and conveyance of floodwaters in the northwest. If river, floodplains and other systems are not viewed holistically as biological, geomorphological units, this can lead to serious degradation of habitat and increase flood hazards which, in turn, can contribute to listing of various fish species as threatened or endangered and result in extraordinary public expenditures for flood*

protection and relief.

1.3. PURPOSE.

It is the purpose of this ordinance to promote the public health, safety, and general welfare, *to maintain streams and floodplains in their natural state to the maximum extent possible* so they support healthy biological ecosystems, and to minimize public and private losses due to flood conditions in specific areas by provisions designed:

- A. To protect human life and health;
- B. To minimize expenditure of public money for and costly flood control projects and flood damage repair;
- C. To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- D. To minimize prolonged business interruptions;
- E. 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;
- F. To help provide 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;
- G. To ensure that potential buyers are notified that property is in an area of special flood hazard; and,
- H. To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.
- I. To assure that flood loss reduction measures under the NFIP protect are consistent with retaining natural floodplain functions related to protecting riparian habitat and the natural processes that create and maintain habitat for fish.*
- J. To assure no net loss of hydraulic, geomorphic, and ecological functions of floodplains.*

1.4. METHODS OF REDUCING FLOOD LOSSES.

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

- A. 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;

B. Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction or relocated and possibly relocating uses outside of the floodplain;

C. Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;

D. Controlling filling, grading, dredging, and other development which may increase flood damage and *alter beneficial natural stream processes*; and

E. Preventing or regulating the construction of flood barriers that would which will unnaturally divert floodwaters in such as way as to, *block natural channel migration*, or may increase flood hazards in other areas.

SECTION 2: DEFINITIONS

Unless specifically defined below, words 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.

2.1. APPEAL. "Appeal" means a request for a review of the interpretation of any provision of this ordinance or a request for a variance.

2.2. AREA OF SHALLOW FLOODING. "Area of Shallow Flooding" means a designated AO, or AH Zone on the Flood Insurance Rate Map (FIRM). The base flood depths range from one to three feet; 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 and AH indicates ponding.

2.3. AREA OF SPECIAL FLOOD HAZARD. "Area of Special Flood Hazard" means the land in the floodplain 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.

2.4. BASE FLOOD. "Base Flood" means the flood having a one percent chance of being equaled or exceeded in any given year. Also referred to as the "100-year flood." Designation on maps always includes the letters A or V.

2.5. BASEMENT. "Basement" means any area of the building having its floor subgrade (below ground level) on all sides.

2.6. BREAKAWAY WALL. "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.

2.7. CHANNEL MIGRATION ZONE. “Channel Migration Zone” means the lateral extent of likely movement along a stream reach during the next one hundred years with evidence of active stream channel movement over the past one hundred years. Evidence of active movement can be provided from aerial photos or specific channel and valley bottom characteristics. A time frame of one hundred years was chosen because aerial photos and field evidence can be used to evaluate movement in this time frame. Also, this time span typically represents the time it takes to grow mature trees that can provide functional large woody debris to most streams. In large meandering rivers a more detailed analysis can be conducted to relate bank erosion processes and the time required to grow trees that function as stable large woody debris.

With the exception of shorelands in or meeting the criteria for the “natural” and “rural conservancy” environments, areas separated from the active channel by legally existing artificial channel constraints that limit bank erosion and channel avulsion without hydraulic connections shall not be considered within the CMZ. All areas, including areas within the “natural” and “rural conservancy” environments, separated from the natural channel by legally existing structures designed to withstand the 100-year flood shall not be considered within the CMZ. A tributary stream or other hydraulic connection allowing PTE species fish passage draining through a dike or other constricting structure shall be considered part of the CMZ.

2.8. COASTAL HIGH HAZARD AREA. “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.

2.9. CRITICAL FACILITY. “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, installations which produce, use or store hazardous materials or hazardous waste. Critical facilities should not be sited in flood hazard zones, since history tells us that we cannot guarantee protection from flooding.

2.10. DEVELOPMENT. “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, storage of equipment or materials, or any other activity which results in the removal of substantial amounts of vegetation or in the alteration of natural site characteristics located within the area of special flood hazard.

2.11. ELEVATED BUILDING. “Elevated Building” means for insurance purposes, a no basement building, which has its lowest elevated floor, raised above ground level by foundation walls, shear walls, post, piers, pilings, or columns.

2.12. EXISTING MANUFACTURED HOME, PARK, OR SUBDIVISION. “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.

2.13. EXPANSION TO AN EXISTING MANUFACTURED HOME, PARK, OR SUBDIVISION. “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).

2.14. FLOOD OR FLOODING. “Flood” or “Flooding” means a general and temporary condition of partial or complete inundation of normally dry land areas from:

- A. The overflow of inland or tidal waters and/or,
- B. The unusual and rapid accumulation of runoff of surface waters from any source.

2.15. FLOOD INSURANCE RATE MAP (FIRM). “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.

2.16. FLOOD INSURANCE STUDY. “Flood Insurance Study” means the official report provided by the Federal Insurance Administration that includes flood profiles, the Flood Boundary-Floodway Map, and the water surface elevation of the base flood.

2.17. FLOODWAY. “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

2.18. HABITAT. *“Habitat” means the combination of essential elements in the ecological function of riverine and marine shoreline systems that, for threatened, endangered, and priority species of fish, included but not limited to adequate:*

- *substrate;*
- *water quality;*
- *water quantity;*
- *water temperature;*
- *water velocity;*
- *cover/shelter;*
- *food (juveniles only);*
- *riparian vegetation;*
- *space;*
- *safe passage conditions;*
- *and stable channel and bed.*

Other elements may include an essential element in ecological functions of riverine and marine shoreline systems that, for threatened, endangered and priority species of fish, includes, but is not limited to, shade and moderation of water temperature, streambank stabilization, shoreline protection, riparian corridors, large woody debris (lwd), lwd recruitment processes, a natural range of variability of flows, and off-channel rearing areas control of sediment input from surface erosion, regulation of nutrient and pollutant inputs to streams, litter and woody debris recruitment, refugia, and food production.

2.19. HYPORHEIC ZONE. *“Hyporheic Zone” is the saturated zone located beneath and adjacent to streams that contains some portion of surface waters and means the area of subsurface flow between surface water and the water table; it is generally above the groundwater level, serves as a filter for nutrients and maintains high water quality. Floodplains provide course beds of alluvial sediments through which these subsurface river flows pass, much like a filter, contributing to habitat.*

2.20. IMPERVIOUS SURFACE. *“Impervious Surface” means any material or land alteration (i.e., clearing, grading, etc.) that reduces or prevents absorption of storm water into previously undeveloped land. That hard surface area which either prevents or retards the entry of water into the soil, water that had entered under natural conditions prior to development; and/or that hard surface area that causes water to run off the surface in greater quantities or at an increased rate of flow from that present under natural conditions prior to development. Common impervious surfaces include, but are not limited to: roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, and packed earthen materials.*

2.21. LOWEST FLOOR. *“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(B).*

2.22. MANUFACTURED HOME. *“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.”*

2.23. MANUFACTURED HOME, PARK, OR SUBDIVISION. *“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.*

2.24. NEW CONSTRUCTION. *“New Construction” means structures for which the “start of construction” commenced on or after the effective date of this ordinance.*

2.25. NEW MANUFACTURED HOME, PARK, OR SUBDIVISION. “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.

2.26. PROTECTED AREA. “Protected Area” means any land and vegetation that lies within the Riparian Buffer Zone, channel migration zone, and/or floodway, whichever is more restrictive.

2.27. QUALIFIED PROFESSIONAL. “Qualifies Professional” means a person with experience and training in fish and wildlife issues and/or river systems; who has experience analyzing fish and wildlife habitats and their functions and values, impacts to the habitats, channel morphology, and mitigation; who derives his/her livelihood from employment as a habitat management consultant or fisheries biologist, or who functions in these areas but as a fluvial geomorphologist. Qualifications include: [1] a B.S. or B.A. or equivalent degree in biology, environmental studies, fisheries, geomorphology or related field, and two years of related work experience, or; [2] five years of related work experience.

2.28. RECREATIONAL VEHICLE. “Recreational Vehicle” means a vehicle, which is:

- A. Built on a single chassis;
- B. 400 square feet or less when measured at the largest horizontal projection;
- C. Designed to be self-propelled or permanently tow able by a light duty truck; and
- D. Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

2.29. RIPARIAN BUFFER ZONE. “Riparian Buffer Zone” means an overlay zone that encompasses all land within distances specified in the ordinance on all watercourses and on either side of all streams measured as a line extending perpendicularly ordinary high water, and within which vegetation retention, pervious surfaces and special management practices are required for the protection of water quality, hydrologic functions, and fish and wildlife habitat. The federal services consider riparian buffer zones as the land adjacent to a water body including off channel areas equal to one site-potential tree height measured perpendicularly from the bank full flow.

2.30. START OF CONSTRUCTION. “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.

2.31. STRUCTURE. “Structure” means a walled and roofed building including a gas or liquid storage tank that is principally above ground.

2.32. SUBSTANTIAL DAMAGE. “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.

2.33. SUBSTANTIAL IMPROVEMENT. “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:

A. Before the improvement or repair is started; or

B. 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 does not, however, include:

A. 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;

B. Any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

2.34. VARIANCE. “Variance” means a grant of relief from the requirements of this ordinance, which permits construction in a manner that would otherwise be prohibited by this ordinance.

2.35. WATER DEPENDENT. “Water Dependent” means a structure or use for commerce or industry, which cannot exist in any other location and is dependent on the water by reason of the intrinsic nature of its operations. *A use that can be carried out only on, in or adjacent*

to water areas because the use requires access to the water body for waterborne transportation, recreation, energy production or source of water. Examples include ship cargo terminal loading areas, fishing, ferry and passenger terminals, barge loading facilities, ship building and dry docking, marinas, aquaculture, float plane facilities, hydroelectric dams, surface water intake, and sewer outfalls.

2.36. WATER TYPING SYSTEM. “Water Typing System” means a system for classifying streams according to their size and fish habitat characteristics. The system is based generally on the Washington Department of Natural Resources classification system, and includes the following types:

A. Type 1 includes all major salmonid-bearing streams that are mapped on the FEMA Flood Insurance Rate Maps. In Washington State, this includes all waters inventoried as “shorelines of the State.”

B. Type 2 includes segments of natural waters not classified as Type 1 that are salmonid-bearing, and are used by substantial numbers of fish for spawning, rearing or migration. Waters are presumed to have highly significant fish populations if they include stream segments having a defined channel 20 feet or greater within the bank full width, are lakes, ponds or impoundments having a surface area of one acre or greater, or are waters used by salmonids for off-channel habitat.

C. Type 3 includes segments of natural waters, which are not classified as Type 1 or 2, and have a moderate to slight fish, wildlife and human use. These waters typically have a defined channel of 5 to 20 feet within the bank full width, or are ponds or impoundments having a surface area of less than one acre.

D. Type 4 includes segments of natural waters with bank full widths of defined channels that are not Type 1, 2 or 3 waters, are typically less than 5 feet in width and which are perennial waters of nonfish-bearing streams.

E. Type 5 includes segments of natural waters with bank full widths of defined channels that are not Types 1-4, are less than 5’ wide and are seasonal nonfish-bearing streams.

SECTION 3: GENERAL PROVISIONS

3.1. LANDS TO WHICH THIS ORDINANCE APPLIES. 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. 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 _____, 19__, 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 which incorporates the data utilized under Section 4.3.2. *Any flood information that is more restrictive or detailed than the FEMA data can be used for flood loss reduction and/or fisheries habitat management purposes, including data on channel migration, more restrictive floodways, maps showing future build-out conditions, specific maps from watershed or related studies that show riparian habitat areas, or similar maps.*

3.3. PENALTIES FOR NONCOMPLIANCE. 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. You may want to include some language here about the potential consequences if the action also “takes” a species listed under the Endangered Species Act.

3.4. ABROGATION AND GREATER RESTRICTIONS. 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. In the interpretation and application of this ordinance, all provisions shall be:

- A. Considered as minimum requirements;
- B. Liberally construed in favor of the governing body; and,
- C. Deemed neither to limit nor repeal any other powers granted under State statutes.

3.6. WARNING AND DISCLAIMER OF LIABILITY. 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: ADMINISTRATION

4.1. ESTABLISHMENT OF DEVELOPMENT PERMIT.

4.1.1. Development Permit Required.

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.

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:

- A. Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures;
- B. Elevation in relation to mean sea level to which any structure has been flood proofed;
- C. Certification by a registered professional engineer or architect that the flood proofing methods for any nonresidential structure meet the flood proofing criteria in Section 5.2.2;
- D. Description of the extent to which a watercourse will be altered or relocated as a result of proposed development; and
- E. Identification of the Riparian Buffer Zone, CMZ, and/or floodplain on the site map and location of the building site location in relation to the Riparian Buffer Zone these areas.*

4.2. DESIGNATION OF THE LOCAL ADMINISTRATOR. The (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 AND RESPONSIBILITIES OF THE LOCAL ADMINISTRATOR. Duties of the (local administrator) shall include, but not be limited to:

4.3.1. Permit Review.

- A. Review all development permits to determine that the permit requirements of this ordinance have been satisfied.

B. 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, including those local, State or Federal permits that may be required to assure compliance with the Endangered Species Act or other appropriate fisheries regulations. If Federal funding is involved, the applicant shall furnish evidence from the Federal agency assuring compliance with the Endangered Species Act.

C. Review all development permits to determine if the proposed development is located in the floodway, or in the protected area of the Riparian Buffer Zone. If located in the floodway, assure that the encroachment provisions of Section 5.4(A) are met. If located in the protected area, assure that all provisions related to the Riparian Buffer Zone at Section 5.5 are met.

The applicant shall be notified that the (city, county) has reviewed the permit for compliance with floodplain management and riparian buffer zone requirements of this ordinance, but that it has not been reviewed for compliance with the Endangered Species Act. The decision does not conclude that activities allowed will or will not conflict with provisions of the Federal ESA, and should not be construed to authorize any activity that will conflict with or violate the ESA. The applicant must ensure that the approved activities are designed, constructed, operated and maintained in a manner that complies with the ESA.

D. (OPTIONAL) The applicant shall be notified that during review of this development proposal, it was determined that this property contains land within the Riparian Buffer Zone, which is an area that must remain in an undisturbed condition in which only native plants are allowed to grow, and that the applicant is required by this ordinance to record a Notice on Title on the property before a permit may be issued.

E. In an effort to site structures as far away from the watercourse and protected area as possible, the applicant will be apprised of the elevations of the 10-year and 50-year floods in detailed study areas at the same time that the (city, county) provides the 100-year elevation as a part of the permit review. The applicant, in addition to plotting the 100-year elevation near the building site, will also plot the 10 and 50-year elevations on the land. The 100-year flood has a 26% chance of occurring in a 30-year period, while the 50-year flood has almost twice that chance (45%) and the 10-year flood has a 96% chance, i.e., it will almost certainly happen at least once in the 30-year period. The purpose is to show the applicant the significantly lower risk of placing the structure further away from the watercourse.

4.3.2. Use of Other Base Flood Data (In A and V Zones).

When base flood elevation data has not been provided (A and 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.

A. 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 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.

B. For all new or substantially improved flood proofed structures where base flood elevation data is provided through the Flood Insurance Study, 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 flood proofed.

ii. Maintain the flood proofing certifications required in Section 4.1.2(C).

C. Maintain for public inspection all records pertaining to the provisions of this ordinance.

4.3.4. Alterations of Watercourses

A. 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. Generally, stream relocations should not be allowed unless the primary function of the action is to restore ecological functioning.

B. Require that maintenance be provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished. *If the maintenance program calls for future cutting of planted native vegetation used in performing the alteration, the system shall be oversized at the time of construction to compensate for said vegetation growth or any other natural factor that may need future maintenance.*

C. *Alterations and relocations, including stabilization projects, shall not degrade fish habitat or the physical processes that create and maintain habitat, or cause increased flood hazard or erosion to other properties and shall be subject to the following provisions:*

i. Bridges shall be used instead of culverts on all Type 1 streams, and shall meet fish habitat requirements of the State Department of Fish and Wildlife.

ii. Any culverts that are used on fish-bearing streams must be arch/bottomless culverts or provide comparable fish protection, and must meet fish habitat requirements of the State Department of Fish and Wildlife Design Manual for Culverts, or more restrictive local standards.

iii. Bridges or other crossings must allow for uninterrupted downstream movement of wood and gravel, must be as close to perpendicular to the stream as possible, be designed to minimize fill and to pass 100-year flood flows allow full channel migration and conveyance of

flood water (100 year flood flows).

iv. Alterations must maintain natural meander patterns, channel complexity and floodplain connectivity. Where feasible, such characteristics must be restored as part of the alteration; if not feasible because the impact is minimal, the applicant shall pay a fee in lieu into a fund the (city, county) can use on the stream, adjacent to the site, where the impact would be greater.

v. The applicant shall identify the channel migration zone for the stream at the project site and for a reasonable reach upstream and downstream of the site, and shall not undertake actions as part of the alteration that would in any way inhibit movement of the channel.

vi. Wherever feasible as part of an alteration, culverts that do not meet fish habitat requirements must be removed or replaced as part of the project.

vii. Alteration projects shall not result in blockage of side channels. If at the time of the alteration there are known barriers to fish passage into side channels, they shall be removed.

viii. If man-made side channels are part of an alteration project for irrigation, industrial or similar purposes, they shall be adequately screened, per requirements of the State Department of Fish and Wildlife's Salmonid Screening Manual, or more restrictive local standards.

ix. For any alteration of a salmonid-bearing stream whose channel is subject to migration, bioengineered ("soft") armoring of stream banks is required. For alteration of other fish-bearing streams, soft armoring of stream banks is required wherever possible, in order to allow for woody debris recruitment, gravels for spawning and creation of side channels. Whatever technique is used must be designed in accordance with the State Department of Fish and Wildlife's Stream Bank Guidelines, or more restrictive local standards. Note: this paragraph makes it seem like the only solution to altering a stream is to construct bioengineered armoring. Actually, the solution may be not to armor it at all. See the standards developed in the Shoreline Guidelines on bank stabilization.

4.3.5. Interpretation of FIRM Boundaries.

Make interpretations where needed, as to exact location of the boundaries of the areas of special flood hazards (for example, 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 as provided in Section 4.4.

NOTE - If you do not include Section 4.4 (Variance Procedure), end the above sentence after the word "interpretation" and add the following sentence: "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. VARIANCE PROCEDURE.

4.4.1. Appeal Board.

A. The _____ as established by _____ shall hear and decide appeals and requests for variances from the requirements of this ordinance.

B. The _____ shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the _____ in the enforcement or administration of this ordinance.

C. Those aggrieved by the decision of the _____, or any taxpayer, may appeal such decision to the _____, as provided in _____.

D. In passing upon such applications, the _____ shall consider all technical evaluations, all relevant factors, standards specified in other sections of this ordinance, and:

i. The danger that materials may be swept onto other lands to the injury of others;

ii. The danger to life and property due to flooding or erosion damage;

iii. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;

iv. The importance of the services provided by the proposed facility to the community;

v. The necessity to the facility of a waterfront location, where applicable;

vi. The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;

vii. The compatibility of the proposed use with existing and anticipated development;

viii. The relationship of the proposed use to the comprehensive plan and flood plain management program for that area;

ix. The safety of access to the property in times of flood for ordinary and emergency vehicles;

x. The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and,

xi. The costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.

xii. Impacts to habitat and natural river processes that influence habitat.

E. Upon consideration of the factors of Section 4.4.1(D) and the purposes of this ordinance, the _____ may attach such conditions to the granting of variances, as it deems necessary to further the purposes of this ordinance.

F. The _____ shall maintain the records of all appeal actions and report any variances to the Federal Insurance Administration upon request.

4.4.2. Conditions for Variances.

A. 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 lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items (i-xi) in Section 4.4.1(D) have been fully considered. As the lot size increases the technical justification required for issuing the variance increases.

B. Variances may be issued for the reconstruction, rehabilitation, or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in this section.

C. Variances shall not be issued within a designated floodway if any increase in flood levels during the base flood discharge would result.

D. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

E. 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.

F. 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 the flood elevations should be quite rare.

G. Variances may be issued for nonresidential buildings in very limited circumstances to allow a lesser degree of flood proofing than watertight or dry-flood proofing, 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.

H. Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

SECTION 5: PROVISIONS FOR FLOOD HAZARD REDUCTION

5.1. GENERAL STANDARDS. In all areas of special flood hazards, the following standards are required:

5.1.1. Anchoring.

A. All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.

B. All manufactured homes must likewise 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 (Reference FEMA's "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques).

5.1.2. Construction Materials and Methods.

A. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

B. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage. *If a lot has a buildable site out of the floodplain, new construction shall be directed to that area. For buildings that have no option and must be built in the floodplain, methods and practices include commonly-accepted measures, such as placing structures on the highest land on the lot, orienting structures parallel to flow rather than perpendicular, and siting structures as far away from the watercourse and protected area as possible (see Section 4.3.1[F]). Also, if the local administrator detects any evidence of active hyporheic exchange on a site, the building shall be located to minimize disruption of such exchange.*

C. Electrical, heating, ventilation, plumbing, and air-conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located to prevent water from entering or accumulating within the components during conditions of flooding.

5.1.3. Utilities.

A. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the systems;

B. 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; and

C. Onsite waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding. *New on-site sewage disposal systems are prohibited in the Riparian Buffer Zone, the floodway, in areas not yet mapped where there could be channel migration and within the 10-year floodplain elevation.*

5.1.4. Subdivision Proposals.

A. All subdivision proposals shall be consistent with the need to minimize flood damage;

B. 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;

C. All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage; and,

D. 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).

E. All subdivision proposals shall be consistent with the need to maximize riparian ecosystems, allow for channel migration and preserve existing beneficial natural functions, by:

i. Identifying the Riparian Buffer Zone, floodway, and channel migration zone (if known) on proposed subdivision maps. Note - Identifying channel migration zones is a requirement of the inventory that is done as part of developing a Shoreline Master Program under the new Shoreline Guidelines.

ii. Prohibiting new, buildable lots within the Riparian Buffer Zone, floodway and, if known, the channel migration zone.

iii. Requiring that new lots outside the Riparian Buffer Zone, floodway and, if known, the channel migration zone, have land with adequate building space outside the 100-year floodplain.

iv. For existing legal subdivisions in the floodplain, new construction on lots that have adequate buildable space outside the floodplain is directed to that location.

v. For any development that can occur in new subdivisions, such as access roads, utilities, parks, trails, etc., limits on impervious surfaces and native vegetation removal at Section 5.5 shall apply, and new road crossings over streams are prohibited.

vi. The local administrator should apply concepts of cluster development, density transfer, credits and bonuses, planned unit development, and transfer of development rights wherever possible and allowed by the (city's, county's) development codes.

5.1.5. Review of Building Permits.

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. In all areas of special flood hazards where base flood elevation data has been provided (Zones A1-30, AH, and AE) 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 (In A and V Zones), the following provisions are required:

5.2.1. Residential Construction.

A. 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.

B. 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.

5.2.2. Nonresidential Construction.

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:

- A. Be flood proofed 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;
- B. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;
- C. 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(B);
- D. Nonresidential structures that are elevated, not flood proofed, must meet the same standards for space below the lowest floor as described in Section 5.2.1(2);
- E. Applicant's flood proofing nonresidential buildings shall be notified that flood insurance premiums will be based on rates that are one foot below the flood proofed level (e.g. a building flood proofed to the base flood level will be rated as one foot below).

5.2.3. Manufactured Homes.

- A. All manufactured homes to be placed or substantially improved on sites:
 - i. Outside of a manufactured home park or subdivision,
 - ii. In a new manufactured home park or subdivision,
 - iii. In an expansion to an existing manufactured home park or subdivision, or
 - iv. In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood; 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 designed foundation system to resist flotation, collapse and lateral movement.
- B. Manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision that are not subject to the above manufactured home provisions shall be elevated so that either:
 - i. The lowest floor of the manufactured home is elevated one foot or more above the base flood elevation, or
 - ii. The manufactured home chassis is supported by reinforced piers or other 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 designed foundation system to resist flotation, collapse, and lateral movement.

5.2.4. Recreational Vehicles.

Recreational vehicles placed on sites are required to either:

- A. Be on the site for fewer than 180 consecutive days; or
- B. Be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or
- C. Meet the requirements of 5.2-3 above and the elevation and anchoring requirements for manufactured homes.

5.3. BEFORE REGULATORY FLOODWAY.

In areas with base flood elevations but where 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.

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, which carry debris, potential projectiles, and erosion potential, the following provisions apply:

- A. 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 shall not result in any increase in flood levels during the occurrence of the base flood discharge. *If the mapped floodway is the greater of the measures at Section 5.5.1, uses in the floodway are subject to the restrictions of the Riparian Buffer Zone, unless an exception is applied for per Section 5.5.3(i). Also, an exception to the no-rise criteria is allowed at the discretion of the local administrator for projects designed to create or restore fish habitat, including recruitment of woody debris.*
- B. 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 shall not be included in the 50 percent.

C. If Section 5.4(A) 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.

5.5. ADDITIONAL STANDARDS FOR RIPARIAN ECOSYSTEM PROTECTION.

In all areas of special flood hazards, including unnumbered A and V zones, the following standards apply:

5.5.1. Riparian Buffer Zone (RBZ).

A Riparian Buffer Zone is established for all watercourses including off channel areas – areas outside this zone but within the Special Flood Hazard Area provide necessary protection to the RBZ. The RBZ is the greater of the following:

A. 150 feet measured perpendicularly from ordinary high water for Type 1 and 2 salmonid-bearing streams; for Type 2 nonsalmonid-bearing and Type 3 streams, lakes and marine shorelines, the distance is 100 feet; on Type 4 and 5 streams and in arid areas, it is 50 feet;

B. The Channel Migration Zone (where known) plus 50 feet;

C. The mapped Floodway (where available).

Note: Use DNR 's new definitions for stream types. Also, you could make this consistent with the standards for Vegetation Protection areas under the Shoreline Guidelines.

The Riparian Buffer Zone is an overlay zone that encompasses lands as defined above on either side of all streams, and for all other watercourses including off channel areas. The RBZ is a no-disturbance zone, other than for approved stream restoration activities. Any property or portion thereof that lies within the RBZ is subject to the restrictions of the RBZ, as well as any zoning restrictions that apply to the parcel in the underlying zone. Restrictions in this area apply to all development, per the definition of "development," and the following restrictions are specifically noted:

A. Buildings, including accessory buildings, are prohibited.

B. No new impervious surfaces may be created.

C. Removal of native vegetation is prohibited.

D. New clearing, grading, filling, land-disturbing activity or other “development” (see definition) is not allowed, other than for the purpose of replacing non-native vegetation with native vegetation, and for other restoration work that may be approved by the local administrator.

E. Septic tanks and drain fields, dumping of any materials, hazardous or sanitary waste landfills, and receiving areas for toxic or hazardous waste or other contaminants, are prohibited.

5.5.2. Outside the Riparian Buffer Zone.

Outside the Riparian Buffer Zone but within the floodplain, the following restrictions apply:

A. Buildings shall be set back 15 feet from the RBZ and shall be constructed using post, pier, piling or stem-wall construction techniques, which permit water to flow beneath the structure, or;

B. If a building is proposed to be built on earth fill, it must be set back 15 feet from the RBZ and the applicant must obtain a certification from a qualified professional that the fill will/will not harm fish habitat, and that it will/will not block side channels, or inhibit channel migration, or increase flood hazard to others i.e., the fill will not be placed within a channel migration zone, whether or not the [city, county] has delineated such zones as of the time of the application. This certification must comply with the (city’s, county’s) peer review process.

C. Balanced cut and fill techniques may be used to elevate a structure, provided the structure is set back 15 feet from the RBZ and the fill is approved by the local administrator, who shall require certification from a qualified professional that the fill will will/will not harm fish habitat, and that it will/will not block side channels or inhibit channel migration, or increase flood hazard to others i.e., the fill will not be placed within a channel migration zone whether or not the [city, county] has delineated such zones as of the time of the application. This certification must comply with the (city’s, county’s) peer review process. OPTIONAL: Change “may” to “shall” in (c) and require balanced cut and fill together with a required certification; replace (b) with (c).

D. Creation of new impervious surfaces shall not exceed 10 percent of the surface area of the portion of the lot in the floodplain.

E. Removal of native vegetation must leave 65 percent of the surface area of the portion of the lot in the floodplain in an undeveloped state; the 65 percent pertains to the entire portion of the lot in the floodplain, including that area in the RBZ, where removal of native vegetation is prohibited.

F. For existing lots created before the date of this ordinance, and for lots in degraded

condition, the applicant can apply for an exception to the impervious surface and vegetation retention requirements. The standard for exceptions is to minimize total building coverage and all other impervious surfaces to allow up to 3000 square feet of disturbance if the lot is less than 30,000 square feet, and no more than 10 percent if the lot is greater than 30,000 square feet. Disturbance includes land alteration involving grading, utility installation and landscaping, but does not include land used for an on-site sewage disposal system. If the applicant cannot meet the impervious surface and/or vegetation retention standards because of site degradation, he/she will be notified of possible consequences related to the Endangered Species Act, and provided such notification described at Section 4.3.1(D), the purpose of which is to encourage restoration.

G. The proposed action must be designed and located so that it will not require new structural flood protection (e.g., levees)

5.5.3. Exceptions to Restrictions of the Riparian Buffer Zone.

The local administrator may grant an exception to the requirements of the Riparian Buffer Zone. Such an exception must be based on a report prepared by a qualified professional for the applicant, and shall require conditions of approval, including mitigation and/or restoration, necessary to assure that the action will not in any way degrade riparian ecosystem functions.

A. Some uses are allowed outright, including activities such as: [1] repair or remodel of an existing building in its existing footprint, including buildings damaged by fire or other casualties; [2] removal of noxious weeds; [3] replacement of non-native vegetation with native vegetation; [4] ongoing activities such as lawn and garden maintenance; [5] removal of hazard trees; [6] normal maintenance of public utilities and facilities; and [7] restoration or enhancement of floodplains, riparian areas and streams that meet Federal and State standards.

B. Water-dependent uses, such as fish enhancement projects approved by the (city, county), private boat docks, marinas, boat ramps, etc.

C. Normal farm practices, other than buildings, in existence at the date of adoption of this ordinance, on land zoned for agriculture.

D. Crossings by transportation facilities and utility lines. Issuance of permits for such uses or activities is contingent upon the completion of a feasibility study that identifies alternative routing strategies that do not violate the RBZ, and on a mitigation plan that assures no net loss of ecological functions in the RBZ and provides restoration where the RBZ is degraded.

E. Trails are only allowed after a critical areas study documents no loss of buffer function, mitigation is added which may include increasing buffer widths equal to the width of the trail, construction uses pervious materials, and the trail is located on the portion of the buffer that is farther away from the stream.

F. New construction of single-family buildings is not permitted except as may be approved through a variance related to size, shape or topography of the property weighed against the possibility of a taking for a parcel that was legally created prior to the date of this ordinance, and may only be allowed if the action results in an equal or greater level of ecological function than the current condition, as certified by a qualified professional.

G. Buffer width averaging may be allowed by the local administrator if it is based on a Habitat Management Plan prepared by a qualified professional, will provide additional natural resource protection over existing conditions, and the total area contained in the buffer on the development proposal site does not decrease nor is there more than a 25 percent decrease anywhere within the buffer. The local administrator may increase buffer widths when necessary to protect streams. This action will be supported by appropriate documentation demonstrating that: [1] a larger buffer is necessary to maintain critical habitat; [2] increased protection is necessary based on evidence of a migrating stream channel; or [3] the adjacent land is susceptible to severe erosion and erosion control measures cannot effectively prevent adverse impacts to the riparian area

H. Floodway exception. If a proposed site is in a floodway that exceeds the other two distance measurements in the RBZ, the applicant has the option to determine whether or not the site is located within the elevation of the 10-year floodplain. If it is both within the floodway and 10-year floodplain, the RBZ and floodway restrictions apply; if it is within the floodway but outside the 10-year floodplain, floodway restrictions and restrictions outside the RBZ apply.

I. Modifications based on detailed community studies. If a community has completed, documented and adopted a detailed, comprehensive watershed-type analysis that better defines riparian areas based on site conditions, etc., that material can be used to modify the RBZ distances (150, 100 and 50 feet) in Section 5.5.1.

Editor's Note: This is a separate supporting document and not typically a part of the FEMA Model Ordinance. It is included here to provide additional information to the reader.

SUPPORTING INFORMATION

FEMA Region 10 Model Ordinance for Flood Loss Reduction and Fish Habitat Enhancement

What will we leave for our children – Excuses, or Salmon?

Purpose

The purpose of this report is to document measures that were added to the FEMA Region 10 Model Flood Damage Prevention Ordinance to enhance fish habitat in the Northwest. The Regional Office has long been aware that certain measures allowed by FEMA's flood loss reduction regulations are sometimes not conducive to maintaining healthy fish habitats, and the intent of this activity is to bring about greater consistency between flood loss reduction and fish habitat enhancement.

The major product is addition of several provisions to the long-standing Model Ordinance, in the context of the model, i.e., the same basic model is intact, but with additions that are noted. The additions in the Model for fish enhancement are in **bold** type, and appear as phrases, whole sentences and, sometimes, whole new sections. In all cases, however, the additions can be distinguished by the bold type.

There is a tremendous amount and variety of information that is available relating to ecosystem and riparian area protection, fish habitat enhancement, Endangered Species Act implications in the Northwest, protection and restoration activities and similar areas. There is little problem with lack of information; rather, the problem is how to focus the available information for the purpose of this project.

Thus, the purpose of this report is to provide the user of the Model Ordinance with supporting information showing the science or technical material that was used in deriving specific measures that were placed into the basic model.

Background

FEMA has provided local governments with model ordinances since the mid-1970s. The models are based on Federal regulations at 44 CFR 60.3, and basically relate to flood loss reduction activities. This stems from the enabling legislation of the National Flood Insurance Act of 1968, as amended, and from the aforementioned regulations, which specify flood loss reduction almost exclusively.

However, through the years, FEMA staff, both at the Headquarters Office and in the Regional Offices, have recognized limitations posed by an exclusive focus on flood loss reduction measures. There are several activities FEMA has taken or been involved with that significantly broaden the somewhat limited scope of this focus, such as:

- FEMA chairs the Federal Interagency Floodplain Management Task Force, which was established in 1975 to carry out the responsibility of the President to prepare for the Congress a Unified National Program for Floodplain Management, and which consists of all Federal agencies that have a role in floodplain management. One of the more recent documents produced by the Task Force is "Protecting Floodplain Resources," which is a very holistic look at natural floodplain values and functions beyond only dealing with flood loss reduction measures.
- FEMA was an early advocate of Multi-Objective Management of floodplains (MOM). The agency produced guidance material to spur planning around this concept, and stimulated its application through reports, at professional conferences, and in other ways.
- The floodplain management, or flood loss reduction regulations of the National Flood Insurance Program (NFIP) are considered to be minimal, and are the basic measures a community must adopt for eligibility in the NFIP. However, FEMA has a program that is part of the NFIP, called the Community Rating System (CRS), which is literally a bible of good floodplain management practices. The basic measures communities must adopt are spelled out in six pages in the Federal regulations; the CRS defines good floodplain management in over 450 pages (plus numerous additional appendices and other specialized documents). Several of these pages spell out multi-objective floodplain management concepts, including those dealing directly with preserving floodplain lands for the natural and beneficial functions they provide.
- Recent initiatives by the FEMA Director have involved gathering National leaders in floodplain management to discuss future directions, one purpose of which is to ascertain whether the focus needs to be further shifted to provide additional protection for natural values of floodplains.

Given the understanding and attention FEMA and its staff has paid to a more holistic view of floodplain management, and given the need for such a look in view of degradation of fish habitat as indicated through various Endangered Species Act listings, it is appropriate that FEMA promulgate measures to at least conserve and protect existing habitat, and to correct certain existing legal measures, such as indiscriminate filling in floodplains, that may actually be harmful to fish habitat.

It is recognized that the proposed measures cannot in any way be construed as required measures a community must adopt in order to retain eligibility in the NFIP, since fish enhancement/riparian ecosystem protection is not within the authorities of the NFIP. Rather, the measures are recommended as a way a community may be able to protect itself in terms of complying with rules of the Endangered Species Act. FEMA recognizes that the best approach for ecosystem protection is the overall approach utilizing comprehensive watershed management planning, but also recognizes that such planning may not be possible or achievable in the near future for some communities. The revised Model

Ordinance, in such cases, can be viewed as at least an interim measure until a community can perform the desired level of comprehensive planning.

Literature Search

An extensive literature search was undertaken and maintained throughout this project. Early successes in this effort stemmed from attending the Annual Meeting of the Northwest Floodplain Managers Association, and from King County, through their Department of Natural Resources. There is extensive literature on various aspects of fish and fish habitat, from State and Federal agencies, academia, regional agencies, local governments, watershed groups, Indian Tribes and private consultants. The difficult part of the project was to focus this information on the task of producing new language for the existing FEMA Model Flood Damage Protection Ordinance, in view of the plethora of information available.

References consisting of books, documents, articles and excerpts that were obtained and reviewed for this project are identified in the Reference section beginning on page 46. There are over 75 documents in this bibliography, some of which are short articles, but several of which are quite lengthy. The text of this report refers throughout to documents that were reviewed from the list that is noted in the References.

Significance of the Floodplain

Floodplain connectivity with streams and other watercourses is recognized as a specific habitat element necessary to be maintained, protected or restored in order for wild salmon to continue to exist and evolve (*Extinction is Not An Option, page II.10*). Major State agencies in Washington and Oregon, and Regional efforts in the Northwest, such as Metro in Portland, emphasize the contributions of floodplains to healthy habitats for fish. This idea is perhaps best expressed in Portland Metro's *Streamside CPR*, as follows: The Riparian area "encompasses the area beginning at the ordinary high water line and extends to that portion of the terrestrial landscape that directly influences the aquatic ecosystem by providing shade, fine or large woody materials, nutrients, organic and inorganic debris, terrestrial insects, or habitat for riparian-associated wildlife. It includes the entire extent of the floodplain because that area significantly influences and is influenced by the stream system during flood events." That report goes on to specify that in larger river-floodplain systems, most of the aquatic productivity occurs in the floodplain. "The interaction of the channel with its floodplain tends to create unique biological communities, cutoff oxbows, sandbars, backwaters, undercut banks, floodplain pools and extensive high water tables. Much of the aquatic productivity occurs in the floodplain."

This is consistent with many of the technical documents that were reviewed. For example, J.V. Ward, in an article published in *Freshwater Wetlands and Wildlife* in 1989 states that "Riverine-wetland ecosystems evolved in response to dynamic interactions between the river channel and the floodplain" and he concludes that "The floodplain is thus an integral functional component of river ecosystems." Much of this aspect of floodplain functions is focused on food production in floodplains, which is echoed by many authors, including

Stanford in *A General Protocol for Restoration of Regulated Rivers*, wherein he states that “Food webs are complex and change predictably along the stream continuum in direct response to variations in the strength of interconnections between channel groundwater, floodplain and upland elements of the catchment.”

The Forest Ecosystem Management Assessment Team (FEMAT) defined riparian reserves as the stream plus the outer edges of the 100-year floodplain, as one alternative for achieving riparian protection. The National Marine Fisheries Service (NMFS) states that in streams with a broad valley floor, it is more appropriate to define the riparian zone based on some measure of the floodplain (*Streamside CPR*, page 38). Also, “In streams, aquatic productivity is almost exclusively concentrated in the channel; in larger river-floodplain systems most of the aquatic productivity occurs in the floodplain.” Metro goes on to state that “According to the scientific literature reviewed for this report (*Streamside CPR*), the riparian zone of influence includes the extent of the floodplain because of the movement of the stream or river across the floodplain through time. Therefore the proposed riparian area width includes the extent of the floodplain. In cases where the floodplain exceeds the 175-foot riparian area width, the extent of the 100-year FEMA floodplain or the area of inundation of the 1996 flood, whichever is greater, is the proposed riparian area width.” While this denotes the importance of floodplains, it should be pointed out that at the time of this writing, the Metro Council had not yet decided on a specific riparian area width for regulatory purposes.

In Washington, the significance of floodplains is noted in the *State/Tribal Wild Salmonid Policy Action Strategy*, thusly: “Protect (and restore where feasible) floodplain habitat of value for wild salmonids.” *Extinction is Not An Option* calls for restoration of natural floodplain functions which will “benefit habitat for aquatic and riparian species as floodplains resume their natural character.” The document also recommends changes to: “Integrate engineering concepts of flood hazard management and biological concepts of salmon recovery into a unified management strategy.” Also, the State’s new Shoreline Master Program Guidelines specify floodplain connectivity and floodplain management throughout the Default and Optional Approaches that have been promulgated.

Finally, the University of Washington Center for Streamside Studies, in a paper prepared for the Washington Department of Fish and Wildlife, devotes the entire paper to describing the relationships between floodplains and habitat; the paper is called *Ecological Issues in Floodplains and Riparian Corridors*. Among its many findings regarding floodplains, it concludes that “Large streams and rivers (where most people are) usually occupy flatter, gentler terrain where there is a large potential for an extensive zone of influence between the river and the floodplain.”

Based on the above information and numerous related documents, it is clear that good stewardship of floodplains can be an extremely important factor in protecting habitat for fish, and that an enhanced Model Ordinance incorporating measures to protect riparian ecosystems of floodplains can be of great value.

Questionnaire and Personal Interviews

The FEMA Model Ordinance Project involved a review of documents obtained from the Literature Search, mainly from State, Federal and regional agencies. Major efforts have been undertaken by the States, as documented in *Extinction is Not An Option* in Washington and *The Oregon Plan*. State agencies in Idaho, Oregon and Washington have produced a wealth of information in support of these and other plans, and much of this information was reviewed as background to support changes in the FEMA Model Ordinance.

However, some of the most valuable input for this project was that which was obtained from local governments, mainly in Oregon and Washington. This was accomplished primarily through questionnaires and personal interviews. In January, a questionnaire was sent to 106 local governments in the three States, 49 to counties and 57 to cities (49 in Washington, 52 in Oregon and 5 in Idaho). The questionnaire asked these local governments: [1] whether their floodplain management ordinance contained any measures beyond the FEMA minimums that are aimed at enhancing fish habitat; [2] if their community had fish enhancement measures in other codes that would be appropriate in the floodplain ordinance; [3] what fish enhancement measures they would recommend if they were preparing a floodplain ordinance; and [4] how they would view several measures that were being contemplated by FEMA for the Model Ordinance.

Detailed responses are contained in a companion document "Analysis of Questionnaires and Personal Interviews." In summary, there were no communities that had measures in their floodplain ordinances aimed specifically at fish enhancement. Several had measures that clearly were "fish-friendly," but they were not adopted on that basis. For example, Skagit County prohibits fill for structural support in their ordinance, a measure that is good for fish habitat, but was adopted for other reasons. Most all the communities responding to the second question would retain their fish habitat regulations in areas other than the floodplain section of the code (such as their sensitive areas-type ordinances). The four ideas that were most evident in reviewing responses to what local officials would recommend if they were preparing a "fish-friendly" floodplain ordinance were:

- Establish and regulate a riparian protection zone;
- Limit fill in the floodplain;
- Limit removal of native vegetation; and
- Develop stronger prohibitions in floodways.

Concerning specific measures in Question 4, local officials, first, were not in favor of outright allowance of fish enhancement measures in stream channels and floodways. They appreciated the flexibility FEMA has offered through its "Policy on Fish Enhancement Structures in the Floodway," but they felt a need for some degree of control, in view of the hazards and safety issues these projects could present to others. This was particularly true of woody debris, where the majority of respondents did not approve of an outright requirement that woody debris deposited from floods be retained onsite or in close proximity, again in view of the potential hazard and public safety issue.

Most respondents thought riparian area protection was better placed in an area of the code other than the floodplain section, though several were favorable to requiring riparian

protection in the floodway. Similarly, most recognized the need for establishing buffer zones together with restrictions in these zones, but would place them in other parts of the code.

Concerning floodplain fills, many expressed a desire to not allow them, but this was tempered by the fact that fill is such a prevalent construction technique that prohibiting it might not be possible. Respondents were virtually unanimous in strictly limiting watercourse alterations that would diminish fish habitat (this included such measures as requiring culverts that assure fish passage, prohibiting barriers and blockages to side channels, and requiring screening where needed). See “Analysis of Questionnaires and Personal Interviews” for additional information on these questions and responses.

The personal interviews were conducted primarily with local city and county officials – they accounted for 23 of the 29 interviews. There were also two interviews with the Regional agencies in Seattle and Portland, two with private consultants and one each with a State agency and the University of Washington. People interviewed were primarily floodplain managers, since it is the floodplain ordinance that is being modified and new fish habitat measures would become part of their administration of the ordinance (at most of these meetings, if the locality had a “fish person” on staff, that person also participated).

Raw notes from the personal interviews are included in “Analysis of Questionnaires and Personal Interviews,” as is a summary of salient points from these interviews. There were a wealth of excellent, new ideas from these interviews that have made their way into the new Model Ordinance (these ideas are usually identified in the discussion of new measures below). Besides the valuable ideas provided by these local officials, measures they already have that relate to fish enhancement were obtained, and were of tremendous use in formulating various aspects of the additional ordinance provisions.

Floodplain and Fisheries Resource Management Workshop

On February 27, 2001, FEMA hosted a workshop to explore mutual ideas for flood loss reduction and fish habitat preservation and restoration, at the Federal Regional Center in Bothell. There were 38 participants, divided more or less evenly on the basis of “flood” and “fish” people. The entire FEMA flood staff participated, as did four people from the National Marine Fisheries Service. There were also representatives from the Oregon and Washington Departments of Fish and Wildlife, the State Coordinators for the National Flood Insurance Program, private consultants, and university personnel. Significantly, there were nine local government representatives, and the two facilitators were also from a local government (King County). This was important because they are the end users of any fish enhancement measures that will be included in an augmented model ordinance, and they can (and did) provide extremely important input on how such measures could work.

The workshop was considerably more far-reaching than merely focusing on the Model Ordinance; there were good discussions on many concepts of mutual concern that noted complexities and issues well beyond merely adding fish enhancement measures to a model ordinance. The results of this workshop are chronicled in a companion document that

summarizes day-long sessions, including the initial presentations by FEMA and NMFS and the detailed discussions that ensued in the morning and afternoon. While this Workshop covered issues that were quite comprehensive, the comments that have been recorded and the discussions that were held proved very valuable to formulating ideas for inclusion in the Model Ordinance. Where specific ideas were brought up at this workshop, they are so noted in the discussion of specific ordinance measures below.

The Basic FEMA Model Ordinance

FEMA has had model ordinances since the mid-1970s. They were published in a series of documents called the Community Assistance Series, and were labeled “Guide for Ordinance Development.” They were published by the Washington D.C. office of the Federal Insurance Administration (then a part of HUD, now a part of FEMA), and contained actual model ordinance language, together with separate columns explaining the rationale for particular provisions. This ordinance language was derived from the Federal regulations at 44 CFR 60.3, closely following the regulations but putting them in the context of a local land use ordinance. The models also include sections on variances, penalties for noncompliance, etc., that are not in the regulations but are needed to assure that the ordinance is legally enforceable.

Concurrent with issuance of the series of National model ordinances, the Regional Office issued its own versions of the models. They were straight-typed and easier to view in ordinance format, and were done mainly because there were few copies of the National model available. However, the Regional model did not vary at all from the National model; it couldn't, in view of the fact that the ordinance had to be based on the regulations, and there was not latitude enabling a field office to change the National model. That has been the case to this day. While there have been cosmetic changes and State-specific measures added to the Regional model ordinances, and while the ordinance has changed a bit through the years with changes in the regulations, the models that exist today are essentially the same as the original models.

The major sections of the model ordinances are the following:

- 1.0 Statutory Authorization, Findings of Fact, Purpose and Objectives
- 2.0 Definitions
- 3.0 General Provisions
- 4.0 Administration
- 5.0 Provisions for Flood Hazard Reduction

The new model totally follows the existing model ordinance format. Most of the additions are in Sections 4 and 5. Section 4 includes language that establishes the required development permit and discusses duties and responsibilities of the local administrator. There are significant additions to these duties that relate to the local administrator's review of permits for restrictions in the Riparian Buffer Zone. There are also significant additions to the section that describes requirements that must be met if a watercourse is to be altered. These new requirements relate to the need to maintain floodplain connectivity

in any alteration, use bridges instead of culverts, use bioengineered armoring, and several others. Section 4 also includes provisions that describe other base flood data that should be used, the need to obtain and maintain elevation and floodproofing certificates, and a major part of this section is devoted to the variance process (which is not mandatory language). This variance process relates mainly to flood loss reduction measures, not fish enhancement measures (a later section covers exceptions to restrictions in the Riparian Buffer Zone).

The most important fish enhancement additions are in Section 5, which is the heart of all of the model ordinances. This section consists of: [1] General Standards, which include anchoring, construction materials and methods, utilities and subdivision proposals; and of [2] Specific Standards, which give the performance standards for residential construction, nonresidential construction, manufactured homes, recreational vehicles, and the more restrictive floodway standards. A new section is added to the Specific Standards, Section 5.5, called "Additional Standards for Riparian Ecosystem Protection," which consists of the Riparian Buffer Zone, Outside the Riparian Buffer Zone, and Exceptions to Restrictions of the Riparian Zone. It is this section that contains the most important additions to the model for fish enhancement purposes.

Limitations of the Revised Model Ordinance

There are limitations that are acknowledged at the outset that may reduce usability of the revised Model Ordinance. They are the following:

1. **The ordinance is not mandatory.** Although the FEMA model ordinances were not mandatory in that they had to be used exactly as they were published, the provisions in the model were, nevertheless, taken directly from the Federal regulations and were, consequently, the easiest way for most jurisdictions to comply with those regulations. While the model *per se* was not mandatory, compliance with the regulations definitely was mandatory. The new fish provisions are not based on Federal regulations and are, therefore, not mandatory. Although the Background and Significance of the Floodplain sections above provide some reasons for FEMA involvement in riparian ecosystem protection, there is no basis in regulation to support this involvement. However, a large majority of the 723 communities that participate in the NFIP in the Northwest are under mandates to comply with rules set forth by the NMFS and U.S. F&W Service for threatened and endangered fish species. Since floodplains are such a key factor, if this ordinance can supply some degree of protection under those rules, it may be in the best interest of the community to consider adoption of the Model. Rather than mandating the ordinance per regulations, it is offered on the basis of it being an **incentive** to comply with the ESA.

2. **The ordinance applies only to the floodplain.** The basic construct of the FEMA model ordinances is that all floodplain management measures apply to mapped streams that were studied by either detailed or approximate study methods and appear on Flood Insurance Rate Maps. The 100-year floodplains appear as either Zone A or V, AE or VE, A1-30, V1-30, AO, or AH, and are also termed Special Flood Hazard Areas. In some communities, this will be adequate, i.e., all streams will be covered. For others, however,

the study and maps will not cover all streams, particularly those that are quite small. FEMA has a general threshold that study will not be performed for streams that have a contributing drainage basin that is less than one square mile. Also, not all lakes, estuaries, lagoons, etc., are always included on FEMA maps. A comprehensive program for riparian habitat may include lands beyond what is on FEMA maps, including very small streams, many intermittent streams (some of these are on FEMA maps), upland areas, entire watersheds, all lakes, reservoirs, estuaries, and wetlands, etc.

3. Conservation and protection, but little restoration. Restoration is very important, as stated in the Final Joint Washington Department of Fish & Wildlife/Tribal *Wild Salmonid Policy* thusly: “The Wild Salmonid Policy Goal will not be attained without active restoration of lost and damaged habitat.” Although there is a presumption that NMFS will accept conditions that already exist whether or not habitat is severely degraded (a bit like zero-based budgeting) it is, nevertheless, important to encourage restoration activities wherever possible. In the Model Ordinance, there are some references to restoration (restoration is encouraged under Alteration of Watercourses, is a use permitted outright if the restoration meets Federal and State standards, and is required in order for certain exceptions to be approved); however, restoration is more difficult to work into an ordinance than achieving it as part of a comprehensive watershed program, which defines valuable habitat land, suggests grant programs to acquire such land and has a host of other planning elements.

Ordinance Changes – Section by Section

1.2 Findings of Fact

The two statements at this section in the existing model relate to floods causing damages to the built environment, and to damages being exacerbated by improper building techniques. The paragraph that is added relates to a view of rivers as interconnected systems that are a geomorphological creation with biological features that produce and nourish various fish species. Many today are beginning to look at managing rivers in an ecologically beneficial way, which is very different than just a few years ago when river management was based largely on hydraulic engineering concepts. This older approach has produced measures that allow fills to be placed in large parts of the floodplain (the flood fringe), regardless of whether or not the fills block natural channel migration; has allowed hardening of river banks that constrain channel meandering; has produced impervious surfaces that reduce floodplain storage and make floodwaters move more efficiently, thereby conveying flood flows faster which, in turn, disrupt natural channel forming processes, reduce water supply, etc. Some of these practices, such as indiscriminate fill in the flood fringes, can actually cause greater degradation of habitat, even though it is a “legal” and normal practice. Addition of the clause in the Findings of Fact recognizes a broader view of river systems that is not only becoming more acknowledged among practitioners, but also realistically recognizes that present practices can actually result in serious degradation of natural processes that protect habitat, thereby maintaining fisheries resources. This idea was expressed by a private consultant at the February 27, 2001 Fish-Flood Workshop (see page 8 of the Summary of the Workshop).

1.3 Statement of Purpose

All eight of the original model ordinance purpose clauses relate to loss reduction measures. They, of course, are derived from the original Act and its implementing regulations. This was observed by a local government representative at the Fish-Flood Workshop, who suggested that a statement of purpose with respect to protection of fish needed to be added to the ordinance. That has been done both in the introduction to the Statement of Purpose (“...to maintain streams in their natural state to the maximum extent possible...”), and through addition of two specific purpose statements, numbers 9 and 10. These statements recognize the value of stream ecosystems, and advocate steps to stem damaging, but legal, past practices regarding building in floodplains. They denote an expansion of the singular approach to floodplain management that has been the norm, and fulfill the multiple objectives that have been encouraged for over 15 years by numerous agencies, including FEMA (see “Background” above). Similar phrases are added in Section 1.4, Methods of Reducing Flood Losses.

2.0 Definitions

Six terms are added to the definitions, and two are expanded. The new terms are: [1] channel migration zone; [2] habitat; [3] impervious surface; [4] protected area; [5] qualified professional; and [6] riparian buffer zone. The two terms that are expanded somewhat are “development,” and “water dependent.” Following are brief comments on these terms:

Channel Migration Zone. This term is taken from definitions in local ordinances (e.g., Mason County), the Washington Department of Ecology’s Shoreline Master Program Guidelines, The Washington Forest Practices Manual and NMFS Take Limit #12 from the 4[d] Rule for Threatened Salmon and Steelhead on the West Coast. It is included in the definitions because it is one of three criteria used to define the Riparian Buffer Zone.

Development. Words are added to this already all-encompassing definition to assure that vegetation removal requires a permit, in view of its importance in retaining natural functions. Vegetation removal is a major tenet in the Washington Shoreline Master Program Guidelines as it likewise is in both the Portland Metro and Puget Sound Tri-County Regional efforts. It is also important to obtain a permit if there will be any alteration of natural site conditions, in view of the implications here on channel migration, and in view of the need to comply with prohibitions on clearing, grading or any other land disturbing activities in the Riparian Buffer Zone.

Habitat. This term is used throughout the revised Model Ordinance. It is defined as elements essential to the development and maintenance of aquatic species, particularly salmonids. The elements are derived from similar definitions in the Washington Shoreline Master Program Guidelines, from the Spence Report (*An Ecosystem Approach to Salmonid Conservation*), from the NMFS definition of Properly Functioning Condition, and from Snohomish County’s Administrative Rules, among others.

Impervious Surface. Several local ordinances define impervious surfaces, and the definition in the revised model is a patchwork from those ordinances. Restrictions on impervious surfaces in riparian areas is a concept that is central to the major Regional planning efforts of Portland's Metro and Tri-County in the Puget Sound Region, as well as to State guidelines, such as those in the Washington Shoreline Master Program.

Protected Area. This term defines those lands that are within the Riparian Buffer Zone. Protected denotes the categories of restrictions that apply in the RBZ, at Section 5.5-1.

Qualified Professional. This definition also is derived from similar provisions in local ordinances (e.g., Issaquah, Mason County, etc.). The intent is to direct applicants to professionals who can make judgments relative to fish habitat, including that aspect of habitat that deals with channel movement, to assure that fills that could harm fish or block natural channel migration are detected.

Riparian Buffer Zone. This definition is adapted from a model ordinance prepared through the Carl Vinson Institute of Government at the University of Georgia, entitled "*Protecting Stream and River Corridors.*" The term is similarly defined or referenced in several local ordinances, and is thoroughly discussed in the Spence report, Portland Metro's *Streamside CPR* report, *Ecological Issues in Floodplains and Riparian Corridors* (pages 8-10), the *Final Joint WDFW/Tribal Wild Salmonid Policy*, *Tri-County's Regulation of Near-shore and Aquatic Development*, and many more. This is the zone wherein the protected area restrictions are applied at Section 5.5-1.

Water Dependent. The definition builds on the NFIP definition, mainly by providing examples of water dependent uses, some of which are particularly applicable to jurisdictions in the Northwest.

Water Typing System. Stream typing systems "come in all sizes and shapes," according to the research, personal interviews and ordinances that were obtained. Various ordinances use various terms, classifications, etc., although they all seem to be based loosely on similar general parameters. This is true for those ordinances that were examined in both Oregon and Washington. The typing system used in the model ordinance attempts to use an "official" typing system, with minor interpretations to fit the objective of the ordinance. Thus, the Washington Department of Natural Resources Water Typing System, found at WAC 222-16-030, is the basis for the definition in the Model Ordinance. It was used because it relates to fish-bearing capacity, particularly salmonid-bearing, and it includes understandable physical parameters, viz., width of channels, that relate well to size of buffers. It is understood that DNR is presently revising this system; however, none of the ordinances that were examined had the new language, and the existing terms are, therefore, retained until the new system is in common use.

3.2 Basis for Establishing the Areas of Special Flood Hazard

The sentence that was added here refers the user to employ any relevant data that is more restrictive than data on the FEMA maps, both for flood loss reduction and fisheries habitat

management purposes. Some jurisdictions are familiar with use of more restrictive floodway and future conditions data in their flood loss reduction activities, since these concepts have been advocated for some time and, in the case of more restrictive floodways, is required in some 13 States and by several localities in the Northwest.

What is new here is the referral that is made to more restrictive data for fisheries management purposes, specifically the use of channel migration data and data from watershed or related studies. There are several communities that were observed during the personal interviews that have information on channel migration, even though that information was not necessarily on official maps; such data should be used for the purpose of defining the Riparian Buffer Zone, per Section 5.5-1 of the model. Also, whenever a community has a detailed, comprehensive watershed-type program that better defines riparian areas, whether or not the information produces larger protected areas, it may be used. This is because it is recognized that referring to a number, such as the 150 foot distance of the protected area at Section 5.5-1, is subject to refinement, but only as a product of such a detailed study. This action is allowed as an exception to the RBZ restrictions, at Section 5.5-3(j).

4.1-2 Application for Development Permit

Applications for development permits require much information as spelled out in the opening paragraph of this section, and also require description of the elevation for all structures, floodproofing elevation and certification (if applicable) and a description of any alteration that may occur to a watercourse. What is added here is that the applicant is required to identify the Riparian Buffer Zone on the site map, and show the relationship between the building site location and the RBZ. This is because buildings must be located outside the RBZ per Section 5.5-1, and must be at least 15 feet away from the RBZ. Inclusion of this information will give the local administrator a basis for determining whether or not this standard will be met by the applicant.

4.3-1 Permit Review

At subsection 2, the local administrator is directed to review any permits that may be required to assure compliance with the ESA or other appropriate fisheries regulations (e.g., State regulations), as a part of the basic requirement to obtain all necessary permits from those Federal, State or local governmental agencies from which prior approval is required. It is recognized there is a certain redundancy here, in view of the fact that the basic requirement (Federal, State or local permits) encompasses all, including any ESA permits that could be required. It is also recognized that there is no specific ESA permit requirement. However, the clause is inserted merely to reinforce the need to be aware of any implications of the ESA. This tracks one of the conclusions in the "Analysis of Questionnaires and Personal Interviews," wherein the majority of respondents did think this should be included, mainly because "It can't hurt to emphasize (reinforce) the need to get appropriate fish-related review," regardless of whether or not this implies duplication. Where Federal funding is involved, however, there must be documentation from the

Federal agency that there is compliance with the ESA, a practice that one of the cities that was interviewed already employs, in recognition of the Federal nexus.

In subsection 3, development permits are required to be reviewed by the local administrator to determine if the proposed development is located in the floodway, and they are then directed to the floodway requirements. Similarly, this review now must also determine if the proposed development is located in the RBZ and, if it is, the applicant is directed to requirements of the protected area in the RBZ at Section 5.5-1, or if outside the RBZ to requirements at Section 5.5-2. The applicant should have this information on his/her site plan, per Section 4.1-2, but the local administrator confirms that information here, and describes the implications of it from Section 5.5.

Subsection 4 is a disclaimer for the local administrator. It is recognized here that local governments do not generally have people who are qualified in fish habitat and ecological functions, nor are they necessarily aware of all the implications of the ESA. The local administrator's decision, therefore, is based on adherence to floodplain management and RBZ requirements of the ordinance; it does not specify that the proposed development does or does not specifically comply with the ESA. The practice and wording here are taken from one local government (Clackamas County) that has successfully applied this kind of disclaimer in its permit issuance procedures, and is considered to be appropriate in view of the high level of uncertainty with regard to the ESA and its implications for local governments.

In subsection 5, a Notice on Title procedure is specified. This is a process that was observed to be used by several local governments (e.g., King County, Clallam County), particularly to record information in cases where sensitive lands are part (or all) of a lot under consideration. For example, King County requires that the owner of any property containing sensitive areas or buffers on which a development proposal is submitted must file such a notice in order to inform the public of the presence of the sensitive areas or buffers, and that development limitations may exist. This process is recommended for disclosure purposes, but is shown as an optional process a community may or may not decide to include in its ordinance.

4.3-4 Alteration of Watercourses

One of two existing standards is clarified in this section, and an entirely new standard is added for fish habitat purposes. The standard that is clarified is Subsection 2, which requires that the flood carrying capacity of an altered watercourse be maintained. One of the meanings of maintenance here is that a maintenance program has to be established by the applicant, so that the altered watercourse will have the same carrying capacity in the future as it has on the day it is completed. This could imply that there would have to be practices such as cutting of vegetation on a routine basis in order to comply with the standard. To avoid this, in view of the value of native vegetation (which would have to be planted for such a project to be approved), the standard is altered to require oversizing of the system at the time of construction, which will obviate the need for future cutting of the

vegetation. This idea was suggested by Whatcom County during the personal interviews, and is appropriately added to the Model Ordinance.

The new standard specifies that any alteration, including streambank stabilization projects, cannot result in any degradation of fish habitat, and there are 9 elements that define specific measures to avoid such degradation:

a) Bridges are required for crossings on all Type 1 salmonid-bearing streams. Clear span bridges are acknowledged as a preferred method of doing crossings, when they have to be done, in most of the literature. For example, the NMFS Take Limits at No. 12, *Municipal, Residential, Commercial and Industrial Development and Redevelopment (MRCI)*, specifies that: "Where a crossing is unavoidable, the plan or ordinance should minimize its effect by preferring bridges over culverts;" There are several local ordinances that require bridges over Type 1 waters (e.g., Redmond, King County, Clallam County), and most refer to the State Department of Fish and Wildlife manual for bridges, culverts and other crossings.

b) The standard for arch/bottomless culverts is found in some local ordinances (e.g., Mason County), and is defined in State Fish and Wildlife manuals such as the Washington DFW document "Fish Passage Design at Road Culverts." There are many other options these manuals provide that offer "comparable fish protection."

c) The standards in this subsection are found in part or totally in existing ordinances or proposed programs. Some of this measure is found, for example, in Tri-County's "Regulation of Near-Shore and Aquatic Development," other parts are found in Portland Metro's Title 3, Jefferson County's Unified Development Code, Mason County's Resource Ordinance, Gresham's Flood Management Performance Standards, and Lane County's proposed Critical Habitat Conservation Overlay Zone; i.e., these are common practices in Northwest communities.

d) Maintaining natural meander patterns, channel complexity and floodplain connectivity are concepts that are taken directly from the Final Joint Washington Department of Fish and Wildlife/Tribal *Wild Salmonid Policy* as action strategies that are recommended for maintaining or restoring stream channel complexity. These practices are repeated in much of the scientific literature. In essence, this does not allow alteration of a natural channel, unless restoration to more natural conditions is appropriate. Indeed, the policy recommends that wherever feasible, channels that are not natural should be restored to achieve features including side channels, meander patterns, channel complexity and floodplain connectivity. The suggestion in the model ordinance regarding restoration is based on a circumstance where an applicant has proposed altering a stream and, because he/she is in for such a permit, in order to achieve their objectives, the local government can also achieve the objective of restoration of a segment of the stream in return. The ordinance also suggests that if restoration would not have a significant impact in the segment in the proposal, a fee in lieu be collected that could be used nearby on the same stream – this was a suggestion from the City of Beaverton, where that practice is recommended.

e) Subsection (e) requires that the applicant identify the channel migration zone prior to any alteration of a watercourse. For those jurisdictions that have identified CMZs, they will be able to rely on their information; however, few have CMZ data, and this requirement places the responsibility on the applicant. This is important in situations where, for example, a streambank stabilization project is being proposed; this measure would prohibit any armoring project that would stop the stream from its natural migration. By requiring the applicant to provide the data, constrictions on channel movement will not occur just because the local government has not produced data on channel movement.

f) Removal of existing culverts that inhibit healthy fish habitat, called for in subsection (f), is a restoration measure. Restoration is not within the general purview of this ordinance; however, in view of its importance (e.g., *Extinction* states that: “The Wild Salmonid Policy goal will not be attained without active restoration of lost and damaged habitat”), and in view of the fact that a proposed project that alters the watercourse is under consideration, it is appropriate to obtain a reasonable degree of restoration, especially in cases where there are clearly non-functional culverts. Fixing a single culvert can open many miles of a stream for spawning. This is consistent with aggressive culvert removal initiatives that are funded and being implemented both by the States of Washington and Oregon, and by several local governments.

g) Subsection (g) prohibits blockage of side channels during the course of an alteration. This is in keeping with allowing streams to perform natural meanders, and in recognition of the tremendous value of side channels for fish habitat. Off-channel habitat was emphasized by Mike Parton of NMFS at the Fish-Flood Workshop, as generally being more productive than in-channel habitat, and this is echoed by most all the scientific literature (e.g., the Washington *Wild Salmonid Policy* specifies a Performance Measure thusly: “Side channels and other off-channel habitat, including wetlands, should remain connected and passable by salmonids to the channel proper”). Also, the Draft Washington *Integrated Streambank Protection Guidelines* state that: “For any project that eliminates off-channel habitat or reduces the opportunity for its creation in the future, compensating off-channel habitat should be created, restored, or enhanced.” This subsection, like (d) and (f) above, calls for restoration as part of project approval, i.e., removal of blockages to side channels, just as suggested in the ensuing language in the *Wild Salmonid Policy*: “. . .and other structures that are constricting floodplains should be removed or modified to allow flood flow, storage, recharge and release.” A restoration action here would be called for only in the proximate segment of stream for which the proposal is being made.

h) For alterations that involve creation of man-made side channels, there must be adequate fish barriers or screening to assure that fish will not become trapped, lost, stranded or destroyed through diversions for irrigation, water supply, recreation, hydropower, etc. In Washington alone, there are over 60,000 places where water is diverted from streams, rivers and lakes. Both Oregon and Washington State laws require that diversions be screened to protect fish. This provision is placed in the Ordinance merely to assure consistency with the State laws, and to give the proponent a picture of all that would be required if an alteration is proposed. Screening requirements of the State are specified for compliance with this standard.

i) As can be seen in this standard in the Model, soft armoring is the preferred treatment for any streambank strengthening project; for a salmonid-bearing stream subject to migration (whether or not there are CMZs formally published on maps), soft armoring is mandatory. The NMFS Take Limits clearly steer away from hard armoring (“In most circumstances, activities that call for hardening stream banks are not consistent with properly functioning conditions”). They aim this statement at streams that are subject to migration, and state that streams must be allowed to meander naturally. The new Washington Shoreline Master Program Guidelines require that the softest feasible method of stabilization be used as the first priority. “Generally, the harder the construction measure, the greater the impact on shoreline processes, including sediment transport, geomorphology, and biological functions. Soft approaches shall be used unless demonstrated not to be sufficient to protect primary structures, dwellings, and businesses.” Soft armoring or use of appropriate streamside vegetation is also a prevalent theme in several local ordinances (e.g., Jefferson County, Mason County).

5.1-3 Construction Materials and Methods

Subsection (2) calls for using methods and practices that minimize flood damage in reviewing permits for new construction. This is a general performance standard that has never been defined in the regulations. At the Fish-Flood Workshop, there were three people who asked that there be more guidance in sections like this to better define the general standards (they were representatives from NMFS, the State of Alaska and King County). Over the years, there have been a couple of techniques that were commonly suggested here, such as placing new structures on the highest ground on the site and orienting the structure parallel to flow, not perpendicular. The additions to the text now include these measures.

However the most important additions are three new standards that are included in this section with adequate definition. They are, first, a requirement that if a lot has a buildable site outside the floodplain, new construction is directed to that area. By locating outside the floodplain, the applicant is not subject to the building restrictions at Section 5.5-2 (flow-through construction, qualified professional opinion if fill is used, and limitations on impervious surfaces and vegetation removal). However, this is not an absolute requirement, and can be challenged by the applicant through the exception process.

The second addition to this standard relates to placement of a building on a floodplain site. Numerous people who were interviewed suggested that FEMA devise some way to site structures as far away from the stream/watercourse as possible, even going so far as to suggest lower insurance rates the further the structure is located from the stream. Using the insurance mechanism would not work, but a method is placed in the Model that should induce an applicant to locate further back on a site. It first requires that the local administrator, who must check the Flood Profiles for accurate reading of the Base Flood Elevation, also read the profile elevations for the 10- and 50-year floods. This is a simple task, which takes virtually no extra time for the local administrator, who will then advise the applicant of the probabilities of occurrence attached to the three different floods in a

30-year time period . The applicant then, in staking out his/her property, would have to plot the three elevations on or near the site (the 10, 50 and 100-year elevations). Knowing that the 10-year flood has an almost certainty of happening, and there is almost twice the probability of the 50-year flood happening vs. the 100-year flood, this would provide information the applicant may well consider in siting the structure appropriately.

The third addition gives the a local administrator a tool to use in judging proposals in relation to the hyporheic zone. The hyporheic zone is one of three interactive aquatic habitats: surface or in-channel habitat, floodplain habitat, and subsurface (hyporheic) habitat. It is the area of subsurface flow between surface water and the water table (it is generally above the groundwater level), which serves as a filter for nutrients and maintains high water quality. Floodplains provide coarse beds of alluvial sediments through which these subsurface river flows pass, much like a filter (Gregory and Bisson). “Thus, in areas of extensive alluvial gravel floodplains (much of the Northwest), the hyporheic zone contributes substantially to total habitat area” (Naiman), including food production for fish.

While the hyporheic zone is very difficult to actually delineate on a map (Bolton), it can be detected from well samples, presence of stone flies and, sometimes, can be seen in an actively upwelling springbrook, where groundwater fed by the springbrook is derived from river water (Snyder). Disruptions to the hyporheic zone can negatively impact water flow, temperature, nutrient supply, water quality and survival-to-emergence for salmonids in the river environment; development in the floodplain should not cause dewatering of the hyporheic zone, interrupt groundwater exchange within the hyporheic zone or inhibit recharge of the hyporheic zone (Snohomish County Administrative Rules). If a local administrator knows about such a circumstance, or has technical resources he/she can draw on to review development applications for areas that are particularly sensitive to hyporheic exchanges, additional data from the applicant should be obtained to assure that the development produces minimal disruption to this system.

5.1-4 Utilities

In the revised Model Ordinance, septic systems are prohibited in the RBZ, the floodway, 10-year floodplain and areas that could be subject to channel migration. Many local governments already prohibit septic systems in floodways (a few even prohibit systems everywhere in the floodplain). Examples include King County, which prohibits septic systems in the floodway, in the Extreme CMZ and requires that they be located out of the floodplain unless no feasible alternative site is available; systems are prohibited in the CMZs of Clallam County and in the 150 foot riparian buffer zones in Jefferson County and Mason County; they are prohibited in the entire floodplain in Vancouver, Redmond and Puyallup; in Lane County, they would be prohibited in their Inner Setback Area; the systems are prohibited in the floodway in Thurston, Clackamas, and Whatcom Counties.

Generally, impacts from septic systems relate to water quality and vegetation removal. However, another very important factor is to assure that these systems are not put into active channel migration areas. The Washington SMA Guidelines specify that local programs must include provisions that prevent restrictions to channel movement within

the CMZ. While septic systems can prevent channel migration, the more likely scenario is that these systems will be destroyed when the channel does migrate, and that is a major reason for keeping them out of the CMZ (such as is being done already in a few communities noted above). Keeping septic systems out of the 10-year floodplain is another measure introduced to the model ordinance. This relates to the frequency of flooding. As discussed under the Riparian Buffer Zone below, the 10-year floodplain is very significant in terms of riparian protection. Additional support for this measure was in an early requirement of the State of Minnesota, which prohibited septic systems in the 10-year floodplain early on, in view of the certainty and frequency of flooding.

5.1-5(5) Subdivision Proposals

The basic change here is that new, buildable lots are prohibited outright in the floodway, RBZ and CMZ if it is known; also, in the remainder of the floodplain, new lots must have buildable space outside the floodplain. For lots in existing subdivisions that have buildable space outside the floodplain, new construction is directed to those areas, just as with the provision above in 5.1-3(2) dealing with construction methods (and subject to the same caveat). Development that can occur within the floodplain must meet limitations on impervious surfaces and vegetation that any other floodplain development would have to meet. Also, new road crossings as part of new subdivisions are prohibited.

There is support for the new subdivision measures, both in guidance material and in practice. Excellent background information is contained in a recent publication by the American Planning Association entitled *Subdivision Design in Flood Hazard Areas*. The following quotation from that document is very relevant to effects of subdivisions on ecosystem considerations for fish:

“FEMA regulations, procedures, and guidance provided through NFIP have long focused on protecting individual structures from flood risk. This is typically accomplished by requiring the lowest floors of homes to be elevated to or above the base flood level (BFE). To a certain extent, this approach reflects a belief that development in floodplains is unavoidable. In many communities, that may be true.

But after nearly 30 years of experience with NFIP, thousands of floods, and billions of dollars in property losses, many communities are now focusing less on how to artificially remove buildings from the floodplain and instead using methods to steer development out of the floodplain.”

Steering development away from floodplains may be a general trend in many parts of the Country, but it is a necessity in the Northwest because of the tremendous implications floodplain development has on habitat, and because of ESA mandates. The APA document goes on to specify a hierarchy of four options for subdivisions, starting with “what we consider to be the best policy for a community – prohibit new subdivisions in flood hazard areas.”

The next policy option is to plat the subdivision in such a way that each lot has a buildable portion on natural high ground (without fill). The document explains that: **“The minimum buildable area of each lot that must be outside the floodplain can be included in subdivision and floodplain ordinances.”** That is the option that is reflected in the revised model ordinance; it is realistic because there is solid justification in the literature and in practice that floodplain connectivity with streams is the most important habitat feature a community can deal with to preserve salmonid species – “Some of the most important components of habitat restoration include protection or restoration of **floodplains** and riparian plant communities” (from *Degradation and Loss of Anadromous Salmonid Habitat in the Pacific Northwest*, by Gregory and Bisson). The Washington SMA Guidelines specify that lots resulting from subdivisions must be large enough or configured in such a way that a residence may be developed without causing ecological impacts to properly functioning conditions and other ecological functions.

From a practical standpoint, much is already happening with regard to restrictions on new subdivisions in floodplains, i.e., the ordinance measures are not that unusual in Northwest communities. Of the small number of communities that were interviewed, at least seven do not allow any new buildable lots from subdivisions in the entire floodplain. They include King County, Clallam County, Jefferson County, and the cities of Beaverton, Troutdale and Bellingham (Corvallis is proposing this). While there are reasonable use exceptions available in some, the basic policy is that no new buildable lots can be subdivided in floodplains. Additionally, Clallam County also specifies that if a portion of a pre-existing lot lies outside the floodplain, new construction is directed to that area (as in subsection [d] of the revised Model Ordinance), and Jefferson County prohibits new stream crossings as a result of new subdivisions (as in Subsection [e] in the revised model Ordinance). Subsection (a) requires that the applicant identify the RBZ, floodway and channel migration zone (if known) on their proposed subdivision map. This, of course, would be subject to review by the local administrator, but would be a flag at the outset of the process that these are sensitive lands that have severe restrictions. The Washington SMA Guidelines are specific on this: “Do not allow the creation of new lots that would require development in the Channel Migration Zone in order to achieve a viable use.” The CMZ must be plotted on the applicant’s maps whether or not the community has identified such a zone, i.e., he/she will have to obtain the services of a qualified professional to ascertain this.

Thus, there is substantial reason and practice to justify the proposed requirements regarding subdivisions. Justification for restrictions on impervious surfaces and vegetation removal is described in the supporting information for Section 5.5-1 and 5.5-2. Finally, the local administrator is directed to the concepts of cluster development, density transfer, credits and bonuses, PUDs and transfer of development rights. Where these concepts are already adopted by a community, they should be made available to applicants in order to allow them relief for not being able to develop in the floodplain. Where they are not available, they are recommended for adoption in communities that could have future floodplain development. A good description of the concepts is in the APA’s *“Subdivision Design in Flood Hazard Areas.”*

5.4 Floodways

Subsection (1) is the basic encroachment standard that has been in effect since the inception of the NFIP regulations that specifies that any encroachment proposed for the floodway has to undergo a step-backwater analysis to determine if there will be any rise in flood levels – the standard is no-rise, i.e., 0.00 rise from the analysis.

Added onto the no-rise floodway encroachment standard is language identifying the floodway as one of three criteria that makes up the protected area of the Riparian Buffer Zone. The supporting information will be explained in the Section 5.5 discussion. Another provision that is in Subsection (1) is an exception to the no-rise criteria which is allowed for projects designed to enhance fish habitat. This measure stems from a policy that FEMA Region 10 issued in 1998 that gave some relief to local officials judging the many fish enhancement projects that were occurring, and are occurring even more now (projects such as drop structures, log drops, root wads, placement of woody debris, rock deflectors, etc.). The policy acknowledged that requiring the no-rise standard for these projects could be more expensive than the projects themselves, and it was not appropriate to judge most of these projects as strictly as judging a new building, fill, etc.

The policy made it possible for the local administrator to rely on an informed judgment regarding the fish enhancement structures, most of which are in-stream projects, short of the maximum hydraulic analysis required for other projects. It allowed the community to defer to the judgment of a qualified professional such as staff of Rural Conservation and Development and the Natural Resource Conservation Service to certify that projects were designed to keep any rise in 100-year flood levels as close to zero as practically possible and that no structures (buildings) would be impacted by a potential rise. Through the questionnaires in this project and, to some extent, through the personal interviews, an attempt was made to ascertain whether or not local officials wanted to place this policy into language of the Model Ordinance, by allowing fish enhancement measures outright in the floodway.

Results from the questionnaire were surprising in that most local officials either did not want this allowed outright, or wanted it but with a certain degree of control available. The control is necessary in view of public safety issues related to potential hazards with in-stream placements and placements deposited by floods. A few pointed out that some projects could be cloaked in the guise of a fish enhancement project that might really be wanted in the development for other purposes. Others emphasized that some placements clearly could present hazards to other existing uses.

This measure is closely aligned with another from the Questionnaire that asked if woody debris from floods should be retained outright, either onsite or in close proximity. Bolton emphasizes that large woody debris is particularly conducive to good salmonid habitat. A study by Sedell estimated that salmonid production can be increased several times by raising the debris load in streams with limited amounts of large woody debris. Most recognized the value of woody debris (provides refuge for juvenile and adult fish, forms pools, creates hydraulic complexity and roughness, provides food sources and habitat for

aquatic insects and wildlife, helps stabilize streambanks and reduces excessive erosion; see Bolton, page 14); however, slightly more than half of the respondents (23 to 20) thought it was not a good idea to require retention of the woody debris and not require a no-rise standard. The main reason was the potential hazard and public safety issue (e.g., logs could hang up on bridges, thereby threatening them, people living in close proximity to log deposits could be threatened, etc.).

Other responses included the thought that a particular project might not be good either for fish or for people, but one wouldn't know if there were no analysis. Also, most were okay with a watershed group proposal for a fish enhancement project, but were concerned with novices and some developers. The City of Redmond always requires a step-backwater analysis (as does Bellingham), because they require mitigation/compensation for any rise that is created, thereby improving hydraulics and helping fish.

In the personal interviews, it was explained that the revised Model Ordinance had proposed language that gave the local administrator the discretion to require a step-backwater analysis, or not require it. Of the 23 local administrators questioned at these interviews, only one felt there was no need for requiring the analysis; the other 22 felt they needed the discretion to decide whether or not to require it (including deposits of woody debris), based on the project.

5.5 Additional Standards for Riparian Ecosystem Protection

This section is new to the FEMA Model Ordinance, and is the heart of the provisions for fish enhancement. It creates a Riparian Buffer Zone (RBZ), and requires restrictions in the rest of the 100-year floodplain as, in essence, a buffer to the buffer zone; i.e., the area outside the RBZ but inside the actual floodplain serves to protect the riparian area, to assure proper functioning of the RBZ. It provides the essential connectivity between floodplains and streams that is so frequently mentioned in the literature. Support for adding this language to a floodplain ordinance is found in the University of Georgia Carl Vinson Institute of Government publication *"Protecting Streams and River Corridors:"*

"A floodplain protection ordinance can be a reasonable mechanism for riparian buffer protection. There is now growing recognition among government agencies that floodplains should be managed in a way that preserves their natural ecological functions."

It should be noted that these zones apply to **all** of the Special Flood Hazard Areas (the 100-year floodplains) delineated on the FEMA maps, including detailed and approximate study areas. These are generally quite extensive, though they can also be somewhat limited, particularly for very small streams (see Limitations above).

5.5-1 Riparian Buffer Zone (RBZ)

The most frequently asked question, and biggest challenge in terms of protecting fish habitat, seems to be "how much is enough," meaning how large is the area that needs to be protected in order to have effective riparian habitat. This was the question that was

introduced early by NMFS's Mike Parton in his presentation on "Critical Riparian Habitat Zones" at the February 27 Fish-Flood Workshop, and it was the subject of considerable discussion throughout the workshop (with no unanimous resolution).

Likewise from the questionnaires and personal interviews, there was no universally accepted distance nor method for calculating the distance, that surfaced. Which is not to say there were no riparian areas established; on the contrary, there were many communities with some kind of fish habitat zone, but the numbers were not consistent, and the methods for deriving the distances were not universal. Bolton, in her *Ecological Issues in Floodplains and Riparian Corridors* states that: "Definitions that can be used to unquestionably identify exact undisputed boundaries of stream corridors or riparian areas or channel migration zones are hard to come by." That was indeed true, judging from this project. Also from Wenger's *A Review of the Scientific Literature on Riparian Buffer Width, Extent and Vegetation*: "Scientifically-based guidelines for local riparian buffer ordinances are not readily available."

However, there is no shortage of warning and guidance urging all at the State and local levels to incorporate some kind of riparian habitat zone in their planning and regulations. The Washington *Wild Salmonid Policy* states it very clearly: "Fundamentally, protection of wild salmonid **habitat** is the most effective way to ensure preservation of the salmonid resource." Also from *Extinction is Not An Option*: "For wild salmon to continue to exist and evolve, specific **habitat** conditions must be maintained, protected or restored. Specific habitat elements include water quality, base and peak water flows, riparian vegetation, habitat access and passage, channel and watershed conditions, floodplain connectivity, and estuarine and nearshore water quality and physical conditions."

Perhaps the most authoritative document on the subject in the Northwest, *An Ecosystem Approach to Salmonid Conservation*, what is referred to here as the Spence report for author Brian C. Spence (though there are four authors), makes the statement most succinctly: "...there is consensus in the scientific community that protection of riparian ecosystems should be central to all salmonid conservation efforts on both public and private lands. If ecosystems are allowed to function in a natural manner, habitat characteristics favorable to salmonids will result." The report goes on to say: "The establishment of riparian buffer zones is generally accepted as the most effective way of protecting aquatic and riparian habitats" (quoting from Cummins et al.).

During the course of the questionnaires and personal interviews, it became clear that riparian buffers were not a new concept to Northwest communities; virtually all had them but, again, there was little uniformity in terms of size, and in terms of methods used in determining the buffers. Here are some representative examples:

- Clark County – 250 feet for Type 1 and 2 waters
- Clallam County – 150' for Type 1 and 2
- Issaquah – 100' for Type 1 and Type 2 with salmonids
- Jefferson County – 150' for Types 1 and 2

- Mason County – 150’ for Types 1, 2 and 3 waters
- Puyallup – 150 feet for Type 1 waters (proposed)
- Redmond – 150’ for Type 1
- King County – 100’ for Type 1 and 2 (150’ for Bear Creek)
- Skagit County – 200’ for Type 1 and 2
- Clackamas County – 100’ for large streams (150’ is proposed)
- Columbia County – 50’ for Class 1 streams
- Jackson County – 50’ for Class 1 (100’ for some activities)
- Lane County – 150’ for Class 1 (consists of an Inner and Outer Setback)(proposed)
- Medford – 50’ for its streams
- Tigard – 75’ (the Oregon “Safe Harbor” distance)
- Umatilla County – 100’ for most activities

The few ordinances that were reviewed for this project were limited by the scope of the project, and generally to those communities that responded to the questionnaire. As can be seen, a distance in Washington that was commonly observed was 150’ for riparian buffers on the larger streams (all communities specified smaller buffers for smaller streams). Smaller buffers were observed in Oregon; however, this number would have been larger had the coastal counties (e.g., Clatsop, Tillamook, Lincoln) been included, as well as some other areas where comprehensive programs have been undertaken.

Uses, restrictions and limitations varied among the jurisdictions that had riparian buffer zones. Analysis of the differences is not provided here, but basically, buffers were perceived as “no-touch” or “no-disturbance” zones. Restrictions are, therefore, analogous to those in the FEMA floodways, though for entirely different reasons. A major difference between these buffers and those proposed in the revised Model Ordinance is that, generally, the buffers in these jurisdictions were the extent of the area with restrictions; in the revised Model, the remainder of the floodplain also contains restrictions that are designed to “buffer the buffer,” i.e., to maintain the buffer in a properly functioning condition.

It is instructive at this point to look at the major regional efforts underway in the Northwest, since they probably represent the most thorough investigations and analyses. The original proposal in Portland Metro’s *Streamside CPR* contained several options; it is difficult to synthesize in a few words here, but did specify for floodplain streams or rivers (vs. headwater or midsection streams) that the regulated area be the greater of 200 feet, or a break in steep slope plus a 25 foot impact area, or the floodplain plus a 25 foot impact area. The report summarized its protection program thusly:

“Chapter V concluded that the environmental, economic, social and energy (ESEE) decision is to limit or prohibit conflicting uses in the riparian area (175’) and impact area (25’) – referred to in the proposed Streamside CPR Protection Program as the “regulated area.” For individual parcels of land that are wholly or substantially within the regulated area, conflicting uses would be limited. For parcels of land for which conflicting uses can be

accommodated outside the resource, conflicting uses within the regulated area would be prohibited.”

As background for these distances, Metro stated that: “After considering all comments.. . staff proposes 175 feet as the Site-Potential Tree Height (SPTH). This determination was based on averaging the original 150-foot SPTH proposed in the preliminary draft of this report, and the 200-foot SPTH recommended by the Goal 5 TAC members and peer reviewers.” They also gave strong consideration to the floodplain:

“According to the scientific literature reviewed for this report, the riparian zone of influence includes the extent of the floodplain because of the movement of the stream or river across the floodplain through time (Spence et al. 1996). Therefore, the proposed riparian area width includes the extent of the floodplain. In cases where the floodplain exceeds the 175-foot riparian area width, the extent of the 100-year FEMA floodplain or the area of inundation of the 1996 flood, whichever is greater, is the proposed riparian area width.”

It should be emphasized that this was proposed in Metro’s December 1999 *Streamside CPR* document. These distances and concepts have not been formally adopted, and are under review at this time (March 2001).

The Tri-County effort in the Puget Sound area also has many options and is difficult to simplify in a few words here. The basic concept that is used is application of a Management Zone (MZ) for all streams and shorelines. It is described thusly:

“The aquatic and adjacent nearshore areas that either provide salmonid habitat or are important to the proper functioning of salmonid habitat are collectively defined as the Management Zone (MZ). The Management zone is further divided into inner and outer zones. The purpose of the inner zone is to protect the aquatic body and to provide the majority of nearshore habitat functions necessary for the salmonid conservation. . . . The outer zone is intended to provide additional benefits and, most importantly, is intended to ensure the proper functioning of the inner management zone.”

The basic width of the MZ for all “shorelines of the State” and fish-bearing streams is 200 feet. In urban areas, the Inner Management Zone (IMZ) is 115 feet and the Outer Management Zone (OMZ) is 85 feet on these watercourses. In rural areas, the IMZ is 150 feet and the OMZ is 50 feet. Under the Fixed Regulations option, the IMZ is generally a no-disturbance zone; there are vegetation retention and impervious surface requirements in the OMZ. Generally, the requirements specify that no buildings be allowed in the IMZ, and buildings in the OMZ must be set back 15 feet from the IMZ. No effective impervious surfaces may be created within the entire MZ. Clearing and grading is not generally permitted within the IMZ, and there is no vegetation removal allowed in the IMZ; a portion of the OMZ vegetation must also be retained in order to achieve an average of 65% in an undeveloped state over the entire area of the site located within the overall MZ.

The Tri-County MZ is a fixed number (200’ for floodplain streams), but is not applied uniformly that way. The intent of the proposal is to build the MZ onto the Channel

Migration Zone (CMZ) where that zone is delineated – “On each side of a stream’s course, the outermost (landward) edge of the CMZ forms the streamward boundary from which the Management Area and its Zones are measured. Wherever no CMZ can be found for a stream, the waterline during bankfull flow shall be the streamward edge of the Management Area.” Thus, the regulated area can be significantly expanded in areas where channel migration information is available.

The scientific basis for Tri-County’s MZ proposal relates to necessary riparian functions (“Our review of the extensive scientific studies on the subject makes it clear that there is no suitable, long-term substitute for healthy riparian forest as both a protector and generator of the diverse habitats to which Puget Sound’s salmonids are adapted”). They further cite work by Pollack and Kennard, and May, wherein setback distances are properly related to specific habitat functions, including channel migration, woody debris production, adequate shade, litterfall, stream temperature control, sediment removal, streambank erosion control, nutrient and pollutant removal, etc. Pollack and Kennard (1998) point out that “riparian buffers are the key component of any salmonid habitat conservation strategy because they. . .provide the majority of the ecological goods and services required to keep salmonid habitat functional.”

Based on the science they obtained, Tri-County formulated MZ widths, which include recommendations for the IMZ (“no-touch”) and the OMZ (limited activity), with the intent of the OMZ to provide protection (therefore certainty) that the IMZ will function properly. They summarize this concept as follows:

“These widths are consistent with the above literature recommendations in that the IMZ alone. . .should be sufficient to allow about 60% to nearly 100% of potential performance of riparian forest functions with regard to LWD supply, shade and humidity control. In many areas, particularly along large streams and mainstem rivers, significant additional protection will be provided by inclusion of CMZs as part of the IMZ. MZ width will generally be 200 feet (aside from additional CMZ width) along salmonid-bearing water bodies, and 100 feet along other waters. The 150-foot IMZ width is based on the approximate mean site-potential tree height for the Tri-County area. . .should be sufficient to yield long-term LWD, SWD, and litterfall supplies to the waters involved, as well as usually providing sufficient shade and other salmonid-habitat-forming functions. . .”

Other widths are specified in the Tri-County proposal for perennial, non-salmonid-bearing streams and for non-perennial, non-bearing streams. These categories are phrased in the new classification system that Washington DNR is developing, and generally can be related to the existing Water Type System still in use, and that is used in the Model Ordinance.

A report was prepared for the University of Georgia Institute of Ecology by Seth Wenger, entitled: *A Review of the Scientific Literature on Riparian Buffer Width, Extent and Vegetation.* In that document, the author emphasizes that: “. . .scientifically-based guidelines for local riparian buffer ordinances are not readily available.” The purpose of his work was to do a National literature review in order to develop a scientific foundation for riparian buffer ordinances that are being established in Georgia. The basic finding is:

“To maintain aquatic habitat, the literature indicates that 10-30 m (35-100 feet) native forested riparian buffers should be preserved or restored along all streams. This will provide stream temperature control and inputs of large woody debris and other organic matter necessary for aquatic organisms.” The literature search was quite exhaustive. While the conclusion prescribes a distance that is less than most of the literature cited above, and less than what most ordinances in the Northwest already have, clearly the differences stem from differences between the Southeastern and Northwest Regions.

NMFS does not specify the distance it will approve for riparian buffers. However, they do have strong language in their take limits that relates to this distance:

“NMFS’ determinations are significantly influenced by science indicating that essential habitat functions are affected to varying (but significant) degrees by streamside activities conducted within a distance equal to the height of the tallest tree that can grow on that site (known as the site potential tree height). The distance is measured not from the stream itself, but from the edge of the area within which a stream naturally migrates back and forth over time (the channel migration zone).”

NMFS is gauging distances not in absolute numbers, but by functions that are necessary in riparian areas. The most definitive (and most quoted) document giving scientific background for riparian functions is the Spence report (*An Ecosystem Approach to Salmonid Conservation*). The document points out that, while entire watersheds can influence aquatic habitat, “. . .the most direct linkage between terrestrial and aquatic ecosystems occurs in the riparian area adjacent to the stream channel.” The report then defines the essential functions performed by riparian vegetation and processes, which include shade, bank stabilization, sediment control, organic litter, large woody debris, nutrients and, to a lesser extent, microclimate and wildlife habitat. Graphs are provided showing the percent of effectiveness for four major quantifiable functions (shading, coarse wood debris, litter fall and root strength) as a function of tree height (height of the tree representing distance from the channel). These distances are cited frequently in much of the literature in the Northwest.

In discussions with State and, mainly, local officials in the Northwest, there is a hard-core, intuitive belief that regardless of technical biological formulas, site potential tree heights, channel migration zones, and other scientific methods for determining what an adequate riparian area should be, the real need is to preserve a basic area or strip of land along all streams; that basic area most frequently seems to be in the 100-150’ range, with most believing the first 50 feet or so are the most important for riparian health. The science can become extremely complicated, technical and there is different science for different functions; however, few communities will have the scientific capability to draw a biological, geomorphological line that shows varying distances on different parts of stream reaches based on the different functions. A standard distance is what most want, with the ability for an applicant to modify the line based on more detailed habitat evaluations.

The Riparian Buffer Zone (RBZ) standard that is chosen for the Model Ordinance is 150 feet for all Type 1 and Type 2 salmonid-bearing streams. For Type 2 non-salmonid-

bearing streams and for Type 3 streams, lakes and marine shorelines, the distance is 100 feet. For Type 4 and 5 streams and in arid areas, it is 50 feet. There are several reasons for these distances, and they are consistent with documentation from other sources:

1. The major argument favoring this approach is that the 150 foot no-touch zone that is the RBZ is protected by strong limitations in the rest of the floodplain; i.e., viewing the entire floodplain as a system, there is considerable protection afforded the critical RBZ area by measures that are significantly strengthened for fish habitat protection in the outer portion of the floodplain. If the 150 feet fall short of some study's preferred riparian zone, protections in the remainder of the floodplain need to be factored into the total picture.

2. *Extinction is Not An Option* characterizes 150 feet or greater for fish bearing streams as "adequate" for stream buffer sizes (page 94).

3. From the Final Joint Washington Department of Fish and Wildlife/Tribal *Wild Salmonid Policy*, riparian areas for Water Types 1-3 are specified to need buffers of 100-150 feet (same for any salmonid-bearing stream greater than 5 feet in width), 100 feet for Type 4 streams and 50 feet for Type 5 streams. The ordinance is almost totally consistent with these recommended standards.

4. The original version of Portland Metro's *Streamside CPR* recommended a riparian distance of 150 feet, based on site potential tree height (a tree height of 120 feet plus 30 feet to protect the root system). This figure was debated among the various review groups; one group recommended 200 feet. Metro averaged the 150 and 200 foot figures, and came up with 175 feet; however, that figure has not yet been adopted. In the Model Ordinance, an additional 15 feet is added onto the 150 feet for buildings, making it 165 feet, very close to Metro's 175 foot figure.

5. From the Tri-County work, their Inner Management Zone for rural areas (outside urban growth boundaries) is 150 feet. "The 150-foot IMZ width is based on the approximate mean site-potential tree height for the Tri-County area and, therefore, . . . should be sufficient to yield long-term LWD, SWD, and litterfall supplies to the waters involved, . . ." The 150 feet in the Model Ordinance is augmented in most circumstances with restrictions in the remainder of the floodplain which can be quite wide, vs. the 50 feet specified for the Outer Management Zone.

6. The Wenger/Fowler report *Protecting Stream and River Corridors* contains a Model Riparian Buffer Ordinance that produces an overlay zone specifying 100 feet as the buffer distance to be used for Georgia communities. If 100 feet is adequate in the Southeast, a distance of at least 150 feet can easily be seen as a distance that is needed in the Northwest, based on differences in vegetation, specifically tree heights.

7. The Washington SMP Guidelines require that: "Local governments shall institute protective setbacks, buffers, standards for retention or restoration of native species, clearing restrictions, and/or other provisions to ensure that (riparian) functions are provided." The Guidelines specify one sight potential tree height for riverine shorelines

where trees naturally grow, a half SPTH and 60 feet for other areas that generally coincide with the distances and Water types listed in the Ordinance. While there are different descriptions of SPTH in the Northwest, the 150 foot figure is within the bounds of reasonableness for an estimated SPTH for much of the Northwest, particularly when protection in the remainder of the floodplain is factored in (restrictions outside the RBZ but within the floodplain).

8. As shown above (page 24), many local governments already have buffer areas designed for aquatic habitat that are generally consistent with the 150 foot figure. From the Washington community ordinances that were obtained as part of this project, the average buffer distance for Type 1 streams was 156 feet; it was 144 for Type 2 streams and 100 feet for Type 3 streams. Thus, what is being proposed in the model ordinance is already being practiced in many communities. These were not just the “big” jurisdictions; rather, they are very representative of large and small counties and cities.

9. From *An Ecosystem Approach to Salmonid Conservation*, the report concludes: “If the goal is to maintain instream processes over a relatively short time frame (years to decades), then fully protected riparian buffers of approximately one site potential tree height (30-45 m [roughly 100 to 150 feet] in most Pacific Northwest forests) are likely adequate to maintain 90% to 100% of most key functions. . .”

The 150 feet is the recommended riparian buffer distance, but the RBZ can be determined using two other criteria, the channel migration zone (CMZ) or the floodway. Use of the CMZ is prominently mentioned in the scientific literature, is already in use in some jurisdictions and in Washington forest lands, and gets strong attention from NMFS in their take limits: “An MRCI development ordinance or plan adequately protects historic stream meander patterns and channel migration zones. . . The (RBZ) distance is measured not from the stream itself, but from the edge of the area within which a stream naturally migrates back and forth over time (the channel migration zone).”

According to the Washington Forest Practices Board Manual (which NMFS has recognized), streams have occupied each part of the valley floor in geologic time, but “the current channel pattern and migration potential are more closely related to recent climatic and erosional patterns. Thus, on the time scale of decades, rivers generally influence only a portion of the valley floor.” This document defines CMZ “as the lateral extent of likely movement along a stream reach with evidence of active stream channel movement over the past 100 years. . .chosen because aerial photos and field evidence can be used to evaluate movement in this time frame (and) this time span typically represents the time it takes to grow mature trees that can provide functional large woody debris to most streams.” The report concludes that CMZs are found in only a small percentage of the entire stream network, though they can be prominent in mainstem rivers.

The Washington SMP Guidelines specify that: “. . .master programs shall include provisions that prevent restrictions to channel movement within the channel migration zone and that contribute to achieving more natural channel characteristics on a comprehensive basis over time.” The Guidelines then say: “Local governments shall institute protective

setbacks, buffers, standards for retention or restoration of native species, clearing restrictions and/or other provisions to ensure that those functions are provided” and as a general guide if there is not a more detailed local program, specifies: “For riverine shorelines where trees naturally grow: One site potential tree height measured perpendicular from the channel migration zone or, absent a channel migration zone, bank full width.”

While Metro’s *Streamside CPR* does not emphasize CMZs *per se*, the Tri-County effort in the Puget Sound Region does emphasize CMZs as a basis for establishing their Management Zone (MZ): “On each side of a stream’s course, the outermost (landward) edge of the CMZ forms the streamward boundary from which the Management Area and its Zones are measured. Wherever no CMZ can be found for a stream, the waterline during bankfull flow shall form the streamward edge of the Management Area.”

Channel Migration Zones are already being implemented in King County. They are a Chapter in the County’s Sensitive Areas Ordinance wherein specific restrictions on development are defined. The County’s adoption of this measure was primarily justified on the basis of public safety, not specifically fish enhancement. Clallam County also has mapped CMZs and practices limitations in these zones, through their Critical Areas Code. Whatcom County has identified a CMZ for the Nooksack River, and mapped that area.

CMZs do exist in some Northwest communities and, where they do, would be used in the Model Ordinance if they extend beyond the specific buffer distances (150, 100 and 50 feet), as the basis for defining the RBZ. While much of the literature suggests starting the RBZ from the CMZ, there is no uniformity of opinion on this among practitioners that were interviewed. Indeed, many thought the extent of the CMZ would generally be sufficient to define the RBZ, while others felt there needed to be some distance established to assure adequate area to grow vegetation, including trees. One county proposed a distance of 25 feet for shade beyond the CMZ, and suggested that trees be maintained and planted within the CMZ; when streams migrate, they take their buffers with them. Generally, there was considerable skepticism to building a RBZ on top of the CMZ, on the part of most local officials.

The conclusion that is in the Model Ordinance is to use the CMZ plus 50 feet as the RBZ, if that is a greater distance than the specified distances based on SPTH or the floodway. While the 50 foot distance is greater than a 25 foot distance that is practiced in Whatcom County, 50 feet is the distance that is used in Clallam County, and is being recommended in Clark County (there may be more, but these were the only ones for which data was gathered in this project).

The third criterion for determining the RBZ is the FEMA floodway. As noted earlier, this concept is not based on considerations relative to fisheries resources; rather, it is purely a hydraulic engineering concept that is a product of a step-backwater analysis that reserves a conveyance area for 100-year flood flows, leaving the remainder of the floodplain for development that would cause no greater than a one-foot increase in flood levels. The importance of the concept is that the floodway is, and always has been interpreted also as a

“no-touch” zone; no-touch for different reasons and derived through totally different methods, but still a zone where little in terms of development can occur.

Some activities can occur in a floodway that cannot occur in a healthy riparian zone, including parking lots, ball fields, golf courses, etc. These uses do not block conveyance (assuming they are built at grade), but they can create impervious surfaces. In the Model Ordinance, such uses would not be allowed. There is backup for this concept from the interviews and questionnaires.

Generally, when the question was asked in the interviews, responses were along the lines that it’s about time FEMA made the floodway a tool that cannot be “worked” by those wanting to develop closer to the stream. Indeed, applicants proposing development in floodways hire engineers who can redo the step-backwater analysis, which can show “no-rise” as a result of an encroachment (often a structure), with consequent approval from the local administrator. A strong sentiment from local officials who were interviewed was that this should not be allowed. In King County, where there are CMZs along certain streams, there is somewhat of a correlation between the CMZs and floodways, i.e., the CMZs are more or less spatially equivalent to floodways, with minor differences. Incorporating both to define the RBZ in such cases makes much sense.

Several responded to the questionnaire (question #4[b]) that they thought riparian protection was appropriate in the floodway. Of the 42 responses, 24 communities either wanted to see this outright or wanted it if adequate measures were in the ordinance to allow certain water-dependent uses, maintenance of public facilities, etc. Another 10 felt riparian protection was needed, but not in a floodplain management ordinance (which it would have to be if floodways are to be used). Also, several answered question #3, which asked communities what they would put into a floodplain ordinance that incorporated fish measures, by expressing the need to strengthen floodway requirements. Some of these people were incredulous that anything could go into a floodway, since they had always interpreted it as a no-build, or no-touch zone.

The Model Ordinance does use floodways as one criterion for defining the RBZ. It is a zone that is on virtually every community’s map where detailed study has been performed, it is a known entity among local officials generally as a no-touch zone, and it generally aligns well with deeper and faster flowing waters. These reasons justify its use for riparian protection. The floodway has also been shown to correlate well generally with limits of the 10-year floodplain; e.g., early studies in Douglas County, Oregon showed a strong correlation when that County mapped its 10-year floodplain (before FEMA required its conveyance floodway). The 10-year floodplain is an “easy sell” to those who are generally opposed to regulation, because it is an area that is frequently flooded whereas the floodway is based on a computer model (see Carl Cook’s comments from the Fish-Flood Workshop). Philip Williams expressed opinions at the Fish-Flood Workshop that strongly suggested concentrating on smaller floodplains, like the 2-year or 10-year floodplain, because of the great ecological value these floodplains have, a sentiment that was corroborated by many in attendance.

As a result of these ideas, an exception to use of the floodway as the RBZ is allowed in the ordinance if a person can show that their property is in the floodway but outside the elevation of the 10-year floodplain. This would give relief to those seeking to use a part of the floodway for a use that might not be compatible with riparian functions; it would not be allowed outright (the floodway would still define the RBZ if it is the greater of the three criteria), and, if it involved above-ground encroachment, would still require a no-rise certification.

RBZ Restrictions. Restrictions in the Model Ordinance call for prohibitions on new buildings, creation of impervious surfaces and removal of native vegetation. New clearing, grading and other land-disturbing activities are also prohibited, except for approved restoration projects. Finally, septic systems, dumping, landfills and storage of toxic or hazardous waste are also prohibited (non-allowance of hazardous materials was specifically suggested at the Fish-Flood Workshop by the State of Oregon DF&W).

These restrictions are consistent with efforts that are already being implemented in several communities, with findings from the literature, and with the major regional efforts underway in the Northwest. The only document that was found that focuses strictly on identifying riparian buffer zones was Georgia's "*Protecting Stream and River Corridors*," which is based on an earlier review of the scientific literature on how to define riparian buffers. The model ordinance provided through these documents shows very similar restrictions on uses in the riparian buffer zone, as summarized in the text (these measures are aimed more at water quality than fish enhancement, thus they may be a bit less restrictive than measures that are being considered for fish habitat areas):

"All significant sources of aquatic contamination and degradation should be excluded from buffers. These include construction resulting in land disturbance, impervious surfaces, logging roads, mining, septic tank drain fields, agricultural fields, waste disposal sites, stormwater detention ponds (except those designed as wetlands), access of livestock, and clear cutting of forests. Application of pesticides and fertilizers should also be prohibited."

Restrictions in the Regional efforts in the Northwest include those in Metro's *Streamside CPR*, which specifies the following regulations:

"Under the Regional Safe Harbor Program, no new development, redevelopment or disturbance is allowed within the regulated area (roughly the first 200 feet from top of bank as described above), except in the instance where an existing lot of record is so situated or so small that the regulated area cannot be avoided when development of the property is proposed. Disturbance areas shall be located as far from the water feature as possible with development first located in the unregulated portion of the property."

In this Metro standard, disturbance activities include placement of buildings and structures, paving, filling, grading, removal of vegetation (except for restoration), or other human-caused change.

In the Tri-County effort, the following basic measures pertain in the “Fixed Regulations” option (these measures generally have no disturbance within the IMZ, and meet the vegetation retention and impervious surface requirements in the OMZ):

- Buildings must be set back 15 feet from the IMZ.
- No effective impervious surfaces may be created within the MZ.
- New clearing and grading is not permitted in the IMZ.
- No development is allowed within 50 feet of the waterbody or CMZ edge, or any side channel, oxbow, spring, or other type of off-channel habitat except as otherwise authorized by the prescriptive standards.

There are several other measures and refinements of these basic measures, but it is clear from the above measures that this is a no-disturbance area.

Existing local ordinances already contain a host of restrictions in their riparian areas – some, such as Clallam, Mason and Jefferson Counties’, all start with the requirement that buffers shall be retained in their natural condition (no-touch), then give some exceptions, which are too lengthy to mention here. A sampling:

- Puyallup and Redmond allow no structures or improvements except those related to trails, educational facilities, docks and other water-dependent uses, etc.
- The only uses allowed in Skagit County’s riparian buffer include certain roads (under strict conditions), docks, limited park or recreational access, low impact uses such as removal of noxious vegetation, and removal of hazardous or diseased trees, etc.
- Jackson County prohibits structures other than for water-dependent uses, prohibits septic systems and has strict vegetation removal standards in their riparian setback areas.
- Lane County prohibits grading, fill, new structures, impervious surfaces vegetation removal, etc. in its proposed Inner Setback Area (though there are exceptions).
- Medford prohibits new structures, impervious surfaces, excavation, grading, fill, stream alteration and removal of vegetation, expansion of non-native ornamental landscaping, dumping or disposal of yard debris and other material in its Riparian Corridors.

There are numerous other examples. The restrictions in the Model Ordinance are consistent with the general description of restrictions in the local ordinances that were viewed. Some of these local ordinances had riparian areas that were smaller than those in the Model Ordinance, and did not use the remainder of the floodplain to protect the RBZ.

5.5-2 Outside the Riparian Buffer Zone

The area outside the RBZ will be a very large area if the floodplain is large; or, there may be no area outside the RBZ on floodplains of smaller streams. As mentioned, the main purpose of the outside area is to provide protection to the RBZ. This section gives standards for construction techniques for buildings in the floodplain; it emphasizes post and piling construction over use of fill material, gives certain standards that must be met if fill or even balanced cut and fill is to be used, and gives standards for creation of new

impervious surfaces and vegetation removal. In all cases of placing buildings in this area, they must be set back 15 feet from the RBZ. This is a standard that provides additional protection to vegetation within the RBZ, assuring that it can grow properly.

Subsection [a] directs buildings to be built using post, pier, piling or stem-wall construction, in order to minimize impervious surfaces and allow floodwaters to flow beneath the structure. **Subsection [b]** allows the use of fill, but on the condition that the applicant obtain a certification from a qualified professional that the fill will or will not harm fish. **Subsection [c]** allows the use of fill using balanced cut and fill techniques, but also requires a certification from a qualified professional as in [b], since areas where the cuts and fills are placed may not be the best in terms of fish enhancement (a statement corroborated by Bill Way at the Fish-Flood Workshop). Requiring balanced cut and fill is optional in the model, because this technique cannot be specifically justified on the basis of fish enhancement. It is a highly recommended technique for water quality purposes and for preserving storage; preserving storage can impact the hydrology of a stream system which, in turn, can impact fish by increasing flood velocities, raising water temperatures, and having other indirect effects. In that sense, FEMA will highly recommend use of this option (see FEMA Region 10's publication on Higher Regulatory Standards).

Fill in floodplains is an issue that has and continues to be hotly debated. In the standard FEMA floodplain depiction, it is assumed that fill will occur over time in flood fringe areas that border streams generally equally on both sides. In essence, this is creating a low-level levee bordering on the floodway, thereby having the ultimate effect when all is developed of channelizing the stream. Such channelization is detrimental to natural processes of streams. Bolton lists a litany of adverse effects:

“Channelization has immediate and direct effects on stream processes because it involves direct modification of the river channel. The ecological effects of channelization consist of both physical and biologic effects to the aquatic system. Channelized rivers tend to have increased water temperatures, less shading from trees, little cover for fish, greater fluctuations in stream temperature and less organic matter input.

A host of other adverse effects of filling are described in *Ecological Issues in Floodplains and Riparian Corridors*. While most situations will not get to the point where fringes are totally filled thereby resulting in something akin to a channelized stream, fill is clearly detrimental to stream systems, as noted in *Streamside CPR* thusly:

Placement of fill material in floodplains for development can impact the flood storage capacity of streams, degrade habitat and instream structure. Excavation in floodplains to meet balanced cut and fill standards may also alter habitat and instream structure upon which fish and aquatic life are dependent for food, shelter, and suitable habitat for reproduction and other life stages.

Extinction is Not An Option discusses degradation by urbanization, specifying that land development changes the natural hydrologic cycle by, among other things, adding impervious surfaces consisting of roads, buildings, lawns and other compacted soils, i.e.,

fills. The discussion of impervious surfaces below shows a clear correlation between filling and creation of impervious surface, thereby making floodplain filling a major detrimental effect on natural stream/floodplain systems.

Another detrimental effect fills can have is on the process of channel migration. Tri-County points this out in its definition of CMZ, which is: “. . .the swath that must be set aside without artificial structures that block such movement (e.g., fills) and without harm to the dense vegetation that normally keeps the channel from changing course too fast.” The Washington SMP Guidelines directly describe impacts of fill thusly: “Fills shall be located, designed, and constructed to protect shoreline ecological functions and specifically shall not adversely affect or preclude the attainment of properly functioning conditions and hydrological and geomorphological processes, including channel migration.”

The practice of filling in the floodplain was included in the questionnaire and in the personal interviews. The questionnaire asked whether or not fills should be prohibited unless approved as meeting ESA requirements. Of the 43 responses, 23 said yes they should (17) or yes but with reservations on the practice (6); thus, 18 said no to banning fills in floodplains. The feeling seemed to be that fill has been a normal construction practice for years, and to ban it now would be inconsistent with past practice. Some said not all fills were bad for fish, and suggested discretion to determine when and when not to allow fills for fish habitat purposes. It was revealed through this part of the project that one major community, Skagit County, already bans use of fill for structural support of residential buildings. Several other major counties reported that fills are rarely used as a construction technique in their jurisdictions (Thurston, Kittitas, Lane, Clackamas, Snohomish and King Counties), and all jurisdictions in the Portland are required to use balanced cut and fill techniques, per Metro's Title 3.

From the personal interviews, of 24 jurisdictions 2 do not allow fills, 7 would ban the practice if they could, 8 require balanced cut and fill, 4 think the practice of filling is okay (all cities with very urbanized floodplains), and 3 feel it depends on circumstances (i.e., some fills are not detrimental to fish habitat). A conclusion from the interviews is that there was strong support for the idea of either not allowing fill, or requiring that a qualified professional certify that a proposed fill will not be harmful to fish, and that it will not restrict channel migration. Most were also favorably disposed to the idea of the peer review process, whereby the applicant hires not only his/her qualified professional, but also pays for the peer reviewer on staff or on retainer for the community. Clearly, there was support for banning the practice of using fills, but there was a realization that that would not be feasible in many of the communities; it is thought that requiring a qualified professional's certification will stop much filling in floodplains and that such a procedure would be tied to very legitimate (scientific) purposes vs. merely relying on an assertion that fills are bad.

Subsection [d] specifies that new impervious surfaces shall not exceed 10 percent of the surface area of the portion of the lot that is in the floodplain. There is quite unanimous acceptance of this standard, and there is good science to support it. In natural forested environments, surface runoff is rare (Wenger and Fowler):

“Impervious surfaces, on the other hand, transfer most precipitation into runoff, leading to increased surface erosion, higher and faster storm flows in streams, and increased channel erosion. As a consequence, urban streams characteristically have greatly elevated sediment levels. Flow from impervious surfaces also carries pollutants directly to streams, bypassing the natural filtration that would occur by passage through soil.”

The Wenger/Fowler report goes on to say that: “A stream may be considered to be impacted when more than 10-12 percent of its watershed is covered by impervious surfaces; when impervious surface levels reach 30 percent, the stream can be considered degraded.” The NMFS Take Limits state that by reducing impervious surfaces, conditions will, in turn, “maintain essential habitat processes such as natural water infiltration rates, transpiration rates, stormwater runoff rates, sediment filtering, and provide hydrographic conditions that maintain and sustain aquatic life.” From Spence: “Research indicates that stream quality impairment is correlated to the percentage of watershed imperviousness. Impaired water quality becomes noticeable at 8% - 12% imperviousness and becomes severe above 30% imperviousness.”

The State of Oregon, through its Goal 5 Natural Resource Element, requires that for riparian corridors, a local ordinance must prevent permanent alteration of the riparian areas such as grading and placing structures or impervious surfaces in buffer areas. *Streamside CPR* points out that when total impervious area in a watershed reaches 10 percent, stream ecosystems begin to show evidence of degradation. The 10 percent figure is used in Washington’s SMP Guidelines: “. . .development shall be limited to a maximum of 10 percent total impervious surface area within the lot or parcel lying in shoreline jurisdiction. . .” This is the same standard that is used in Tri-County’s Draft Stormwater Management regulations.

Subsection [e] specifies that the maximum removal of native vegetation on a lot in the floodplain is 35 percent, and this pertains to the entire lot including that portion that may be in the RBZ, where removal of native vegetation is not allowed. This is an important tenet in the NMFS Take Limits: “The existence of native vegetation along stream corridors is a condition that can support essential habitat processes such as temperature control, bank stability, stream complexity over time, the filtering of pollutants, or contributions of large logs and other woody debris to a stream.” Wenger and Fowler describe vegetation needs: “Effective performance of all functions, including protection of aquatic habitat, requires forested buffers. Therefore, we recommend that riparian buffers be preserved in a naturally vegetated state consisting of native forest.” *Upstream: Salmon and Society in the Pacific Northwest* stresses the importance of vegetation:

“Riparian vegetation mediates key interactions between aquatic and terrestrial ecosystems and in many respects controls the productivity of streams by influencing water, sediment, and nutrient dynamics; shading; inputs of fine particulate organic matter and woody debris; and the stability of streambanks and floodplain terraces. The direct influence of riparian vegetation on streams declines with increasing distance from the channel and with the height of the dominant tree species.”

Streamside CPR devotes many pages to the values of natural vegetation cover and concludes that: "Removal of vegetation and the construction of structures within the riparian area are the activities most likely to conflict with riparian functions and values." The Washington SMP Guidelines also give much attention to the values associated with native vegetation and the need to retain it:

"Vegetation conservation along shorelines is critical to protect aquatic resources including many priority species and their critical habitat. The intent of vegetation conservation is to protect existing and restore degraded habitat so as to contribute to ecological functions. . . and ecosystem-wide processes performed by vegetation along shorelines. Vegetation conservation should also be undertaken to protect human safety and property, to increase the stability of river banks and coastal bluffs, to reduce the need for structural shoreline stabilization measures, to improve the visual and aesthetic qualities of the shoreline, to protect plant and animal species and their habitats, and to enhance shoreline uses."

While the Guidelines emphasize the need to conserve and protect vegetation, the standards do not apply retroactively to existing uses and structures, such as existing agricultural practices. Local master programs are directed to vegetation characteristics described in *Management Recommendations for Washington's Priority Habitats*, a publication of the Washington Department of Fish and Wildlife. Specific standards are required of local programs that include native vegetation removal limits and related standards for retention or restoration of native species. Local Master programs are required to set minimum standards in each zone (e.g., there can be no significant vegetation removal in the natural environment, no significant vegetation removal except as demonstrated to be necessary for an allowed development in the rural conservancy areas, no significant removal of existing native vegetation except for water-dependent uses in the high intensity environment, and so on).

The Tri-County proposal contains specific vegetation removal standards, as follows:

"65% of the MZ shall be set aside in an undeveloped state to protect, to the extent practicable, existing hydrologically mature vegetation or the potential of future reestablishment of such vegetation. In addition to the IMZ, which shall be set aside in its entirety, a portion of the OMZ shall also be set aside, as necessary, to achieve an average of 65% in an undeveloped state over the entire area of the site located within the MZ."

The 65% retention of native vegetation is a figure that is mentioned in some local programs, including King County's (Clackamas County requires that a minimum of 75% of the setback area be preserved with native vegetation). Most jurisdictions require a vegetation management plan before any removal can commence. Most do not allow any removal of native vegetation in their riparian buffer zone (other than noxious weeds and replacement of other non-native vegetation with native vegetation). Statements such as this in the Puyallup Sensitive Areas Code are typical: "Buffers shall consist of an undisturbed area of native vegetation." In the Model Ordinance, there can be no removal of native vegetation in the RBZ, and the 65% figure is used in the area outside the RBZ.

An exception to both the impervious surface and vegetation retention standards is provided in **Subsection [f]**. This exception recognizes there could be circumstances peculiar to a particular lot, or a lot may be severely degraded and, for these reasons, it would be difficult to meet the specified standards. Similar disturbance allowances by variance are contained in King County's Rules and Regulations for "Sensitive Areas: Presumption of Salmonids, Sensitive Area and Buffer Modifications, and Mitigation Requirements." They are also incorporated into Tri-County's proposed "Permitted Activities Requiring Project-Specific Mitigation" from their *Regulation of Near-Shore and Aquatic Development*. The notification regarding the ESA is modeled after Clackamas County's, which is used effectively to induce development proponents to undertake restoration (planting) programs to higher levels of native vegetation – in some cases, this practice can come close to achieving the desired 65% figure.

5.5-3 Exceptions to Restrictions of the Riparian Buffer Zone

The local administrator is provided with the ability to grant exceptions to requirements of the RBZ, on the condition that the major performance standard be met, i.e., actions may not in result in any degradation of riparian ecosystem functions. Any exception, however, must be based on a report from the applicant, prepared by a qualified professional, assuring that the project will meet the performance standard regarding maintaining riparian ecosystem functions. There are 10 exceptions listed, all of which can be found in existing ordinances from communities around the Northwest. The significance of allowing exceptions is highlighted in Wenger and Fowler's *Protecting Stream and River Corridors*:

"Ensuring a degree of flexibility in delineating riparian buffers is an important strategy when creating an ordinance. A buffer ordinance. . .should withstand any legal challenges based on property rights. It will not usually preclude use of a property and will not necessarily reduce property values. In those cases where properties are severely impacted, the owner should receive a variance. Local governments can, as shown in the model ordinance, make an exception for existing land uses. These are defined as uses that, prior to the effective date of the ordinance, are either completed, ongoing (as in the case of agricultural activity), under construction. . . etc."

Subsection [a] describes uses that are allowed outright. All or parts of these uses are found in the critical areas-type ordinances of Jefferson County, Mason County, Skagit County and Clackamas County, among others. Restoration projects that meet Federal and State standards (#7) is taken from Metro's Title 3 Model Ordinance, which permits any restoration or enhancement project outright if it meets Federal and State standards.

Subsection [b] allows water-dependent uses in the RBZ. These especially must be done with the performance standard under the general description in 5.5-3 in mind "to assure that the action will not in any way degrade riparian ecosystem functions." Similar clauses are found in critical areas-type ordinances of Clallam County, Clackamas County, Jackson County, Lane County, and Medford, among others.

Subsection [c] permits normal farm practices, other than buildings, that were in existence at the time of adoption of the ordinance. Agricultural operations are a special concern in that they often can be sources of contamination, and there are many areas where they are already in operation in floodplains, making it difficult to change. This is consistent with the SMP Guidelines, which say that “new shoreline master program provisions do not apply retroactively to existing agricultural uses.” While this provision in the model ordinance allows such operations to continue to exist, an agricultural operation that does not currently use the riparian area could not plant the area, spread manure, allow grazing, or otherwise use the RBZ in nondesignated ways after the ordinance is enacted. This is also evident in the SMP Guidelines, which say “New development, clearing and grading in support of agricultural uses shall be located and designed to avoid significant ecological impacts,” and must include standards for setbacks, vegetation conservation, etc. Exceptions are provided in the Georgia Model Riparian Buffer Ordinance as follows: “Agricultural production, provided that it is consistent with all state and federal laws, regulations promulgated by the Georgia Department of Agriculture, and best management practices established by the Georgia Soil and Water Conservation Commission.” Wording similar to that in the Model is also contained in the Lane County Critical Habitat Conservation Zone (proposed) and Medford Riparian Corridor Ordinance, among others.

Subsection [d], crossings, is similar to wording that was found in virtually every local ordinance that was reviewed, as well as in the Georgia Model Riparian Buffer Ordinance. The NMFS Take Limits treats crossings thusly:

“An MRCI development ordinance or plan avoids stream crossings – whether by roads, utilities, or other linear development – wherever possible and, where crossings must be provided, minimize impacts. Where a crossing is unavoidable, the plan or ordinance should minimize its effect by preferring bridges over culverts; sizing bridges to a minimum width; designing bridges and culverts to pass at least the 100-year flood (and associated debris). . . .”

Wording in the Model Ordinance is consistent with this language; additional Model Ordinance language that is relevant here is found at Section 4.3-4, Alteration of Watercourses. Specific and more detailed language on crossings in habitat areas is found in the ordinances of Clallam County, Issaquah, Jefferson County, King County, Mason County, Redmond, Skagit County, Clackamas County, Gresham, Jackson County, Lake Oswego, Lane County, and Medford.

Subsection [e] provides an exception for trails in the RBZ, on conditions that there be no loss of buffer function, buffer widths be increased through mitigation, pervious materials must be used, and trails must be located as far from the stream as possible. These, again, are from provisions in existing ordinances in Northwest communities that are adopted and are being implemented. Trails can be an important factor in increasing consciousness of habitat areas by allowing people to view them up close. They can be made using pervious surfaces (the City of Redmond has such a requirement in their ordinance), thereby complying with the standard of creating no new impervious surfaces. Provisions for trails are specifically contained in the ordinances of Lane County, Medford, Tigard, Troutdale, Clallam County, Issaquah, Jefferson County, Mason County, Redmond and Skagit County. In

some cases, there is a fairly detailed description of how trails can be built, such as in the Clallam and Jefferson County ordinances.

Subsection [f] deals with an exception from the prohibition of single-family buildings in the RBZ. While few would like to see new construction of houses in a riparian buffer zone, without some kind of allowance keyed to the taking issue, the ordinance would be subject to some vulnerability. This was recognized by the writers of the Georgia Model Riparian Buffer Ordinance, who also had a provision to allow construction of a single family residence by exception when: “. . .it is not reasonably possible to construct a single-family dwelling without encroaching upon the Riparian Buffer Zone.”

The Washington SMP Guidelines require that local governments require a letter of exemption for certain kinds of development to assure that new development meets the conditions and objectives of the Guidelines – construction of or addition to a single-family residence is one of those development types. The SMP Management policies specify that: “limited single-family residential development may be allowed as a conditional use . . . if such shoreline master program provisions result in an equal or greater level of ecological functions and properly functioning condition.”

Generally, local ordinances contain some kind of relief to allow construction of a single-family residence when there is no option but to use some of the buffer area. King County, for example, allows an exception to its moderate channel migration zone for a primary dwelling unit provided that the structure is located on a pre-platted separate lot, there is no feasible alternative location outside the migration area, and the proposed structure will be located the farthest distance from the migrating channel. Snohomish County reports that, in practice, exemptions are sometimes granted for construction of single-family structures in their Native Growth Protection Area, when there is absolutely no alternative (and the proposed site is not in the floodway).

Clackamas County allows development of residences in their River and Stream Setback Ordinance for lots of record where lot depth precludes compliance with the setback standards. Structures must be sited the maximum distance from the stream given the lot configuration, and the structure footprint cannot exceed 25% of the lot area. Lane County, in its proposed Critical Habitat Conservation Zone, would authorize a variance to allow a structure within the outer setback area (the outer 75 feet), in order to “avoid a taking of the property development rights on a lot or parcel that was lawfully created prior to the adoption of the ordinance.” There are numerous conditions attached to the granting of such a variance. While not many ordinances specifically identify this kind of exception or variance, it is expected that, in practice, most do grant some kind of relief when there is absolutely no alternative, similar to the practice identified by Snohomish County.

Subsection [g] allows buffer width averaging at the discretion of the local administrator. This practice can be allowed if there is a Habitat Management Plan prepared by the applicant (through a qualified professional) that is provided to the community, if the plan shows there will be additional protection over existing conditions, and the total area of the buffer on the site does not decrease nor is there more than a 25 percent decrease anywhere

within the buffer. Virtually every local ordinance that was reviewed has some kind of buffer averaging technique, in recognition of the idea that not all areas of all buffers offer the same level of protection. This is a practice that is even recognized in the Spence report, where it is stated that: “. . .watershed analysis can be used to justify smaller or larger buffers and more or less harvest within riparian zones as long as riparian functions are not impaired.” In the Wenger/Fowler report, buffer averaging is included in their model ordinance as a minor variance. They say that buffer averaging: “allows the buffer width to be reduced at certain points as long as the average buffer width remains the same along a parcel. It is very likely that cases will arise in which it is necessary and ecologically defensible to reduce the buffer width at certain points.”

Some of the local ordinances, such as King County’s, do not specify a percentage that averaging can incur: “Buffer width averaging may be allowed by King County if it will provide additional natural resource protection, as long as the total area contained in the buffer on the development proposal site does not decrease.” But most specify 25 percent as the maximum averaging can alter the buffer. For example, Snohomish County ties averaging to degraded sites: “An applicant may be allowed to reduce the width of the fish and wildlife habitat conservation area by up to 25% in places where the riparian habitat has been legally previously degraded, if the applicant provides restoration of the functions and values of the degraded riparian habitat.” Examples from other ordinances:

- Clark County’s Habitat Conservation Ordinance says “portions of the riparian zone can be reduced up to 50%. . .if riparian zone widths are correspondingly increased elsewhere within the applicant parcel, such that the overall size and function and values of the riparian zone are maintained in the parcel.”
- In Clallam County, buffers can be reduced or increased, the only limit being that buffers cannot be reduced to less than 50 feet at any point.
- Jefferson County allows averaging if it is justified on the basis of a Habitat Management Plan, and is not reduced anywhere in the buffer by more than 25%.
- Skagit County allows averaging to reduce buffer widths to 50%, as long as there is no net loss of HCA riparian functional values.

Although there are two examples above that allow averaging to reduce parts of buffers by up to 50%, the norm in viewing the other ordinances is 25%. Some have proposed reducing this to 10%, but as long as this practice results in some restoration or improvement (as in the Model Ordinance), the 25% figure is considered adequate. This idea was mentioned in Washington’s *Wild Salmonid Policy*: “Averaging buffers to meet buffer requirements will not be permitted except where it would result in greater protection.”

Subsection [h] provides the local administrator with the ability to increase buffer widths, which is important for areas of particularly sensitive habitat and, especially, for areas of channel migration, including those that may not yet be mapped. This element is absolutely essential, particularly where the local administrator is aware of detailed watershed studies that alert him/her to habitat needs that are in excess of the distances specified in the ordinance. Most ordinances already in existence that are designed to protect fish habitat

do contain this kind of provision giving the local administrator appropriate discretion to expand the buffer distances. For example, Jefferson County allows buffers to be increased when a larger width is necessary to protect the structure, function and character of its Fish and Wildlife Habitat Area and to prevent a significant adverse environmental impact to that area. The determination must be supported by considerable specified documentation. This process is virtually identical to the process in Mason County, and both relate to severe erosion and channel migration issues as possible triggers for increasing buffers.

Subsection [i] is the floodway exception described earlier under the description of the Riparian Buffer Zone (RBZ). Here, if the floodway is the larger of the three criteria that define the RBZ, the other two being the specified distance based on SPTH (150, 100 or 50 feet) and the channel migration zone plus 50 feet, the RBZ can be determined by whether or not the property is within the 10-year flood elevation. If it is not within the 10-year flood elevation, the RBZ restrictions can be excepted. There was strong sentiment at the Fish-Flood Workshop to recognize the values of smaller floodplains *vis a vis* their contributions to fish habitat, as described above under the RBZ discussion. The 10-year floodplain was prominently mentioned in these discussions.

Additionally, a recent study has shown that because floods at and near bankfull stage are associated with processes that tend to shape the stream channel and riparian habitat, a reduction in velocities would reduce excessive scour and, therefore, reduce the risk of riparian and in-channel habitat disturbances and impacts on fish production. This study concludes that maximum floodplain storage may be achieved at elevations that have average values corresponding to the 10-year flood elevations (Coulton). Factoring this together with the perceived spatial correlation between the floodway and 10-year floodplain as well as the clear “marketability” of the 10-year floodplain, leads to the conclusion that this measure should be an important determinant in defining the RBZ.

Subsection [j] is recognition that FEMA supports the comprehensive watershed approach to the study, planning and implementation of measures to achieve proper fish habitat conservation, protection and restoration. The comprehensive effort is best documented by reference to Oregon LCDC’s Goal 5 Natural Resource requirements, and Washington’s Shoreline Master Program Guidelines. In the SMP Guidelines, there are numerous references to how a local jurisdiction should develop its plans and ordinances from the comprehensive perspective. Following are quotes from the Guidelines:

*“The preferred method for local governments to accomplish a detailed, **comprehensive inventory** of ecological conditions is to participate in an interjurisdictional statewide, regional, or watershed-based inventory.”*

*“The objective of shoreline management provisions for critical areas shall be the protection of existing ecological functions and ecosystem-wide processes and restoration of degraded areas to upgrade ecological functions and ecosystem-wide processes. Local governments should accomplish this on a **comprehensive basis**.”*

*“Effective management of riverine corridors depends on conservatively regulating the uses within shoreline jurisdiction, the stream channel, associated channel migration zone, wetlands, and the floodplain. Water quality and hydrological processes also depend upon subsurface flows through the adjacent hyporheic zone, surface water run-off, and ground water in lands outside the floodplain. For this reason, **comprehensive watershed efforts** are the most effective approach to corridor management.”*

*“Master program provisions for riverine corridors shall, where applicable, be based on the information from **comprehensive watershed management planning.**” Flood hazard reduction measures are most effective when integrated into **comprehensive strategies** that recognize the natural hydrogeological and biological processes of water bodies.”*

Whenever a more detailed analysis becomes available, it should be used as the basis for this kind of program. If pieces of such a program become available before the entire program is finished, they could easily be used immediately under this exception clause. Also, this provision feeds Subsection [h] above, in that better information based on a comprehensive study may be used at any time by the local administrator to increase the width of buffers.

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