



Floodplain Habitat Assessment and Mitigation

Draft Regional Guidance

2011



FEMA Region 10

Regional Guidance
for
Floodplain Habitat Assessment and Mitigation

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- City of Auburn
- City of Carnation
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Introduction

Background

This Regional Guidance is written for communities in the Puget Sound Basin. It will assist them in meeting the requirements and criteria of the Endangered Species Act (ESA) for fisheries species as clarified in the Biological Opinion issued by the National Marine Fisheries Service (NMFS) on September 22, 2008. This Regional Guidance is intended for environmental planners, wildlife, floodplain, stream, and wetland scientists, and other qualified habitat professionals.

This document is designed to support the NFIP-ESA Model Ordinance, which was also prepared by FEMA Region X. The Model Ordinance includes a Biological Opinion Checklist which provides a summary of what is required of communities by the Endangered Species Act. For further details on the Biological Opinion's requirements, see the Model Ordinance *Introduction* section and the Biological Opinion text in Appendix E of the Model Ordinance.

Communities have the option of adopting the Model Ordinance or ensuring that their existing regulations fulfill all the Biological Opinion's requirements. Sections in the Model Ordinance are referenced in this guidance to help the reader match the requirements with the Biological Opinion and NFIP regulations. Additional references included in this assessment are listed at the end of the document.

This guidance was prepared with technical input from local officials, engineers, natural resources scientists, and planners. It is designed to assist qualified habitat professionals, representing both permit applicants and permit officials to ensure that new development will not adversely affect the habitat of protected threatened and endangered species in floodprone areas, including those areas associated with stream, lake, and marine water bodies.

Although the Biological Opinion addresses ESA listed salmonid species and Southern Resident killer whales, the Model Ordinance and this guidance may also help generally guide assessment of potential impacts to other ESA listed species that may be potentially present in or near the project action area. This assessment guidance does not, however, provide details on possible methods of how to assess impacts to any ESA-listed wildlife, invertebrate, or plant species that may be present, nor impacts to their habitats.

Definitions

Four terms are used in this guidance and the Model Ordinance that may not be the same terms used in a community's regulations: "Regulatory Floodplain", "Special Flood Hazard Area" (or "SFHA"), "Protected Area," and "development." These terms are introduced in the Definitions section of the Model Ordinance (Section 2). The first three are defined in more detail in Sections 3.1, 3.2 and 3.4 of the Model Ordinance.

The Regulatory Floodplain is comprised of the SFHA and the Protected Areas, where:

- The SFHA is the area subject to flooding by the base flood (as determined and mapped for each community by FEMA within flood insurance studies and accompanying Flood Insurance Rate Maps (FIRMs)); and
- The Protected Area is comprised of those lands that lie within the boundaries of the floodway, the riparian habitat zone, and the channel migration area.

An example of how the Regulatory Floodplain, SFHA, and Protected Area interrelate is shown on the next page. A community's ordinance may use a different term to delineate the same or a larger area in order to reach the same objective of addressing adverse effects to aquatic and riparian habitat in the most sensitive areas. However, as these terms are used throughout this guidance, please refer to the full definitions included in Sections 2 and 3 of the Model Ordinance in order to ensure full consistency with the Biological Opinion.

A fourth term is also used throughout this document. In Section 2, the Model Ordinance defines "development" as

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, subdivision of land, removal of more than 5% of the native vegetation on the property, or alteration of natural site characteristics.

When to Conduct a Habitat Assessment

Whenever a development project is proposed in the Regulatory Floodplain, the property owner must obtain a floodplain development permit from the community (Section 4.1). Certain types of projects can be permitted relatively quickly (see "Allowed Activities" on page 4). Applicants for projects that are not listed as exempt from conducting a habitat assessment by the community's floodplain management ordinance must assess the impact of the proposed development on flooding and habitat.

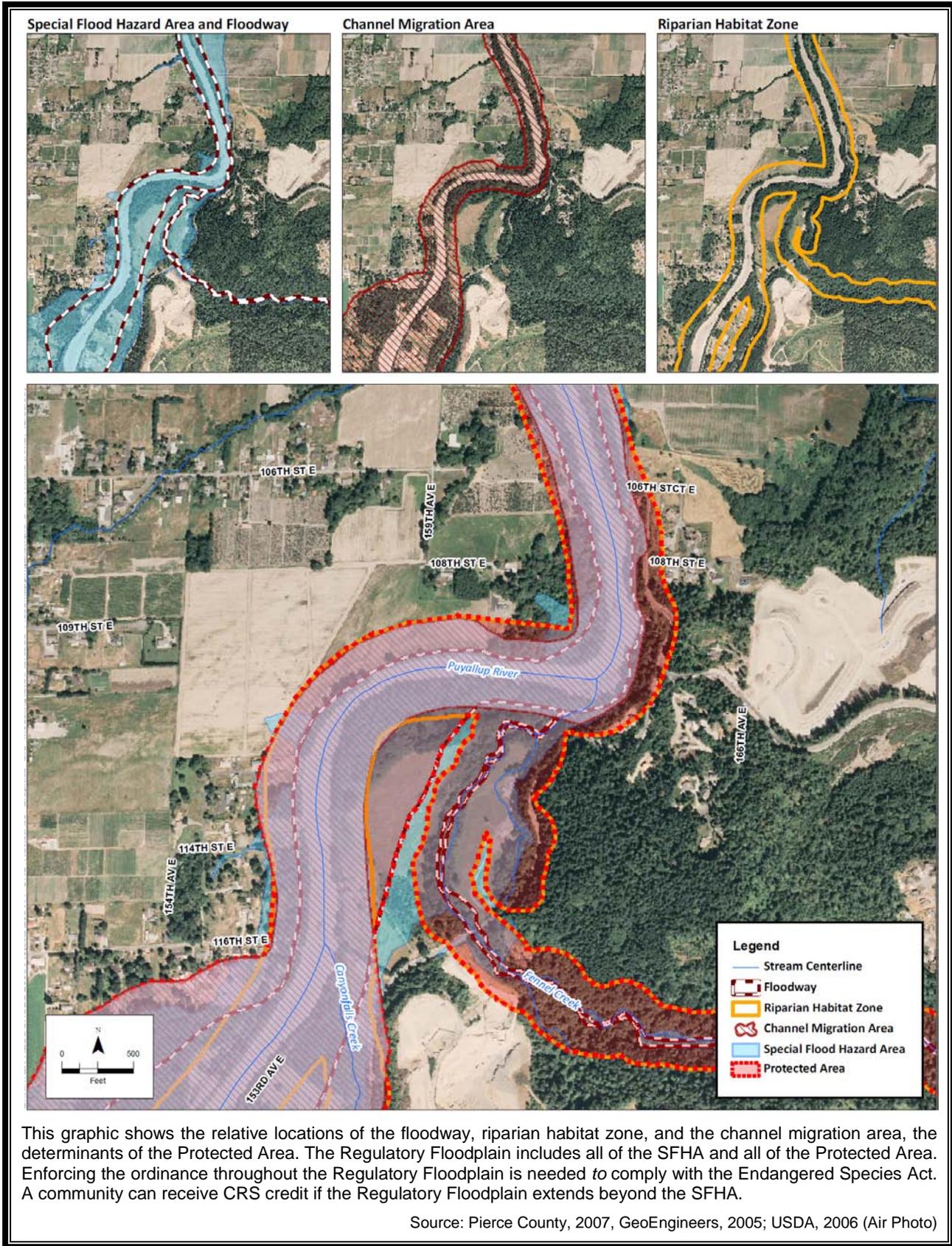
An adverse impact on flooding is prevented through the ordinance requirements for a floodway or encroachment analysis (Section 7.5) and compensatory storage (Section 7.6).

The impact of a project on habitat is more complicated because there is often little or no information on the site's natural features and different projects will have different impacts. Therefore a habitat assessment is needed to identify those features and determine how the proposed project will affect them (Section 7.7 in the Model Ordinance).

There are only two circumstances where a habitat assessment would not be required:

1. Projects that are listed as exempt from conducting a habitat assessment in the community's floodplain management ordinance; and
2. Projects that have undergone Section 7 consultation under the Endangered Species Act (ESA) in order to obtain a federal permit.

It should be noted that projects requiring a federal permit under Section 404 of the Clean Water Act would likely need a consultation process through the U.S. Army Corps of Engineers Regulatory Branch. The Section 404 permit process includes consultation with the US Fish and Wildlife Service (USFWS), and/or NMFS. Such consultation is required as required under Section 7 of the ESA.



If a permit applicant has prepared a Biological Evaluation or a Biological Assessment and has received concurrence from USFWS or NMFS, the project is deemed to comply with the ESA. In such cases, the additional habitat assessment requirements of this guidance are not required (see Section 7.7.A of the Model Ordinance).

Once it is determined that a habitat assessment is needed, a step by step assessment process is recommended in this guidance. This process is summarized in the flow chart on the following page. Steps 1 – 4 comprise the basic habitat assessment.

If the assessment finds an adverse effect, then the permit applicant must prepare a plan that identifies steps the permit applicant will take to mitigate that impact (Section 7.8 in the Model Ordinance and Steps 5 – 6 in this document) and must implement the mitigation plan.

It is recommended that applicants start with conceptual development plans and conduct a preliminary impact assessment before they invest in detailed project plans and specifications. Continued communication with community staff will also help identify problems and solutions before too much time and/or money is spent on a project that may require additional mitigation measures. It may be necessary for some communities with limited staff to request assistance from their neighboring jurisdictions or other partners in assessing the adequacy of draft habitat assessments written on their behalf. This guidance document allows for flexibility in the format of many aspects of the assessment. Review of draft assessments will require some familiarity of the range of formats that adequately portray and interpret fisheries population and habitat survey data.

A permit applicant should weigh the cost of preparing the assessment and the mitigation plan, should one be needed, against the cost of locating the project outside the Regulatory Floodplain. It may cost less in time and money to simply avoid the SFHA and the Protected Area.

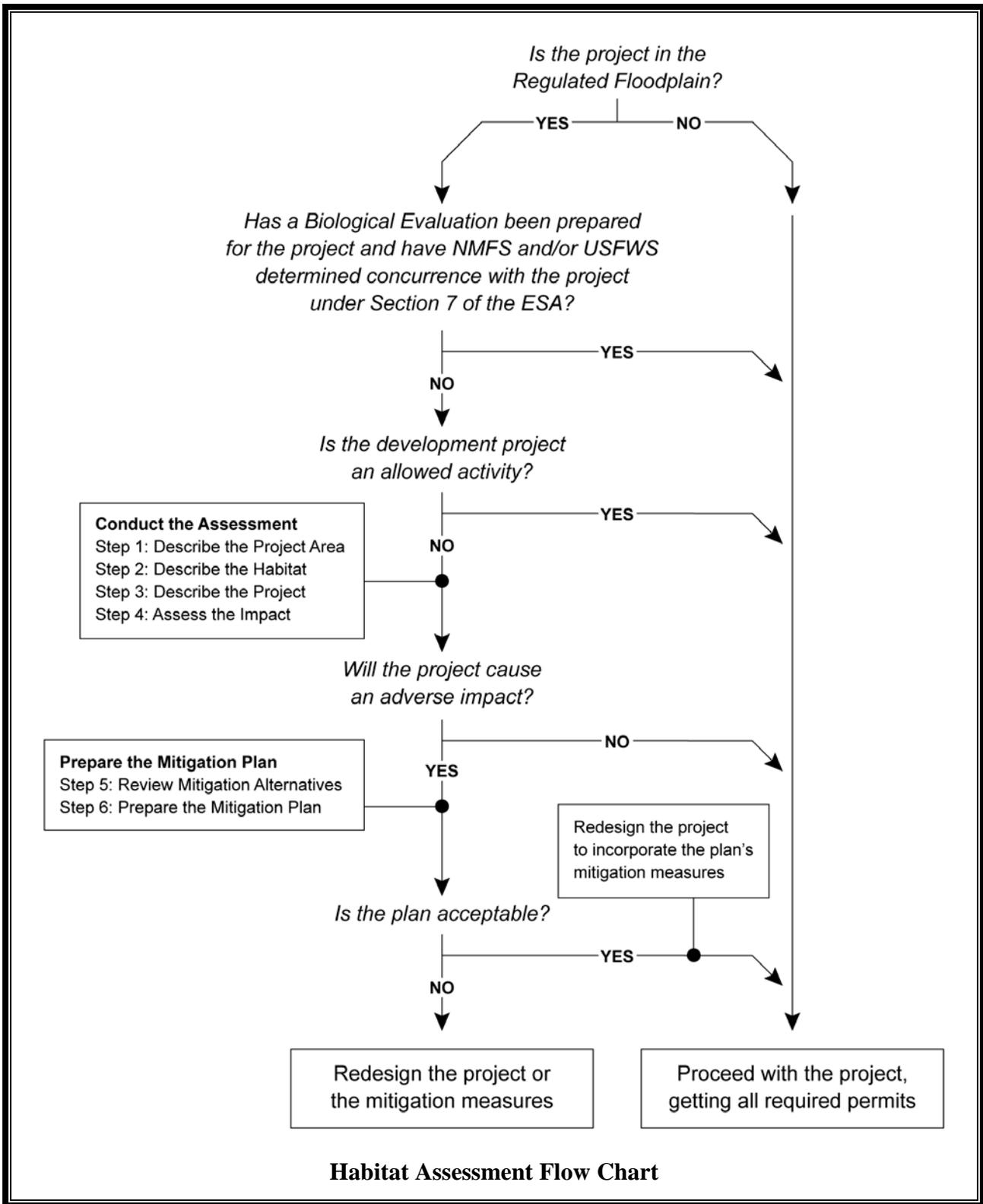
Allowed Activities

A habitat assessment is not needed if it is not required for certain activities, as specified by the community's floodplain management ordinance. The Model Ordinance, in Sections 7.1 and 7.2, identifies two types of activities that can proceed without the habitat assessment. The reader must check the community's flood management ordinance because it may have a slightly different list.

Section 7.1 of the Model Ordinance clarifies that some activities are not considered "development" and therefore do not need a floodplain development permit, provided all other State and local requirements are met. An example would be normal maintenance of structures, such as re-roofing and replacing siding (provided they are not part of a larger project that would need a permit). The Model Ordinance's list is not included here, because the community's list may be different.

Section 7.2 of the Model Ordinance lists other activities which are allowed in the Regulatory Floodplain without the floodway analysis or the habitat impact assessment required under Sections 7.5 and 7.7, providing they meet all the community's other requirements and a

floodplain development permit is issued. Again, the Model Ordinance's list is not included here, because the community's list may be different and takes precedence.



Conducting the Assessment

The following steps should be taken to adequately identify and address the impacts a proposed project may have on habitat within the Regulatory Floodplain. In circumstances where an approved habitat assessment (Steps 1 through 4) determines that no impacts to habitats associated with ESA listed species will occur, development of a mitigation plan is not necessary. However, for any activity requiring a habitat assessment within the Regulatory Floodplain, it is highly likely that impacts to habitats associated with ESA listed species will occur. When habitat impacts are identified, a mitigation plan must be prepared for the project, in accordance with Steps 5 and 6.

Step 1. Describe the Project Area

The project area is generally the parcel being developed. In some cases, the project may extend to a larger area, such as when a road to the parcel is to be built or improved. Step 1 should produce two documents:

1.1. Project Area Description

If a Washington State Joint Aquatic Resources Permit Application (JARPA) form has been prepared for the project, it will include the general project area description information that would be included as part of the habitat assessment, but it may not adequately describe all the aspects habitat function, species distribution, hydrologic variables, and/or water quality. At a minimum, a Washington State JARPA form would include the following information:

- Location information:
 - Street address
 - City and County
 - Township, section, and range
 - Latitude and longitude
 - Tax parcel number(s) of the project location
 - Type of ownership of the project (Federal, State, or locally owned public lands; tribal lands; privately owned lands)
- Water resource information:
 - Watershed name
 - Water resource inventory area (WRIA). Information on Puget Sound basin WRIs can be found at the Washington State Department of Ecology's watershed planning webpage (<http://www.ecy.wa.gov/watershed/index.html>) and mapping webpage (<http://www.ecy.wa.gov/services/gis/maps/wria/wria.htm>)
 - Water bodies in which work will occur, including water typing. For more information on water typing and a map that designates the types for major water bodies, see the Washington State Department of Natural Resources water typing webpage

(www.dnr.wa.gov/BusinessPermits/Topics/ForestPracticesApplications/Pages/fp_watertyping.aspx)

- Water bodies bordering or adjacent to the project location, including water typing.
- Shoreline Management Areas associated with shorelines of the state, as managed by the State Shoreline Management Act and local Shoreline Master Programs. Shoreline Management Area information should include the Shoreline Environment designation and a description of the approximate extent of jurisdiction. To identify associated Shoreline Management Areas and Shoreline Environment designations, review the jurisdiction's Shoreline Master Program and contact the local permitting official.
- Critical Areas associated with streams, designated pursuant to the Growth Management Act and the local critical area ordinance. Critical areas management information should include the critical areas designation and a description of the extent of jurisdiction.
- Fish and Wildlife Habitat Conservation Areas (name and short description). Fish and Wildlife Habitat Conservation Areas are designated by local governments pursuant to the Growth Management Act. They should include waters of the state (i.e., Type S streams and shorelines), habitats for species that are endangered or threatened (including designated critical habitats and areas where the presence of listed species is documented), habitats for species of local importance, and natural area preserves. The community should have a list of designated Fish and Wildlife Habitat Conservation Areas and/or criteria for designating them.

1.2. Project Area Map

The second item needed for Step 1 is a map, drawn to scale that delineates the following:

- Parcel boundaries
- Area of the finished project (including roads)
- Any additional area(s) that will be disrupted during construction (including access routes, staging areas, and areas to be re-graded or filled)
- All water bodies
- Site topography, soils and geology
- Fish and Wildlife Habitat Conservation Areas
- Existing native vegetation by vegetation community zones. For example, a map could distinguish areas with existing coniferous forest cover vs. areas with existing shrub cover vs. areas with existing meadow cover.
- Boundaries of the following regulatory areas (see Section 3 of the Model Ordinance)
 - Special Flood Hazard Area
 - Floodway
 - Riparian habitat zone
 - Channel migration area

- Depths of the 10 and 100-year floods at representative locations. This need only be provided where flood data are available from existing studies or the community.

Step 2. Describe the Project Area’s Habitat

During Step 2 of the habitat assessment, the applicant describes the existing habitat conditions of the project area. Tasks 2.1 and 2.2 of Step 2 are largely based on existing scientific information on the species use and habitat in the project vicinity.

2.1. Background Research

Step 2 needs to start with an examination of existing sources of information relevant to threatened or endangered species and their habitats in or near the project area in order to adequately describe current population and habitat conditions. There may be thorough inventories already available. The following sources should be checked, and appropriate sections referenced as needed:

- The community’s planning or environmental protection department for critical areas inventory maps, best available science consistency studies, designated Fish and Wildlife Habitat Conservation Areas, Shoreline Master Program, flood control and floodplain management plans, and watershed and habitat studies
- The community’s parks and/or natural resources departments for natural area studies
- National Marine Fisheries Service distribution of Threatened and Endangered Species (www.nwr.noaa.gov)
- National Marine Fisheries Service critical habitat maps (www.nmfs.noaa.gov/pr/species/criticalhabitat.htm)
- US Fish and Wildlife Service distribution of Threatened and Endangered Species (www.fws.gov/westwafwo/speciesmap.html)
- US Fish and Wildlife Service critical habitat maps (<http://criticalhabitat.fws.gov/> and www.fws.gov/pacific/bulltrout/)
- USFWS National Wetland Inventory maps (www.fws.gov/wetlands/)
- USFWS and NMFS habitat recovery plans, when published for ESA listed species in the project vicinity
 - USFWS: www.fws.gov/pacific
 - NMFS: www.nwr.noaa.gov
- US Department of Agriculture, Natural Resource Conservation Service soil survey maps (<http://websoilsurvey.nrcs.usda.gov/app/>)
- Washington Department of Fish and Wildlife Priority Habitats and Species Database (<http://wdfw.wa.gov/hab/phslist.htm>)
- Washington State Department of Ecology Water Quality Assessment (www.ecy.wa.gov/programs/wq/303d/2008/index.html)

- Inter-agency basin (by Washington State Water Resource Inventory Area) fisheries recovery plans - - usually lead a county or tribe, and often containing the most detailed and current information available regarding populations and habitat conditions (request county or tribe for citation and access if a local recovery plan exists)

2.2. Protected Species Identification

The review of the existing research should identify all federally-listed species and designated critical habitats, Essential Fish Habitat (EFH, defined by the Magnuson-Stevens Fishery Conservation and Management Act) and affected EFH species, and Fish and Wildlife Habitat Conservation Areas that occur in or near the project action area. Species or habitats that have a viable potential to be directly, indirectly, or cumulatively negatively impacted by proposed ground disturbing actions need to be described. The appropriate spatial and temporal scales for each form of potential impact must also be identified and briefly explained. Further discussion of such possibly measurable or observable impacts, and the appropriate spatial and temporal scales for effect analysis, will occur later in this document.

The table below is an example of how species presence and ESA status of populations and Critical Habitat could be presented. Additional columns could also be inserted to list the status of EFH and other categories when present and convenient to describe in a tabular format.

Occurrence of Listed Species and Critical Habitat in or Near the Project Area. (Sample Display)				
Common Name	Scientific Name	ESA Status	Jurisdiction	Critical Habitat Present
Puget Sound Evolutionarily Significant Unit (ESU) Chinook Salmon	Oncorhynchus tshawytscha	Threatened	NMFS	Yes
Puget Sound Distinct Population Segment (DPS) Steelhead	O. mykiss	Threatened	NMFS	None
Coastal-Puget Sound DPS Bull Trout	Salvelinus confluentus	Threatened	USFWS	Yes

To obtain general maps of the distribution of ESA-listed or proposed species, listed critical habitats, and any areas designated Essential Fish Habitat check with the NMFS and USFWS data sources described in Section 2.1 of this document.. Please note that the maps of potential fish distribution at these websites are not necessarily the most detailed or accurate that exist, and that the regional or local offices of NMFS, USFWS, and/or WDFW may be able to provide more accurate maps based on recent fish and habitat surveys, including known migration barriers.

EFH species are managed by NMFS. On the west coast of the United States there are three EFH species that potentially occur in freshwater systems; these species are pink, coho and Chinook salmon. If project actions may potentially negatively impact estuarine and marine systems, numerous species of groundfish and coastal pelagic fishes may also need to be considered.

This task should summarize the biological and ecological information that will be needed for the habitat assessment. Appropriate information on the species' life history, its habitat and distribution, and other data on factors necessary to its survival, must be included in order to

provide sufficient background for the analyses in later sections. It is important to note that even though the September 2008 Biological Opinion focused on salmon and EFH, *all* threatened or endangered plant and animal species in or near the project area need to be addressed, and may require additional surveys and methods beyond those described in this guidance. .

i. Several sources of existing information are listed above in Section 2.1, and when appropriate information from them can simply be cited by page-specific reference when such documents are readily available. Other sources are the locally developed best available science documentation reports, which are required to be prepared by each Puget Sound community for their critical areas standards under the Growth Management Act. The Corps of Engineers' *ESA Consultation Initiation Template* and NMFS' *Consultation Initiation Template and User's Guide* provide similar guidance. Habitat assessments must describe existing conditions for both the species populations and habitats, and must also estimate the potential effects of the proposed action. The detail and extent of the assessments will vary by the nature and scope of the proposal and potential for negative impacts. This section's narrative could follow the format and guidance provided in Section III.B Description of Species in these *Templates*. Both the Corps and NMFS use the following outline: Biological requirements

- ii. Factors of decline
 - a. Historical pressures on the species
 - b. Current pressures on the species
 - c. Limiting factors for recovery of the species
- iii. Local empirical information (if available)
 - a. Current local population information
 - b. Ongoing monitoring programs (if any)
 - c. Population trend of the species

<p style="text-align: center;">Example Primary Constituent Elements</p> <p>(Chinook salmon and steelhead trout, 50 CFR Part 226, Federal Register / Vol. 70, No. 170 / Friday, September 2, 2005)</p> <ol style="list-style-type: none">1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.2. Freshwater rearing sites with water quantity and floodplain connectivity3. Freshwater migration corridors free of obstruction4. Estuarine areas free of obstruction5. Nearshore marine areas free of obstruction6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.
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Following the description of the protected species, there should be a summary of the habitat needs for each species. This section of the narrative needs to identify and describe the key factors that are important for the protected species. These Primary constituent elements (PCEs) are the key habitat components required for an ESA listed species, as identified in the final critical habitat rules and published in the Federal Register for listed species (see example in the box). The PCEs must be described when critical habitat may potentially be affected. In those cases where listed Critical Habitat is not present near the project action area, describing available habitat in terms of the PCE variables is still recommended in order to concisely depict key habitat features.

2.3. Site Investigation

Tasks 2.1. and 2.2. give the applicant guidance on where to look and what to look for regarding species potentially present at the site. Following completion of the first parts of Step 2, a site visit is needed to determine if there are habitat areas with which identified species have a

“primary association”. “Habitats of primary association” include critical components of the habitats which, if altered, may reduce the likelihood that the listed species will maintain and reproduce over the long term. A site visit and determination of site-specific conditions is necessary to determine what actual impacts to ESA listed species, EFH, and associated habitats may occur. . This process must identify those areas discussed in Step 2.2 as being primary constituent elements for each ESA listed species within the project area. For example, identification of Chinook salmon habitat areas of primary association should look for those constituent elements listed in the box above. This field work must include adjacent lands and waters, upstream and downstream of the site.

The description of the project area habitat and conditions should also identify existing modifications to the project site within the Regulatory Floodplain, including existing structures, roads, impervious areas and graded or filled areas. Any existing modification that is impairing habitats of primary association and habitat functions identified and described in the next section should be described. Including activities to restore habitat in these modified areas could help the assessment conclude that there will be no adverse effects to habitat due to the project (see also Task 3.3 of Step 3).

The Washington Department of Fish and Wildlife’s *Management Recommendations for Washington’s Priority Habitats: Riparian* (see References and Resources section of this guidance) describes common land uses and modifications that impair riparian habitats. The References section lists guidance materials related to other common floodplain and aquatic habitat types.

2.4. Habitat Narrative

The findings of the field investigation are used to prepare a description of the habitat areas of primary association that will need to be protected. The narrative for this part of the assessment report needs to describe the presence and quality of the natural features that relate to the primary constituent elements for all species and habitat areas identified in Tasks 2.2 and 2.3. As described in the final paragraph of Task 2.2, primary constituent elements are the key habitat components required for an ESA listed species, as identified in the final rules and published in the Federal Register when species are listed.

It is possible that there may be limited information available from the sources identified in Tasks 2.1 and 2.2. The habitat narrative must note where this occurs and clarify where statements are based on scientific reports and data and where they are based on the professional opinion of the author. This is one of the most vital aspects of the assessment and is required in order for readers to assess the basis and relative confidence of statements related to current conditions and estimated environmental effects.

The habitat narrative includes an assessment of the components and processes for each of the habitats of primary association identified during the site investigation. The narrative must identify what components and processes have a high level of function and what components and processes are impaired by previous site and/or area (i.e. watershed level, basin level) modifications. The narrative needs to include the following headings for each identified habitat

area in order to ensure that the assessment will cover all items required by the Biological Opinion (Appendix A, part 3) and Section 7.7.B of the Model Ordinance:

- A. The primary constituent elements. These are identified in the final rules that designated critical habitat for listed threatened and endangered species (see the NMFS and USFWS critical habitat map links within the References and Resources section to access final rules for ESA listed species). For example, for an inland site with Chinook salmon habitat (see box, previous page), the first three sections of the habitat narrative would cover freshwater spawning sites, freshwater rearing sites, and freshwater migration corridors. In those cases where listed Critical Habitat is not present near the project action area, describing available habitat in terms of the PCE variables is still recommended in order to concisely depict key habitat features

- B. Water quality. Discussion of existing water quality should identify water quality levels within project area water bodies and compare existing levels to state standards. The standards for freshwater surface water quality in Washington State are set by WAC 173-201a and are detailed by the Department of Ecology (www.ecy.wa.gov/programs/wq/swqs/criteria.html). Information in Washington State's Water Quality Assessment (303(d)) should be supplemented with any known site specific information (information on 303(d) is found at www.ecy.wa.gov/Programs/wq/303d/index.html). Local and county environmental managers or land use planners should be contacted to assist in identifying relevant water quality information. The absence of being listed on the 303(d) list for known violations of state water quality standards for one or more variables does not necessarily support that a water body segment currently meets standards for all water quality variables. Data on some water quality variables is extremely limited or non-existent for some stream and river reaches, and water body segments only become listed via documented repeated violations that are estimated to likely be man-caused.

- C. Water quantity. Site flood dynamics and hydrology must be assessed to varying degrees that are appropriate for the nature of proposed action and resources potentially at risk. Flood and low flow depths, volumes, velocities, and flow paths have an important effect on the way habitat is formed. The habitat narrative should describe these factors with an emphasis placed on the effects of flood events on habitats. Tributary streams, seeps, stormwater outfalls, waterways that pass through the project site, and other water sources should be identified and described. This discussion may rely on and reference other flood and site hydrology studies prepared for the project and should be focused on how flood dynamics and hydrology impact local habitat areas. Generally a semi-quantitative assessment of water quantity should be sufficient for projects limited in scope, scale, and overall potential to result in negative impacts to TES fish populations or their critical habitats. Projects with more potential for measurable or observable negative impacts will sometimes require more rigorous examinations of hydrologic or sediment regimes based on best available data, and often on correlations to existing gage stations. They may also require more intensive field surveys and possibly 1- or 2-dimensional flow modeling to describe likely extents of inundation, water velocities, and possible changes to instream and riparian habitat during and following future flood events.

- D. Vegetation communities and habitat structures. This should include a discussion of riparian vegetation and woody debris, along the banks and throughout the mapped channel migration area. Freshwater riparian conditions should be characterized consistent with the guidance in *Management Recommendations for Washington's Priority Habitats: Riparian. Characterization of marine shoreline conditions* should be consistent with guidance from the Washington State Departments of Fish and Wildlife and Ecology (*Land Use Planning for Salmon, Steelhead and Trout*), and with other Puget Sound nearshore guidance materials listed in the References and Resources section of this guidance
- E. Spawning substrate. The quality, quantity, and general distribution of potential spawning substrate must be described in cases where there is any potential for TES fish species or their critical habitats to be negatively impacted by project actions. At a minimum such a description would include estimates of the D50 and/or D84 alluvium sizes, and the general range of the substrate types that exist across each of the different channel types in potentially affected stream reaches (e.g. 10% boulder, 20% rubble, 30% cobble, 30% sand, 10% fines among stream reach 1). For those proposed actions that have potential to deliver significant quantities of fine-sediments to stream reaches in listed critical habitat, or in those areas that may otherwise provide potential habitat to TES species, the percent fines (i.e. the fraction of sediment less than 0.85 mm in diameter) needs to be estimated and the analysis methods described. This information would be needed to describe the current condition of one of the key habitat characteristics for fish, and later estimate how (if) any additional inputs of fine-sediments may degrade spawning habitat.
- F. Floodplain refugia. Disconnecting a river from its floodplain is perhaps the single most damaging action on fish and their habitats. Some of the key aspects and processes that occur in properly functioning river systems are ongoing lateral migrations and hydrologic connectivity between the stream and its floodplain, including the groundwater systems; and the production and utilization of organic matter by riparian and aquatic communities. The hydrologic connections provide the means of temporary storage of flood waters, while also providing key off-channel refugia (shelter), and a source of water during dry summer base-flow periods. Many urbanized watersheds have clearly lost these functions to varying degrees. Biological diversity can't be maintained in stream ecosystems, nor do they have the potential to recover from major episodic disturbances if the stream is largely disconnected from its floodplain. Some of these diverse habitat types also provide refugia from high velocity flows during flood events.

The habitat assessment needs to describe the current condition of floodplain connections and processes. This can usually be accomplished in a brief narrative via a combination of a site visit and examining aerial photography. Some of the conditions that need to be noted include, but are not necessarily limited to: the extent of the channel migration zone; general channel geometry in the potentially affected stream reaches, including the distribution and size of riffles and pools; review of FIRM maps (if they exist); and identification of any side-channels and tributaries.

2.5. Habitat Area Map

Once all habitat areas of primary association are identified and described, they should be delineated on a map. The map should be to the same scale as the project area map (Task 1.2) to facilitate comparison of the habitat to be protected with the extent of the Regulatory Floodplain, the Protected Area, the riparian habitat zone, and other relevant features, such as watercourses and wetlands.

Step 3. Describe the Project

There are two key parts of the project that need to be described at this stage of the assessment report: the final project, i.e., what the area will look like and how it will be used when the project is completed, and the construction process that will be followed to get there. The final project should be covered first. Measures taken by the developer to prevent or minimize damage to the habitat areas should also be included and highlighted.

As with Task 1.1, if a Washington State Joint Aquatic Resources Permit Application (JARPA) form has been prepared for the project, it will include the general project description information required for the habitat assessment, but usually not all the information needed for the habitat assessment.. JARPA is under the Washington State Governor's Office of Regulatory Assistance. More information and the JARPA form template can be found at: www.ora.wa.gov/resources/permitting.asp.

If the information is already being provided in a Washington State JARPA that includes the level of detail described in this guidance, the community may accept the application form as sufficient for the project description.

If a Washington State JARPA has not been prepared for the project, the project area description should include the information included in Tasks 3.1 and 3.2 of this section.

3.1. Final Project

All features present when construction is finished should be described. This includes:

- A summary of the project, including all features that will be present when construction is finished
- Project category (industrial, commercial, residential, institutional, transportation, recreational, maintenance, environmental enhancement)
- All structures, including boat launches, fences, docks, and pilings, etc.
- Roads, bridges, culverts, trails, and pavements
- All structures or facilities that would impact water bodies or wetlands, including aquaculture, buoys, mining, bank stabilization, channel modifications, culverts, dams, levees, ditches, fishways, moorage, outfall structures, etc.
- Above and underground utilities

- Water supply
- Wastewater disposal
- Stormwater management facilities
- Non-native landscaping

The level of detail for these descriptions may be generalized for those features located outside the identified habitat areas. The features need to be shown on one or more maps that will facilitate relating the project to the project area map (Task 1.2) and the habitat area map (Task 2.5).

There should also be a description of:

- The ongoing activities that will be conducted at the site
- Ongoing activities that will affect adjacent areas, such as an increase in traffic, an increase in stormwater runoff from the site, increased noise, and changes air quality.

3.2. Construction Process

At a minimum, this section should cover the following points:

- Land clearance (areas to be cleared and native vegetation that will be removed)
- Any work in water, including a description of the methods and materials used
- Grading and filling
- Stormwater management measures taken during construction
- Utility installation (including any on-site wastewater treatment)
- Methods and techniques for construction of structures, including buildings, roads, bridges, paved areas, retaining walls, shoreline modifications, and types of equipment.
- Construction phasing and anticipated construction timing.
- Mobilization and staging plans.
- Temporary construction access and staging areas.

Maps and a timeline are needed to show where and when each activity will occur.

3.3. Protection Measures

There are several Federal, State, and local regulatory requirements for developments to include measures that minimize their impact on the environment. Others may be initiated by the permit applicant. These should be described here. They could include:

- Preserving a setback area from any disturbances
- Drainage/erosion control plan during construction

- Post-construction stormwater/drainage plan
- Use of low impact development techniques (which may eliminate or reduce runoff from areas to be developed)
- Actions to implement wetland mitigation plans
- Compensatory storage provisions to replace lost floodplain storage¹ that are able to demonstrate that they will not potentially strand fish.

Those protection measures that benefit the construction process, such as a sedimentation basin, should be included in the construction process timeline.

Step 4. Assess the Impact

The impact assessment must analyze the direct and indirect effects of the action on the aquatic, riparian, and floodplain habitat areas identified in Step 2, as well as effects of future actions reasonably certain to occur. Primary factors to be considered in the assessment of impacts include:

- The proximity of the action to the species present, management units, or designated critical habitat units. This includes assessing the likelihood of measurable or observable impacts to fish or their critical habitats based on the relative location(s) of the action and nearby populations and habitats. As an example, habitats located well downstream of an action that is expected to deliver significant volumes of sediment to upstream reaches may still be measurably impacted if those sediments may be routed (transported) downstream to areas of concern. The appropriate temporal and spatial scales of analysis will vary by the variables of concern and nature of the project, and must be described in the assessment.
- The distribution of a action over one or several action areas and sub-watersheds give a spatial and watershed perspective for any accumulated impacts due to impacts in multiple locations.
- The timing of the proposed action and any resulting negative impacts relative to sensitive periods of the lifecycles of any potentially impacted TES fish species.
- The nature of the effects of the proposed action on elements of the species' lifecycle, population size, variability, or distribution; or on the primary constituent elements of any critical habitat including any direct, indirect, interdependent, interrelated, or cumulative effects.

¹ Compensatory floodplain storage requirements are included in Section 7.6 of the Model Ordinance. This section requires that compensatory storage areas must be graded and vegetated to allow fish passage during flood events without creating fish stranding sites. Areas of compensatory flood storage should be designed to create floodplain habitat whenever feasible. Compensatory storage should not be used in areas prone to avulsions because lowering floodplain elevations or digging pits in these areas may increase the probability of an avulsion.

- The duration of possible effects of the proposed action on listed species or critical habitat. The three potential categories of potential effects are: 1) a short-term events where effects reduce to negligible levels almost immediately after the action; 2) actions that may result in sustained long-term effects that are measurable or observable after the proposed action is completed; and 3) actions that cause permanent changes, resulting in a new threshold (condition) for some aspects of a population or it's critical habitat.
- The frequency of any negative impacts due to the proposed action, described as the mean number of events per an appropriate time basis for the proposed action. This rate must then be compared against best available data on the estimated recovery rates of any potentially affected species to assess how those species would likely be impacted by multiple disturbances (if such occur)
- The severity of any negative effects to TES fish or their critical habitats that may potentially occur due to the actions of the proposed project. In this context severity is not analogous to intensity, but is closely related. A severe disturbance infers that affected fish would take a longer time to recover, due to the both the intensity of effects, as well as the effects of the other variables described above.

4.1. Types of Impacts

The References section at the end of this document lists resources that have additional guidance for the assessment of impacts.

Direct effects: According to ESA rules and regulations, direct effects occur at or very close to the time of the action itself. Examples could include construction noise disturbance, loss of habitat, or sedimentation that results from the construction activity. The discussion must include information on the temporal and spatial limits of the effects, species tolerances, severity of effect, mortality and other forms of take, and expected habitat loss as a result of the proposed action. Identification of the appropriate estimated temporal and spatial scales of potential impact are key to the assessment of environmental consequences. It is recommended that a table or list of appropriate scales for each pertinent issue (e.g. possible erosion and delivery of sediments to stream channels, water pollutants, changes in instream or riparian habitat, changes in hydraulics, etc...) be created to document appropriate scales of analysis for the nature and location of the proposed action.

Direct impacts a project may have on a habitat area include, but are not limited to:

- Permanent clearing and grading of any habitat area;
- Temporary clearing and grading of any habitat area during construction;
- Permanent structures, pavements, etc., constructed within or placed within a habitat area;
- Modification of a stream channel or side channel including bank stabilization measures and removal or changes to large woody debris (other than stream restoration efforts); and
- Diversion of water that will change the hydrology of the area

Indirect effects: Indirect effects are also caused by or result from the proposed action; however they are likely to occur later in time. They may occur outside of the area directly affected by the action. Indirect impacts include, but are not limited to:

- Disrupting high or low stream flows, including impacts from stormwater runoff;
- Contributing to sedimentation that fills in substrate;
- Blocking a corridor that connects habitat areas;
- Increases in water body temperature and other water quality parameters through removal of riparian vegetation;
- Disturbance of riparian vegetation (for example, clearing vegetation to the edge of a forested riparian area);
- Moving or removing large woody debris;
- Destabilizing banks and modifying channel migration processes; and
- Modifying wetland areas through disturbance of adjacent vegetation or modification of hydrology.

Interdependent and interrelated actions: Determining whether other activities are interrelated to, or interdependent with, the proposed project should be determined by asking the question: *Would the other activities occur in the absence of the proposed project (i.e., do they depend on the project for their justification or have no independent utility without the project)?* If the answer to these questions is “no,” then the activities are interrelated or interdependent and should be analyzed with the effects of the action.

Cumulative effects: Under the ESA cumulative effects include the lingering effects of past and current actions (as depicted in the environmental baseline) that overlap in time and space with the proposed action, as well as estimates of the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area. Permit officials are required to review the cumulative effects of all projects when the proposed action has the potential to produce any measurable or observable negative effects. Assessing possible cumulative effects in a relatively rigorous, yet pragmatic fashion is often a challenge. The cumulative effects section can not simply be a list of other projects. It must in some manner describe the estimated accumulated impacts of future projects that are reasonably certain to occur, superimposed upon the baseline of current conditions in which some habitat variables may still be adjusting to other past actions.

4.2. Report Format

The outline below is a variation on NMFS guidance regarding how to describe the effects of a proposed action in a biological assessment (NMFS 2009). . The components of this outline must be covered in some manner, but the format may vary.

A. Direct effects

1. First primary constituent element (e.g., freshwater spawning sites²);
2. Second primary constituent element (e.g., freshwater rearing sites);
3. Third primary constituent element (e.g., freshwater migration corridors);
4. Essential Fish Habitat designated by the National Marine Fisheries Service;
5. Fish and Wildlife Habitat Conservation Areas;
6. Vegetation communities and habitat structures;
7. Water quality;
8. Water quantity, including flood and low flow depths, volumes and velocities;
9. The channel's planform pattern and migration processes;
10. Spawning substrate, if applicable; and/or
11. Floodplain refugia, if applicable

B. Indirect effects - see the list on the previous pages of this document and include consideration of indirect effects to items A.1 through A.11, above, that are applicable to the proposed project.

C. Effects from interdependent and interrelated actions

D. Cumulative Effects

E. Effects determinations – see following section.

F. Summary

4.3. Effects Determination

An effect determination needs to be made for each different habitat area (i.e. a stream reach or other useful delineation). Determinations for each area can then be used to make an overall project effect determination. For example, if there are no effects to all the identified habitat areas, then the overall determination would be that the project would have no effect. If, however, some habitat areas are affected the project would be determined to potentially have an effect. In such instances, effects determinations for each identified habitat area would inform efforts to mitigate any adverse effects. It is critical to document how the effects determinations were reached.

NMFS, USFWS, and the Corps use the following effects determination criteria and this language needs to be used for habitat assessments:

² Primary constituent elements are key habitat components for ESA listed species as specified in the Federal Register at the time of critical habitat designation for listed species. See the discussion earlier in this guidance for further information.

- No Effect (NE): the project has no effect whatsoever to the listed species or designated critical habitat.
- May Affect, Not Likely to Adversely Affect (NLAA): the effects to the listed species or designated critical habitat are insignificant and/or discountable. A determination of NLAA would be made for those activities that have only a beneficial effect with no short or long-term adverse effects.
- Likely to Adversely Affect (LAA): the effects of the project will result in short -or long-term adverse effects on the identified species or designated habitat area.

If the effects determination is NLAA, the report should indicate what minimization and conservation measures would help eliminate or minimize the impact. For example, the permit applicant could time certain construction work to occur when the species are not present in the project area. If such measures do not eliminate the potential adverse effect(s), then mitigation measures will be needed in the mitigation plan (steps 5 – 6).

4.4. Assessment Report

If the assessment concludes No Effect (NE) or May Affect, Not Likely to Adversely Affect (NLAA) (with minimization and conservation measures), then the report should be prepared and submitted to the community's permit office. For NLAA determinations that include minimization and conservation measures, the assessment must include enough detail to show how the measures are related to potential project impacts.

The assessment report must include all the information needed to support the effects determination and the rationale for reaching the conclusion(s). It could be organized to follow Steps 1 – 4 as outlined in this document. The level of detail should be commensurate with the level of anticipated impacts. Projects with significant impacts or potential for significant impacts (due to project type and/or project location) require more detailed review and analysis.

If the assessment concludes Likely to Adversely Affect (LAA) or NLAA and there are no minimization or conservation measures included in the project design, then the assessment will need to proceed to Step 5.

Preparing the Mitigation Plan

The following sections (Steps 5 and 6) provides guidance on preparing a mitigation plan, including reference to other habitat-specific restoration and mitigation guidance materials developed for the Puget Sound region. The final objective of floodplain habitat mitigation is to ensure that there is no adverse effect to habitat, in terms of features, area, and/or function. Step 6, Task 6.1 of this guidance provides additional guidance on mitigation objectives, including specific requirements for mitigation within Protected Areas and the Regulatory Floodplain.

For many development proposals, permit conditions and mitigation actions required to meet other local and state permit requirements may also provide mitigation for the impacts determined through Step 4 of this guidance. In such instances, permit conditions and mitigation actions may overlap to serve as mitigation for impacts to floodplain habitats as required by the local floodplain management ordinance. The conditions and mitigation proposed, however, must be

sufficient to mitigate for all floodplain habitat impacts in order to meet the objective of no adverse effect to habitat.

Step 5. Review Mitigation Alternatives (Mitigation Sequencing)

5.1. Avoidance

There are four major types of alternative mitigation approaches to rectify an adverse effect. They are listed in order of preference and effectiveness: avoidance, minimization, restoration, and compensation. They may work independently or in combination. The final objective is to provide sufficient and appropriate mitigation to compensate for habitat impacts, in terms of features, area, and/or function.

Avoidance is the preferred approach. It is recommended that a development project stay out of the Regulatory Floodplain rather than implement activities needed to mitigate the project's adverse effect on aquatic and riparian habitat. The permit applicant should give serious consideration to relocating or redesigning the proposed project to avoid floodplain habitat impacts and the need for a mitigation plan.

The community may want to encourage the permit applicant to avoid the Regulatory Floodplain with additional incentives. Puget Sound communities currently use many strategies to encourage conservation of certain areas by allowing for development at a more intense level in other areas. These are usually provisions of a zoning ordinance or separate development regulations. There are three approaches, amongst others, that Puget Sound jurisdictions use to encourage conservation:

1. Providing density incentives to individual property owners: A density incentive or density credit system would allow specified land uses to occur at a more intense level within a portion of a parcel outside of the floodplain as compensation for conservation of floodprone areas within the parcel. For example, if a 20 acre parcel is zoned for one acre lots and half of the parcel is in the Regulatory Floodplain, the community might consider allowing the 10 "dry" acres to be developed with half acre lots, allowing the development to still construct 20 homes. This would allow for a higher density of development in a portion of the property and would require the remaining, high habitat value floodplain to be conserved as a dedicated tract. This strategy is similar to clustering development methods, such as is often used in planned unit developments. Under both approaches, the overall project does not exceed the development density allowed by the zoning district.
2. Transferable development rights: Transferable development rights (TDR) systems have been in limited use by certain jurisdictions within the Puget Sound region in recent years. TDR systems allow for the transfer of development density from one parcel of land (with some conservation value, such as a floodplain or wetland) to another parcel or area that is planned for higher density development. Implementation and administration of TDR systems has proven challenging in many circumstances, due to the required coordination in establishing density receiving and density giving areas, and in negotiating density

credit values. However, a community, regional, or watershed based TDR system may be a successful strategy for floodplain avoidance.

3. Tax relief for conservation lands: Tax relief is a financial incentive that has proven to discourage development of sensitive lands. As an example, King County, Washington has an established system of providing property tax relief for lands that are established as conservation areas. All projects must meet certain criteria and approval is not automatic. Such a system could provide an additional venue to encourage conservation of floodplain lands.

5.2. Minimization

If the entire project cannot avoid the Regulatory Floodplain, it may be that it can be designed to minimize the areas of impact by keeping more disruptive parts of the project out of identified high value habitat areas. For example, while water access may be necessary for the project, the design might place all buildings and pavements out of the riparian habitat zone. Here are some ideas for this approach:

- Site the project footprint away from the higher value habitat areas.
- Designate buffer areas that are not disturbed during or after construction (note that Section 7.4 of the Model Ordinance prohibits disturbing native vegetation in the riparian habitat zone without mitigation).
- Include vegetation enhancement measures around the site's active use areas.

Many adverse effects are due to the disruption caused by construction. Here are some ideas to avoid these types of problems

- Perform all work in dry weather and/or during the dry season
- Incorporate erosion and sedimentation control measures
- Use vegetable oil-based hydraulic fluids in all equipment working in water
- Prepare and train crews on a spill prevention and pollution control plan
- Store, stage, and refuel equipment outside the riparian habitat zone
- Inspect equipment daily for leaks
- Time specific phases of work to occur during "species work windows," when the species are not present or will not be affected

5.3. Restoration

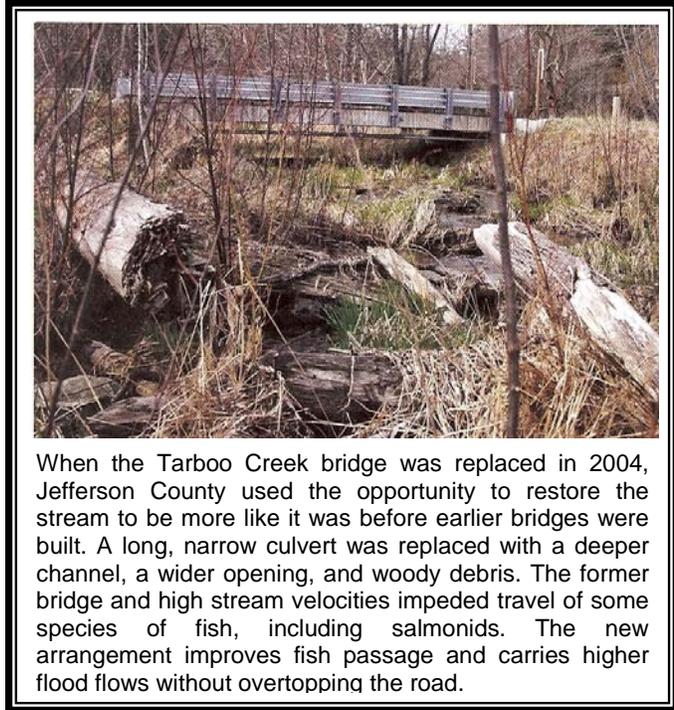
A project's plans should include restoring or improving areas disrupted by the construction process. Wetlands, channels, and riparian areas can be repaired or rebuilt after the land clearance, grading and filling is done. All areas temporarily cleared should be re-vegetated with native plants.

In some cases, restoration projects can be improvements to conditions that existed before the project. The box to the right provides an example, where a Jefferson County stream was enhanced during a bridge replacement project.

5.4. Compensation

Restoration measures can mitigate the impact of temporary disruption, as when an area is torn up for construction but intended to remain as open space. Restoration can produce an equal or better habitat at the *same* location.

Permanent changes to the land and water that cannot be avoided will need to be compensated for. Compensation must be designed to produce an equal or better quantity and quality habitat, even though it will be in a *different* location (which may or may not be on the owner's property). It should be noted that the compensation measure must account for the habitat functions and elements identified in Step 2. Some functions, such as a freshwater migration corridor, will not work in a different location.



The applicant should also keep in mind that the area required for constructed compensatory habitat is generally greater than the area of impact because of the length of time it takes to successfully create properly functioning stream side channel, wetland, or upland floodplain habitat area that provides similar functions and characteristics of natural habitat, (See the Auburn Narrows compensation example, next page.)

5.5. Select the Best Approach(s)

Selecting the best mitigation approaches for the proposed project is an iterative process. It should consider avoidance as the preferred choice. If work must be done in a sensitive area, it should consider the costs of restoration and compensation. If those costs are too high, avoidance should be reconsidered.

Selecting the best mitigation approach can and should be done in conjunction with the local, State, and Federal regulatory offices. Involvement of their knowledgeable staff allows discussion of the approaches and evaluation of preliminary project designs. This can save a lot of work designing the mitigation project. Early and periodic meetings with appropriate regulatory agencies can increase the likelihood of the mitigation plan meeting all regulatory requirements and can reduce potential costs and schedule delays during the approval process.



Auburn Narrows floodplain restoration project along the Green River, King County. This project was funded by a developer of a nearby site in order to compensate for the adverse effect of a floodplain development. The project included creation of side-channel habitat, off-channel habitat, and riparian habitat.

– ESA Adolfson

Step 6. Prepare the Mitigation Plan

6.1. Objective

As noted in Step 5, the objective of the mitigation plan is to assure that sufficient and appropriate mitigation is provided to compensate for habitat impacts, in terms of features, acreage, or function. If the assessment cannot conclude that the project will have No Effect (NE) or May Affect, Not Likely to Adversely Affect (NLAA), then the mitigation plan needs to identify activities that will result in NE or NLAA. The plan document needs to be of sufficient detail to demonstrate how this is done, using avoidance, minimization, restoration, and/or compensation measures.

Objectives for mitigation are differentiated for those impacts occurring within Protected Areas, and those impacts occurring outside of the Protected Area in the remainder of the Regulatory Floodplain. Within the Protected Area only avoidance can assure that there are no adverse effects on the quantity and quality of habitat functions. If there are unavoidable short- or long-term adverse impacts due to the proposed action, then the project can't occur within the limits of the NMFS biological opinion for the NFIP and separate ESA consultation must occur.

Outside of the Protected Area, within the remainder of the Regulatory Floodplain compensation, restoration, and other minimization measures are also options as described below:

- Doubling, tripling, or further increasing the area of compensatory mitigation to offset the difference in quality and function of lost habitat versus constructed habitat and thereby increase the mitigation ratio (area of habitat impacts : area of compensatory mitigation provided).
- Identifying additional areas of previously degraded habitat within the project area and developing and implementing a plan to restore them.
- Implementing restoration actions which are targeted as a high priority by an adopted and approved species recovery plan, when such actions are identified within the same 5th field HUC watershed as the proposed action, and approved by local, state, and federal permitting agencies.

For all mitigation, the final plan (construction level detail) should not be drafted until the local permitting office(s), in coordination with state and federal agencies, as necessary, has agreed that the conceptual mitigation plan would meet the objective. Coordination with local permitting officers will ensure that the scope of the planned mitigation will be commensurate with the scale of the impacts and will meet the objectives identified above.

6.2. Format

Many communities have tried and true formats for environmental assessments. It may be easier for all involved to keep to that format. Otherwise, Chapter 2 of *Wetland Mitigation in Washington State Part 2: Developing Mitigation Plans* has detailed guidelines on what to include in a mitigation plan. There is a recommended outline in Appendix C of that publication which is geared to larger projects involving complex habitat impacts and mitigation. Smaller less complex projects involving small impacts may not require all the information in the outline because it may not be relevant or applicable.

Here is an example mitigation plan outline;

1. Introduction, background, etc.
2. The project area, with map (taken from Step 1 of the assessment)
3. The project area's habitat, with map (taken from Step 2 of the assessment)
4. Project description (taken from Step 3 of the assessment)
5. Impact on habitat (taken from Step 4 of the assessment)
6. Alternatives considered (taken from Step 5, this should note why some alternatives, especially avoidance, were not selected)
7. Mitigation concept (an overall explanation of the measures)
8. Construction measures
 - a. Grading plan, with existing and post-construction topographical maps

- b. Construction methods (e.g. equipment to be used)
 - c. Construction schedule
9. Permanent measures
- a. Surface water management
 - b. Vegetation plan
 - c. Permanent buffer areas
 - d. Etc.
10. Post-construction monitoring and maintenance plan
11. Bond arrangements

6.3. Minimum Standards

At a minimum, the mitigation plan’s components 7, 8, 9, 10, and 11 should be consistent with the mitigation guidance requirements of the Seattle District of the Corps of Engineers and *Wetland Mitigation in Washington State Part 2: Developing Mitigation Plans* (see Reference section) and with the community’s critical areas regulations. If there are inconsistencies between these requirements, the standards that provide the highest level of environmental protection and the greatest likelihood of mitigation success take precedence.

Reviewing Habitat Assessments and Mitigation Plans

This section provides guidance for the local permit official. The following strategies may be used to ensure that habitat assessments and mitigation plans are prepared by a qualified individual or company and meet the intent of the Model Ordinance and this guidance.

Establishing a List of Qualified Consultants: The community could provide a list of qualified consultants to developers and land owners who have experience in the area. Another strategy for ensuring that qualified consultants are used could include developing qualification criteria for authors of habitat assessments and mitigation plans; see the box to the right for an example of one community’s criteria.

Example Qualification Criteria
<p>The following criteria could be used by a community as part (likely not all) of the minimal criteria needed to conduct habitat assessment to ensure assessments and mitigation plans are prepared by a qualified consultant:</p> <p style="text-align: center;"><i>Reports and plans shall be prepared by persons who have a minimum of a bachelor's degree in wildlife or fisheries habitat biology, or a related degree in a biological field from an accredited college or university with a minimum of four years experience as a practicing fish or wildlife habitat biologist.</i></p> <p>Qualifying criteria should include further specifications for all wildlife, fisheries, habitat, and environmental professionals that could be relied upon to address the broad array of habitats and conditions that occur in floodprone areas.</p>

Public Comment Period: After habitat assessments and mitigation plans are submitted, the permitting official may require a public comment period before assessment conclusions and/or mitigation plans are approved. This approach could include a requirement that public notice be posted in a publication of record. The intent of the public comment period would be to ensure that interested third parties would have ample

opportunity to review and comment on proposed projects. This could alert the local permit official to issues or impacts not adequately addressed by an assessment or mitigation plan.

Third Party Review: The community may establish a system of third party review(s) by qualified consultants or agencies. Third party review is frequently implemented by local jurisdictions in the Puget Sound region for other environmental permits and approvals. The cost of third party review could be passed on to the applicant. This may require establishment of a third party review system in the ordinance.

Establishing a system of third party review could augment internal review within the local jurisdiction. Another option for certain jurisdictions could be formalizing a system of internal review where qualified staff would determine the adequacy of submittal materials.

Review Checklists: Permit staff could develop a review checklist for assessment and mitigation plan submittals. A checklist would likely need to be tailored to specific types of development activity due to the site- and habitat-specific nature of habitat assessments and mitigation plans.

References and Resources

Federal and State Regulations

“Endangered Species Act – Section 7 Consultation, Final Biological Opinion,” National Marine Fisheries Service, September 22, 2008

Model Ordinance for Floodplain Management Under the National Flood Insurance Program and the Endangered Species Act, FEMA 2011.

NFIP Floodplain Management Requirements A Study Guide & Desk Reference for Local Officials, FEMA 480, 2005, www.fema.gov/library/viewRecord.do?id=1443

Mitigation guidance and JARPA Permit information, Army Corps of Engineers, Seattle District. <http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=REG&pagename=Forms>

CRS Credit for Habitat Protection, FEMA, 2010, <http://training.fema.gov/EMIWeb/CRS/>

Maps and Databases

Critical habitat maps:

- NMFS: <http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm>
- US Fish and Wildlife Service: <http://criticalhabitat.fws.gov/>

Forest Water Typing System: Washington Department of Natural Resources www.dnr.wa.gov/BusinessPermits/Topics/ForestPracticesApplications/Pages/fp_watertyping.aspx

A Framework for Delineating Channel Migration Zones. Washington State Department of Ecology and Washington State Department of Transportation, Ecology Publication # 03-06-027, 2003. <http://www.ecy.wa.gov/biblio/0306027.html>

National Wetland Inventory maps for the Puget Sound Region, U.S. Fish and Wildlife Service, <http://www.fws.gov/wetlands/>

Priority Habitats and Species (PHS) Database, Washington Department of Fish and Wildlife, <http://wdfw.wa.gov/hab/phslist.htm>

Washington Natural Heritage Database, Washington Department of Natural Resources, http://www.dnr.wa.gov/ResearchScience/Topics/NaturalHeritage/Pages/amp_nh.aspx

Washington State Soil Survey data, see the USDA Natural Resource Conservation Service maps or online *Web Soil Survey*, <http://websoilsurvey.nrcs.usda.gov/app/>

Regional Guidance for Hydrologic and Hydraulic Studies in Support of the Model Ordinance for Floodplain Management under the National Flood Insurance Program and the Endangered Species Act, FEMA Region X, 2010, www.fema.gov/about/regions/regionx/NFIP_ESA/hydrologicandhydraulicstudies.pdf

Water Quality and Quantity

How to Meet Ecology's Construction Stormwater General Permit Requirements: A Guide for Construction Sites, Washington State Department of Ecology, 2008, <http://www.ecy.wa.gov/biblio/9937.html>

Standards for freshwater surface water quality in Washington State, Department of Ecology <http://www.ecy.wa.gov/programs/wq/swqs/criteria.html>

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, 2005, <http://www.ecy.wa.gov/programs/wq/stormwater/manual.html>

Washington State Water Quality Assessment, Washington State Department of Ecology, <http://www.ecy.wa.gov/programs/wq/303d/2008/index.html>

Water level data:

- US Geological Survey: <http://wa.water.usgs.gov/data/>
- Washington Department of Ecology:
http://www.ecy.wa.gov/programs/eap/flow/shu_main.html

Mitigation

Engineering with Nature – Alternative Techniques to Riprap Bank Stabilization, FEMA Region X, 2009

Floodplain and riparian corridors: Washington Department of Fish and Wildlife (Bolton and Shelberg, 2001) <http://wdfw.wa.gov/hab/ahg/floodrip.htm>

Habitat Conservation Planning Handbook, US Fish & Wildlife Service and National Marine Fisheries Service, 1996, <http://www.fws.gov/endangered/hcp/hcpbook.html>

Land Use Planning for Salmon, Steelhead, and Trout: A Land Use Planners Guide to Salmonid Protection and Recovery, Washington State Department of Fish and Wildlife and Washington State Department of Ecology, 2009, <http://wdfw.wa.gov/habitat/plannersguide/index.html>

Management Recommendations for Washington's Priority Habitats: Riparian, Washington Department of Fish and Wildlife, 1997; <http://wdfw.wa.gov/hab/ripsum.htm>

Protection and Restoration of the Nearshore Ecosystems of the Puget Sound, Puget Sound Nearshore Partnership, 2004, http://www.pugetsoundnearshore.org/technical_reports.htm

Stream Habitat Restoration Guidelines, Washington Department of Fish and Wildlife, 2004, <http://wdfw.wa.gov/hab/ahg/shrg/index.htm>

Wetland Mitigation in Washington State Part 2: Developing Mitigation Plans, Washington Department of Ecology, US Army Corps of Engineers, and US Environmental Protection Agency, 2006, <http://www.ecy.wa.gov/biblio/0606011b.html>

Additional References

Invasive species information: Washington State Noxious Weed Control Board. http://www.nwcb.wa.gov/weed_list/weed_list.htm

Low Impact Development, Puget Sound Partnership. Available: www.psp.wa.gov/stormwater.php

Landscape Planning for Washington's Wildlife: Managing for Biodiversity of Developing Areas, Washington Department of Fish and Wildlife, 2009, <http://wdfw.wa.gov/hab/phsrecs.htm>