

3.0 Components of a Biological Assessment

Contents

3.0	Components of a Biological Assessment.....	3.1
3.1	Introduction.....	3.3
3.1.1	Background and Consultation History	3.3
3.1.2	Description of the Proposed Action	3.11
3.1.3	Impact Avoidance and Minimization Measures	3.15
3.1.4	Action Area	3.17
3.2	Status/Presence of Listed Species and Designated Critical Habitat in Action Area.....	3.20
3.2.1	Species and Critical Habitat List(s) and Listing Status.....	3.20
3.2.2	Presence of Federally Listed and Proposed Species in the Project Action Area.....	3.20
3.2.3	Presence of Federally Designated and Proposed Critical Habitat in the Project Action Area.....	3.22
3.3	Environmental Setting	3.23
3.3.1	Habitat Conditions in Action Area (Terrestrial Species and Marine Species).....	3.23
3.3.2	Habitat Conditions in Basin or Subbasin (Freshwater Aquatic Species)	3.24
3.4	Effects of the Action	3.25
3.4.1	Direct Effects	3.27
3.4.2	Delayed Consequences.....	3.29
3.4.3	Effects from Interrelated and Interdependent Actions/Activities	3.29
3.4.4	Cumulative Effects.....	3.30
3.4.5	Other Considerations.....	3.31
3.5	Conclusions.....	3.33
3.6	Magnuson Stevens Fishery Conservation and Management Act	3.35
3.7	Reference Citations and Appendices	3.36

Tables

Table 3-1.	Example of biological assessment format.....	3.4
Table 3-2.	Exposure response matrix example.	3.14

3.0 Components of a Biological Assessment

Chapter Summary

The BA consists of the following main parts or sections, each of which is discussed in detail in this chapter. WSDOT has developed a BA template in conjunction with FHWA, USFWS, and the NMFS. This template must be used for all WSDOT project BAs. BA elements include:

Introduction

- Background and Consultation History
- Project Description
 - Description of project elements
 - Description of project sequencing and timeline
- Impact avoidance and minimization measures
- Action area

Status / Presence of Listed Species/ Designated Critical Habitat in Action Area

- Species and Critical Habitat List / Listing Status
- Presence of Federally listed and proposed species in the project action area
- Presence of Federally designated and proposed critical habitat in the project action area

Environmental Setting

- Habitat Conditions in Action Area (Terrestrial species/critical habitat, Marine species/critical habitat)
- Habitat Conditions in Basin or Subbasin (Freshwater Aquatic species/critical habitat)

Effects of the Action

- Direct Effects
- Delayed Consequences
- Cumulative Effects (formal consultations only)

Conclusions (Effect Determinations)

Magnuson Stevens Fishery Conservation and Management Act

- Essential Fish Habitat (EFH) background
- Description of the proposed action
- Potential adverse effects of proposed project
 - Adverse effects on EFH for Salmonids

- Adverse effects on EFH for Groundfish
- Adverse effects on EFH for Coastal Pelagic Species
- EFH conservation measures
- Conclusions

References

Appendices (as needed)

- Official Species Lists
- Biology of listed species
 - Species Name
 - Status of Species and Critical Habitat
 - Life History Information
- Pre-BA Meeting Notes
- WSDOT Fish Removal Protocols and Standards (most current)
- Plan Sheets

The Endangered Species Act requires preparation of a BA for any major construction project with a federal nexus. The purpose of a BA is to evaluate the potential effects of a proposed project on listed and proposed wildlife, fish, and plant species and designated or proposed critical habitats that are likely to occur in the vicinity of the project. To ensure compliance with the ESA, some agencies, including WSDOT, prepare BAs for projects that would not be considered major construction.

The BA should use the “best available scientific and commercial information” (USFWS, NMFS 1998). This information is used to help analyze project impacts and is the basis for the effect determination. This information must have been evaluated by the Services and found to be acceptable.

Project biologists may contact the Services for additional species-specific information, including contact information for local area habitat biologists or academic experts. Recovery plans are also an excellent source of information. A list of available recovery plans is available in CHAPTER 19, RECOVERY PLANS.

Using the WSDOT/FHWA biological assessment template, the biological assessment review checklist, or the no-effect letter checklist (available on the WSDOT environmental website at: <http://www.wsdot.wa.gov/environment/technical/fish-wildlife/policies-and-procedures/esa-ba/preparation-manual>) can help to ensure that all necessary topics are addressed in a “no effect” letter or a BA. The content of each BA section is summarized in Table 3-1.

Brief descriptions of each of the sections within a BA are provided below. Many of these discussions are accompanied by brief excerpts from BAs that exemplify common errors or illustrate high-quality BA writing.

3.1 Introduction

3.1.1 Background and Consultation History

The background and consultation history section is a one- to two-page summary of the interactions, meetings, formal and informal correspondence (pre-BA meeting, emails, phone conversations, etc.) between the action agency and the Services. The section should be organized chronologically to accurately reflect the progression of the administrative record for the project.

If project representatives attended a pre-BA meeting, provide the date of the meeting and the names of the USFWS and NMFS biologists attending, so that the BA can be assigned to a reviewer who participated in the pre-BA meeting. Include pre-BA meeting minutes in the appendices. Provide information on how pre-BA comments were addressed.

Table 3-1. Example of biological assessment format.

Section Heading	Subsection Heading	Contents of Section and Subheadings	Notes
Table of Contents	List of Tables List of Figures List of Appendices		Make sure page references are correct. Make sure page references are correct. Make sure page references are correct. Make sure all appendices are identified
Introduction			
	Background and Consultation History	<ul style="list-style-type: none"> ▪ Summary of consultation activities with the USFWS and NMFS, including: <ul style="list-style-type: none"> – Date of pre-BA meeting if one was attended, and names of the USFWS and NMFS biologists attending. – Summary of subsequent consultation activities and correspondence. – The Pre-BA meeting minutes should be attached in the appendix. 	Address Pre-BA comments in meeting minutes.
	Project Description	<ul style="list-style-type: none"> ▪ Project proponent ▪ Federal nexus ▪ Project purpose (i.e., congestion relief, safety) ▪ Brief summary of project (a few sentences), expected date and overall timeline. Also identify environmental benefits associated with project. ▪ Specific project location (milepost begin/end of project, township/range, latitude/longitude, etc.) ▪ Watershed in which project is located (WRIA), 6th-field HUC ▪ Brief description of project setting/vicinity/existing conditions 	Include vicinity map. Additional maps or aerial photographs as needed to illustrate resource or project characteristics. If doing in-water work, include river mile.

Table 3-1 (continued). Example of biological assessment format.

Section Heading	Subsection Heading	Contents of Section and Subheadings	Notes
<p>Introduction (continued)</p>	<p>Project Description (continued)</p> <ul style="list-style-type: none"> ▪ Description of Project Elements ▪ Description of Project Sequencing and Timeline 	<ul style="list-style-type: none"> ▪ Deconstruction of project into its components ▪ Construction activities and types of equipment for each component ▪ Describe size and configuration of project footprint (e.g., cut and fill amounts, acres of impervious surface). Include permanent and temporary impacts. ▪ Secondary project features (mitigation sites, staging areas, detours, waste/stockpile areas, etc.) and directly related BMPs ▪ Quantify new impervious surface and address how stormwater will be treated, what the associated stormwater BMPs are and where the discharge points are. The load and concentration information can be included here. ▪ Quantify and describe temporary and permanent impacts to vegetation (identify type of vegetation that will be affected, species, diameter at breast height if applicable). Describe noise generating activities and whether noise attenuation measures or monitoring will be implemented. ▪ Describe in-water work; include stream bypass, dewatering, fish exclusions, and fish moving. ▪ Detailed project timeline and sequencing addressing each of the components 	<p>Photos or simple project plans may be inserted in this section, or more detailed figures may be referenced in the appendices.</p> <p>It can be helpful to provide a 2-column table (Date/Activity) listing each construction step in chronological order. Emphasis should be placed on construction phases/activities that will particularly impact protected species.</p> <p>Follow the Module links in the BA template to see the level of detail needed for seven types of common WSDOT projects.</p> <p>Provide in-water work window, and identify the time work will occur in the water. Provide hours of operation, specify day or night, time of year (months and year), duration. Tables/Gantt charts are often the best way to present some of this information (e.g., construction equipment, BMPs, construction timeline).</p>

Table 3-1 (continued). Example of biological assessment format.

Section Heading	Subsection Heading	Contents of Section and Subheadings	Notes
Introduction (continued)	Impact Avoidance and Minimization Measures	<ul style="list-style-type: none"> ▪ Impact avoidance and minimization measures (minimization measures [MMs], best management practices [BMPs], and performance standards) identified for each project component as applicable. 	Identify MMs or BMPs that will be implemented for each project component. Compile impact avoidance and minimization measures into a single list or summary, including additional measures that may be identified for specific species. Highlight project features designed to minimize impacts of the project (like build retaining wall here, shifted work to median to avoid wetlands, etc.). This can be provided in a list format.
	Action Area	<ul style="list-style-type: none"> ▪ Characterization and description of the physical, chemical and biological impacts of project activities and describe the geographic extent of these activities ▪ Description of extent of zones of impact that comprise action area ▪ Definition, delineation, and description of extent of action area 	Insert a map or aerial photo with action area identified. Action area can be constructed by overlaying/combining multiple zones of impact associated with project effects. For example, the single action area for the project may be composed of a water quality impact zone, terrestrial noise impacts zone, aquatic noise impact zone, etc. Be sure to have a paragraph that defines the extent of the action area in its entirety as depicted on the map. Be sure to consider delayed consequences, terrestrial and underwater noise, and downstream water quality effects.
Status/Presence of Listed Species/ Designated Critical Habitat in Project Area	Species and Critical Habitat List / Listing Status Species Presence in Action Area Critical Habitat Presence in Action Area	<ul style="list-style-type: none"> ▪ List of species and critical habitats addressed in the BA ▪ Summary of listing status of species and critical habitats addressed in the BA ▪ Explanation of why other species on NMFS or USFWS lists are not addressed in the BA ▪ Species occurrence in the action area, including specific life history stages that occur within the action area ▪ For freshwater species – Presence of species by subbasin. ▪ Presence or absence of critical habitat in the action area, including specific Physical or Biological Features (PBFs) within the action area 	Include a table identifying listed and proposed species/critical habitat addressed in BA and their federal status. Provide detailed information on site-specific species and critical habitat occurrence. Section may be organized to address terrestrial species first followed by aquatic species. Identify fish by DPS or ESU. Include date(s) of field reviews by project personnel, persons involved, and results. Include information from local sources, including agency biologists, tribal biologists, or others with local knowledge and experience. Place general information on species and habitat requirements in appendices. Do not include candidate species.

Table 3-1 (continued). Example of biological assessment format.

Section Heading	Subsection Heading	Contents of Section and Subheadings	Notes
Environmental Setting	Habitat Conditions in Action Area – Terrestrial Species and Marine Species Habitat Conditions in Basin or Sub-basin—Freshwater Aquatic Species	<ul style="list-style-type: none"> ▪ Brief characterization of project area and history that describes the influence of existing conditions and previous activities on the species and the functional condition of critical habitat: <ul style="list-style-type: none"> – Development patterns – Surrounding land use – Wetlands – Geology and soils – Vegetation ▪ Analysis of presence and condition of habitat features as they pertain to the species addressed in the BA (describing applicable setting conditions only, focusing on elements necessary to complete the analysis of effects) ▪ Assessment of key habitat features for each species and for each critical habitat PBF in the action area. <ul style="list-style-type: none"> – What function does/should the habitat provide? – How well is habitat functioning (use matrices for guidance)? ▪ Presence or absence of suitable habitat for listed and proposed species in the action area ▪ For freshwater species – Include NMFS or USFWS matrices as appropriate and provide citation. Table should be provided in the body of the BA, summarizing aquatic setting conditions and anticipated impacts at watershed and project/action area scales. ▪ For freshwater species – Summary of pathways and indicators that will be affected by the project and for which data are sufficient (provide detailed analyses in BA appendices). 	<p>Photos and maps, which are helpful for federal reviewers, may be inserted in this section.</p> <p>Terrestrial habitat features: foraging habitat, nesting or dispersal habitat, prey overwintering areas, prey concentration areas, migration corridors, suitable habitat, occupied habitat.</p> <p>Marine habitat features: foraging habitat, forage fish spawning areas, prey concentration areas, haul outs.</p> <p>If the project has no aquatic impacts and is isolated from aquatic habitat, provide information on the terrestrial environment only.</p> <p>If project will have stormwater impacts, be sure to clearly characterize the baseline water quality conditions including metals concentrations and loading (if known).</p> <p>Only include summary of pathways and indicators that will be affected by project activities within the BA Environmental Setting section.</p> <p>Use limiting factor analysis, limiting factor reports, aerial photos, field investigations, and consultation with professionals for supporting information.</p>

Table 3-1 (continued). Example of biological assessment format.

Section Heading	Subsection Heading	Contents of Section and Subheadings	Notes
<p>Effects of the Action</p>	<p>Direct Effects Delayed Consequences Effects to Terrestrial Species Effects to Aquatic Species</p>	<ul style="list-style-type: none"> ▪ Discussion of specific direct effects and delayed consequences, injury and mortality, behavioral response, estimate extent of exposure, etc. <ul style="list-style-type: none"> – For all species – Exposure and response analyses – Determine if exposure is likely. <ul style="list-style-type: none"> ▪ If exposure likely: <ul style="list-style-type: none"> - Assessment of species response to direct effects of the action - Assessment of species response to delayed consequences of the action – For habitat as it relates to the species: <ul style="list-style-type: none"> ▪ Analysis of direct effects and delayed consequences to habitat conditions <ul style="list-style-type: none"> - Analysis of how species would respond to the affected habitat in the context of existing setting conditions. – For critical habitat: <ul style="list-style-type: none"> ▪ Analysis of effects to PBFs and setting conditions ▪ Analysis of direct effects and delayed consequences to <u>each</u> PBF in the action area <ul style="list-style-type: none"> - Analysis of how action will impact the function of each PBF (long-term, short-term, temporary, permanent, seasonal) in the context of existing setting conditions. - Analysis of how species would respond to the affected PBF function. – Identification of additional species-specific impact avoidance and minimization measures (MMs), best management practices (BMPs), conservation measures, and performance standards to reduce potential for exposure or to address anticipated response. 	<p>Tie potential effects to compliance with species recovery plans, management plans, and/or habitat conservation plans.</p> <p>Analyze in detail only project impacts that potentially affect listed species and critical habitat.</p> <p>Discuss beneficial effects.</p> <p>Take into consideration proposed impact minimization measures and BMPs.</p> <p>For marine and terrestrial environments, assessment of project effects on existing environmental conditions that are pertinent to the species. There are no matrices available for these environments, so the biologist must determine what environmental characteristics are pertinent to the analysis.</p> <p>For freshwater aquatic environmental setting, assessment of effects on the setting conditions (in NMFS and USFWS matrices) at watershed and/or action area scales. Confine detailed analysis to those indicators that will sustain impacts. Additional analyses can be provided in BA appendices.</p> <p>Additional measures that may be identified for specific species should be compiled into a single list or summary of impact avoidance and minimization measures. This list will be included in the Project Description section of the BA.</p> <p>Consider the proposed project’s compliance with all pertinent species-specific recovery, management, and/or watershed plans.</p> <p>A table (Impact, MMs/BMPs) may effectively summarize anticipated impacts to protected species or critical habitat and the applicable off-setting mitigation or related minimization measures.</p>

Table 3-1 (continued). Example of biological assessment format.

Section Heading	Subsection Heading	Contents of Section and Subheadings	Notes
Effects of the Action (continued)	Effects from Interrelated and Interdependent Actions	<ul style="list-style-type: none"> ▪ Detailed description of interrelated and interdependent actions or activities. ▪ Use the “but for” test. ▪ Analyze direct effects and delayed consequences to species and habitat associated with interrelated and interdependent actions. 	These actions are considered part of the larger action (action = proposed project + interrelated/interdependent actions).
	Cumulative Effects	<ul style="list-style-type: none"> ▪ Assessment of cumulative effects within the action area 	<p>Remember that the cumulative effects discussion is not based on the NEPA definition; and it is for formal consultations <u>only</u>, not considered when making effect determinations.</p> <p>Identify and briefly describe all future state and private actions that are reasonably certain to occur within the action area. Reasonably certain means that the projects have applied for permits or discussed and planned out at the local jurisdiction level.</p>
Conclusion		<ul style="list-style-type: none"> ▪ Effect determination for each species present in project area ▪ Effect determination for designated critical habitat present in project area: <ul style="list-style-type: none"> – Effect determination to include summary of rationale (summary of effects on species and habitats in a bulleted list format), for each species/critical habitat analyzed 	<p>For each listed species and designated critical habitat, effect determinations are needed:</p> <ul style="list-style-type: none"> ▪ No effect (absolutely no effect whatsoever, either positive or negative); ▪ May affect, not likely to adversely affect (insignificant – never reaches the level where take occurs, or discountable – extremely unlikely to occur; or entirely a beneficial effect); ▪ May affect, likely to adversely affect (measurable or significant effects – will require formal consultation)

Table 3-1 (continued). Example of biological assessment format.

Section Heading	Subsection Heading	Contents of Section and Subheadings	Notes
Magnuson Stevens Fishery Conservation and Management Act	EFH Background Description of the proposed action Potential adverse effects of the proposed action	<ul style="list-style-type: none"> ▪ Federal mandate (Magnuson-Stevens Act) <ul style="list-style-type: none"> – Action agency, project name. Can reference previous project description, but describe in 1-2 sentences. ▪ EFH managed species potentially present in project vicinity ▪ Elements of EFH present in project vicinity ▪ Analysis of project impacts, referencing ESA Analysis of Effects section above if necessary ▪ Conclusion for each EFH-type present in project area 	Address EFH separately from ESA analysis.
	<ul style="list-style-type: none"> ▪ Adverse effects of the proposed action on salmonid EFH ▪ Adverse effects of the proposed action on groundfish EFH ▪ Adverse effects of the proposed action on coastal pelagic EFH EFH Conservation Measures Conclusions		Discuss EFH conservation measures
References		<ul style="list-style-type: none"> ▪ List of information resources used in BA preparation 	
Appendices	WSDOT Fish Removal Protocols and Standards (most current)	<ul style="list-style-type: none"> ▪ Information/reporting outlined in the WSDOT Fish Removal Protocols and Standards 	Include if applicable
	Official Species Lists	<ul style="list-style-type: none"> ▪ Current species Lists from USFWS and NMFS 	Lists are available on-line on agency websites.
	Biology of Listed Species	<ul style="list-style-type: none"> ▪ General information on life history and habitat requirements 	
	Environmental Baseline for Aquatic Habitats Minutes for the Pre-BA meeting	<ul style="list-style-type: none"> ▪ Detailed environmental setting discussion of the NMFS/USFWS indicators and pathways 	

3.1.2 Description of the Proposed Action

The initial paragraph in the Description of the Proposed Action section should describe the rationale for preparing the BA in light of ESA requirements. Include the specific federal nexus for the project. The project purpose and need statement should provide a clear statement of purpose for the proposed project, as well as a brief description of proposed actions in relation to the needs discussed. (This is not the same as the NEPA purpose and need statement, which has stringent regulatory requirements and implications.) If the project is related to an ongoing series of projects or actions, provide a brief project history. This discussion is optional; however, it can provide reviewers with useful insight into the larger picture or context of the project.

The introduction to a project description should provide the following information:

- Name of the project proponent
- Clear identification of the federal nexus of the project
- Project purpose, need, and history, if relevant (not the same as the regulatory purpose and need statement required in NEPA documents)
- Brief summary of project

The project location must also be clearly conveyed in the initial paragraphs of the Description of the Proposed Action section. In this portion of the BA, related photographs can be particularly helpful for reviewers.

The description of the project location should include information on the following topics:

- State route or interstate identification
- Milepost start and end of project
- County
- Township, section, and range
- Latitude and longitude
- Watershed in which project is located: including water bodies in which work will occur, and water resource inventory area (WRIA) identification

This brief summary should also clearly identify the watershed in which the project site is located by the 6th-field hydrologic unit code (HUC), to facilitate NMFS tracking of the project in its database. For general information on HUCs, see <http://water.usgs.gov/GIS/huc_name.txt>.

A vicinity map should be provided to visually identify the location of the project area; aerial photographs can also provide good contextual information.

The discussion of habitat features present in the vicinity of the project can be general in nature. The habitat discussion should become more specific later in the document as environmental setting conditions in the project action area are discussed. The discussion of habitat should be pertinent to the terrestrial or aquatic species addressed in the BA.

3.1.2.1 Description of Project Elements

The description of proposed activities begins with an overview of the proposed action and project footprint (i.e., where project or construction activities will occur), including overall project timeline and environmental benefits. The project footprint discussion should provide an overview of the extent of temporary and permanent disturbance associated with the project. The environmental benefits section should provide an overview of the anticipated benefits associated with the project.

This section should then provide the reader with a detailed picture of all proposed project actions, by deconstructing the action into all of its elements. The proposed project action discussion should describe each of the proposed project elements, including specific construction methods, materials, and techniques associated with each project element, and summarize the anticipated impacts associated with each element. This description should be accompanied by plan drawings, as appropriate, to illustrate the locations and configuration of the project components and proposed activities. Project plans should be kept readable and simple, and may be included in this section or referenced in a BA appendix. Project elements should be listed in chronological order, if possible.

A description of the required site preparation and construction equipment should be provided for each impact or project element, if the equipment is capable of producing high noise levels or measurable impacts on listed species or habitats. For many projects the standard equipment list of bulldozers, dump trucks, etc., is suitable. However, some projects require special equipment, such as rock drills or spiders for in-water work, and these should be listed explicitly in the BA.

The locations of various secondary project features, including staging areas, waste sites, stockpile sites, and construction material source sites (e.g., rock quarries or gravel pits developed specifically because of this project), if known, should also be addressed in the BA to provide reviewers with a complete picture of the extent of the proposed project. These areas are considered during the analysis of direct effects and delayed consequences or are addressed as interrelated and interdependent activities or actions of the proposed project and may appreciably expand the action area of a project.

As needed, more detailed project description information can be incorporated into the project description section. In general, the level of detail provided should be commensurate with the level of impacts that are anticipated.

Behind the scenes, the deconstructed project elements should be listed in a tabular format to facilitate their incorporation into the later analysis of project effects on listed species and critical habitats. The methodical analysis of each project element to determine the potential for exposure for listed species or designated critical habitat followed by an analysis of the anticipated response of the species to the proposed project is termed the “Analytical Framework” by the Services. An example of the standard matrix used to document this analysis is provided in Table 3-2 below. For each listed species and each designated critical habitat in the action area a table containing the same project elements but different analysis (each would have different potential for

exposure) would be prepared and included in the Appendix of the BA. These tables essentially summarize the analysis that is described in detail in the BA.

At this point in the analysis, only the first few columns (Action and Where and perhaps the Stressor, When, Duration, Frequency, Minimization Measures and/or Performance Standards columns) would be filled in based on project description related information.

Once the proposed action has been described in detail, any interrelated and interdependent actions or activities associated with the proposed project should be described in detail. After both the proposed action and interrelated and interdependent actions have been described, all of the impact minimization measures and best management practices that will be implemented should be described and also compiled into a comprehensive list.

The discussion of construction activities should provide sufficient detail for a reviewer to clearly understand the project, all of its elements, and associated impact minimization measures or best management practices.

3.1.2.2 Description of Project Sequencing and Timeline

The section should conclude with a discussion of the sequencing of project elements and detailed timeline projections. If possible, it is preferable to include the specific dates or months during which construction will occur. Seasonal references are not sufficiently precise for the purposes of reviewers.

Following is an example of an inadequately described construction schedule in a BA recently reviewed by the Services:

Construction of this improvement is scheduled to begin in the summer of 2018. It is estimated to take 50 working days to complete this project.

One reviewer responded:

Can we get more specific dates? Or at least specific months? How does this timing relate to the fish window and other guidelines for construction timing?

Often a BA is written before a project has been funded, advertised for contractor bids, or fully designed, in which case specific dates may not be available to the project biologist. In this situation, providing an example of how construction phasing and timing would occur is helpful for reviewers. Providing a visual overview of the project elements and chronology, as would be illustrated in a Microsoft Project schedule spreadsheet, is particularly effective.

Table 3-2. Exposure response matrix example.

Action	Where	Exposure					Response to Stressor	Minimization Measures	Performance Standards	Resulting Effects of the Action
		Stressor	When	Duration	Frequency	Life History Form				
Project element 1										
Project element 2										
Project element 3										
Project element 4										
Project element 5										

To allow for unforeseen complications or prohibitive weather conditions during project construction, the BA may stipulate more time for completion of construction activities than that estimated by project engineers. For example, a project biologist may add 10 percent contingency time to a project by extending the project end date, or a few days may be added to the contract time (e.g., stipulating 260 rather than 240 days). Before making these revisions to the project schedule, the project biologist should check with the project manager to ensure that this contingency time is considered useful. Providing contingency time often ensures that the BA adequately addresses project activities in the event that the project is slightly delayed or behind schedule.

3.1.3 Impact Avoidance and Minimization Measures

The BA should highlight the measures that have been taken to avoid or minimize project impacts. These may include design elements of the project, such as the construction of retaining walls to minimize impacts on streams, or use of steel piles or untreated wood piles to avoid contamination of aquatic habitats, in addition to other impact minimization measures (MMs) and best management practices (BMPs). MMs and BMPs are applicable to every project type. Conservation measures are measures taken to help recover listed species and are not applicable to every project. Performance standards are measurable benchmarks for a particular performance objective agreed to by the Services and the action agency, and also do not apply to every project or to every action within a project.

Descriptions of MMs and BMPs should be clearly worded and should describe specific actions to be implemented to eliminate or reduce adverse effects of the action in general. Because the Services cannot consult on recommendations, but only on project elements or methods that will actually occur, choose language such as *will* or *shall be implemented*, instead of *may*, *to the practicable extent possible*, *frequently*, etc. Transportation-related activities and related impact minimization measures are discussed in PART 2, IMPACT AVOIDANCE AND MINIMIZATION MEASURES.

Specific project-related impacts on habitat features and species in the action area are assessed in the Effects of Project on Species and Critical Habitats section of the BA, where additional MMs or conservation measures for individual species may also be identified. A summary of construction-related and species-related MMs, conservation measures, and BMPs should be provided in the BA to be considered as part of the impact assessment for species and habitats and to help substantiate the rationale for effect determinations.

While each construction technique may require specific MMs to avoid or minimize its potential impacts, project-related impacts may be avoided or reduced through careful planning, design, and timing. A project biologist can work with project designers and engineers throughout the entire design process, from pre-project planning to project implementation, to aid in identifying potential impacts and avoidance and minimization measures.

For example, project biologists may be called upon to help identify sensitive species and habitats in the general vicinity of a proposed project prior to any design work, so that these issues will be considered and represented in any subsequent planning or project design. Similarly, a project biologist can help designers identify whether proposed project designs or methods would adversely affect a listed species or its habitat, and whether alternative designs would minimize those impacts or avoid the need for formal consultation. A project biologist can also help project managers identify whether timing restrictions are necessary for a project, so that project timing and phasing can be planned appropriately to avoid or minimize impacts on listed species.

Useful information sources for determining whether habitat and species impacts can be avoided include the following:

- Habitat management plans for nest territories (see PART 3, CHAPTER 19, RECOVERY PLANS)
- ESA highway runoff effects guidance (see PART 2, STORMWATER IMPACT ANALYSIS)
- Definitions of *harm* and *take* under the ESA, as related to habitat and listed species (see PART 3, GLOSSARY AND ABBREVIATIONS, and/or CHAPTER 19, WORKING WITH LISTED SALMONIDS)
- ESA *take* avoidance plans for suitable habitat
- Salmon information websites (see CHAPTER 19, WORKING WITH LISTED SALMONIDS)
- Information on wildlife and plant sensitive periods (see CHAPTER 19, WILDLIFE SENSITIVE PERIODS CALENDAR, and IDENTIFICATION WINDOW FOR THREATENED AND ENDANGERED PLANTS IN WASHINGTON STATE).

Examples of alternative construction methods that may be helpful include the following:

- Vibratory pile driving rather than impact pile driving techniques
- Non-explosive expansion materials rather than explosive materials
- Special equipment or techniques known to have lower or fewer impacts
- Noise shields to help contain the radius of sound impacts

Many MMs or BMPs identified by project biologists within the BA may be consistent with WSDOT standard specifications and can easily be incorporated into contract documents. However, other impact minimization measures or conservation measures that are not standard specifications (e.g., timing restrictions) may be identified by a project biologist as necessary to minimize impacts on species; these measures must be coordinated with the project manager so that they can be incorporated into contract documents as special provisions (for more information, see PART 2, IMPACT AVOIDANCE AND MINIMIZATION MEASURES).

To facilitate the analysis of project effects on listed species and critical habitats ensure that this information is incorporated into the Exposure-Response matrix used to document the analytical framework underlying the discussions and conclusions contained in the BA provided in Table 3-2 above.

At this point in the analysis, most of the columns (Action Where, Stressor, When, Duration, Frequency, Minimization Measures and/or Performance Standards columns) would be filled in based on project description related information.

3.1.3.1 Summary of Impact Avoidance and Minimization Measures

The BA should provide the reviewer with a consolidated list of construction-related and species-related impact minimization measures for easy reference when examining the effect determination section of the BA.

3.1.4 Action Area

This section of the BA contains the definition of and supporting rationale for the *action area* for the proposed project. Normally, a map is also provided to illustrate the extent of the action area.

The action area for a proposed project is defined as all areas to be affected by the federal action, and not merely the immediate area involved in the action (Endangered Species Act (50 CFR 17.11)).

Direct effects are defined as “direct or immediate effects of the project.” Direct effects include all immediate impacts (adverse and beneficial) from project-related actions (e.g., construction-related impacts such as noise disturbance or loss of habitat), those disturbances that are directly related to project elements that occur very close to the time of the action itself (e.g., sedimentation), and those impacts stemming from actions or activities that are interrelated or interdependent to the proposed action.

Delayed consequences (formerly known as indirect effects) include those effects that are caused by or will result from the proposed action or the larger action (including interrelated and interdependent actions or activities) and are later in time (generally after the construction period), but are still reasonably certain to occur. Delayed consequences may result from the operation of the project or future activities related to the project (e.g., future impacts from trail use, induced land use change or growth, increased traffic). The BA must examine these continued impacts (adverse and beneficial) in order to ascertain overall project-related impacts. The analysis of delayed consequences can be complex and should include an assessment of the impacts related to the following issues:

- Does the project create a new facility (e.g., a new road or interchange) or increase the capacity of or access to the existing system?

- Is surrounding development contingent on the proposed project? In some cases, developments are tied by permit condition or Growth Management Act concurrency to certain transportation improvements.
- Is any anticipated future development the result of (caused by or dependent on) the project?

The *zone of influence*, which is defined for project-related traffic and development issues as part of the delayed consequences analysis, may help to define the limits of the action area. The process of this analysis and defining the zone of influence is summarized in WSDOT *Guidance – ESA, Transportation, and Development: Assessing Indirect Effects* (Chapter 10). At the very least, a delayed consequences analysis should address all 10 questions that are posed in the WSDOT indirect effects guidance document¹. A more detailed discussion of delayed consequences, including the WSDOT guidance, is provided in PART 2, DELAYED CONSEQUENCES.

To help determine the project action area, the geographic extent of project impacts must be determined. The project biologist should determine the physical, biological and chemical impacts associated with each of the proposed project elements and with interrelated and interdependent activities. The biologist must then determine the magnitude, extent, and timing of when these impacts will occur, and most importantly the geographic extent of areas that will be affected by these impacts. The action area represents a geographic composite of all the areas that will sustain impacts associated with project activities.

In summary, the action area includes the geographic extent of physical, biological, and chemical impacts of the project, which in turn can be influenced by the implementation of MMs and BMPs. Consequently, the action area is usually larger than the project area and sometimes larger than the project vicinity.

The action area includes but is not limited to the following areas: equipment staging areas, detour routes around the project area on a case-by-case basis², material sources that are developed due to the project, water bodies receiving highway runoff, the river upstream and downstream of a bridge project, and wetland mitigation sites or other mitigation sites resulting from project impacts. Similarly, the extent of noise impacts should also be included in the action area. For example, if the noise impacts associated with a project extend to a 1-mile radius, the action area

¹ In May 2009, FHWA NMFS, USFWS and WSDOT published inter-agency guidance on addressing land use indirect effects to assist BA authors with the preparation of these analyses. Although “indirect effects” are now known as “delayed consequences”, the guidance document will continue to use the former term until updated inter-agency guidance has been published.

² Assess whether the detour route will result in environmental impacts that significantly differ from existing conditions. If a road being used for a detour does not normally support heavy traffic and the detour will divert heavy traffic onto it, the project biologist might consider including a detour route in the action area. Similarly, if the detour would result in noise impacts that do not occur under normal conditions, the project biologist would likely consider the detour route as part of the action area.

encompasses this entire area (see PART 2, CONSTRUCTION NOISE IMPACT ASSESSMENT, for more information on how to assess this impact).

The action area is determined independently of the effects of the action on listed species and critical habitat. After the action area is identified, then the distribution of the listed species and critical habitat is overlaid on the same map to determine which species and critical habitat may be subject to effects of the action.

We currently evaluate the action area and the extent of effects of a project (especially noise effects) based on human perception of the environment; the environment as seen through our human vision, color spectrums, hearing frequencies and disturbance thresholds. Scientific research is resulting in an increased understanding of how animals may perceive the world differently from humans, and WSDOT is beginning to consider looking at the effects of an action based on the animals' perception of the world. For example, we now place marine mammals into functional hearing groups. As research continues, we will be exploring how we define the extent of effects on the environment as we learn what the "environment" looks like through the senses of animals we are consulting on.

In addition to clearly defining the action area limits, a thorough description of the action area must provide a rationale for these limits. A graphic representation of these limits can prove invaluable for reviewers. The discussion of the action area should include detailed information pertaining to the anticipated impacts of the proposed action upon the areas and resources surrounding the project. Required additional information to support the action area definition includes:

- Describe land uses within the action area.
- Identify any water resources within the action area (e.g., rivers, tributaries, wetlands, floodplains, and aquifer recharge areas).
- Document existing environmental conditions or environmental setting conditions (i.e., substrate, water quality, tides and currents [where applicable], flow rate, macrofauna, vegetation, wintering concentrations, perch trees, forage areas, spawning or rearing habitats, etc.).

Several examples of properly defined and illustrated action areas are provided in PART 2, ACTION AREA.

3.2 Status/Presence of Listed Species and Designated Critical Habitat in Action Area

3.2.1 Species and Critical Habitat List(s) and Listing Status

It is a statutory requirement that the BA be based on a current species list. A table listing species and critical habitat covered in the BA provides reviewers with a concise summary of the species and critical habitats addressed throughout the report. This table should provide common names of species, scientific names of the species or subspecies, and federal status (state status can be included but is not required) of each of these species (see Table 3-2). The table should also indicate whether or not there is designated or proposed critical habitat within the project vicinity.

If a species list was received from the Services, a formal species listing citation should be provided. This listing and the printout of the species list from the agency website, should be included in the BA report as an appendix. Also provide a summary of the date(s) on which field reviews were conducted to assess project impacts and environmental setting conditions in the project action area.

This section of the BA should also identify any species included on the USFWS or NMFS lists that are not addressed in the BA, with a brief explanation of the reason for not including them in the BA analysis.

3.2.2 Presence of Federally Listed and Proposed Species in the Project Action Area

This section of the BA should focus on behavioral characteristics of species and habitat elements that are central to completing the analysis of effects and effect determinations. Depending upon the species or critical habitat addressed in the biological assessment, the biologist may choose to organize this section of the report by terrestrial species followed by aquatic species. The section should include current site-specific information about each species, their use of the action area, and the suitability of the habitat in the action area for each species.

The species and habitat information provided in the main body of the BA should be brief and limited to the information needed to support the overall analysis of effects and effect determinations. For example, information on nesting habits is unnecessary if only foraging habitat exists within the action area. The project biologist should not address the entire life history of a species or conservation recommendations; however, clear and concise information must be provided on each species that may be present, when it is present (i.e., year-round, temporary, or seasonal), and its life stage and activity during that timeframe (i.e., incubating, spawning, rearing, migrating through an area, overwintering, roosting, nesting, or foraging). General life history information is not necessary unless it pertains directly to the proposed project.

If it is pertinent to the assessment and is available from a reliable source (such as recovery plans), the information provided may also include current population estimates, trends, conservation needs, or threats to species in the action area.

Citations of relevant scientific literature or research findings should be provided throughout the BA as they are mentioned. And in all cases the project biologist should identify the information sources used for determining the occurrence of listed species (e.g., PHS database, local agency biologists, or *Salmon and Steelhead Status Inventory* [SASSI]).

Items that should be addressed or provided in this section of the BA include the following, which are discussed more fully below:

- Citations of information sources for each species identified as potentially occurring in the vicinity of the project through listings provided by the Services or interviews with local experts
- Site-specific species occurrence and habitat information:
 - Timing
 - Life phases
 - Distribution
 - Occurrence within action area
 - Occurrence within a species project analysis area and habitat connectivity with suitable habitat within the action area
 - Designated ESU or distinct population segment (DPS)
 - Presence of designated critical habitat
 - Presence and occupancy of suitable habitat
 - Description of habitat types

To ensure the protection of listed species in the site vicinity, no site-specific information or exact locations of species present, as identified in PHS maps or otherwise, should be included in this public document.

The BA is focused on the potential impacts upon a specific population of the listed species potentially occurring in the vicinity of the project. The run timing, or timing of species use of the project footprint and action area, local status information, and presence or absence of suitable habitat or designated critical habitat should be provided for the species or specific run using the action area. It is important to discuss species presence year-round if permanent or year-round impacts are expected. Essential information includes the location of the project in relation to designated territories, or areas containing threatened or endangered evolutionarily significant units or distinct population segments (ESU/DPS) of salmonids, as well as the characteristics and presence of designated critical habitat within the project action area.

Often BAs fail to provide adequate information on species life histories, habitat requirements, and ecology, especially for local populations, at the action area scale. Another common shortcoming in BAs is to state illogical or erroneous assumptions (e.g., because the area has only

second-growth vegetation, there is no spotted owl use). Information provided in this section should be logical, detailed, and empirically sound. The project biologist should strive to provide a comparative analysis by describing the available habitat features in comparison to habitat features that define suitable habitat. This analysis should be presented for species within the project action area and in the project vicinity, to determine whether species may move through the project action area en route to foraging or nesting habitats.

This section of the BA provides information pertaining to occurrence of a species within the immediate vicinity of the project area and in the action area itself, and details the specific habitat types and features within this area.

To facilitate the analysis of project effects on listed species and critical habitats ensure that this species information, in particular the life history form or timing information, is incorporated into the Exposure-Response matrices, outlined in Table 3-2 above, used to document the analytical framework underlying the discussions and conclusions contained in the BA for each species and designated critical habitat.

At this point in the analysis the Life History Form columns would be filled in based on site-specific species information. Or perhaps this column would be modified to address individual Physical or Biological Features (PBFs) for critical habitat.

General life history and habitat requirement information should be included in the appendices of the BA. This discussion should provide ecology and life history information relevant to the specific project and its action area. Some general species-level information, such as species information on a regional or statewide scale, can provide useful background for reviewers; however, this information should be kept to a minimum. For information on species occurring in Washington State, see LISTED SPECIES IN WASHINGTON STATE: USFWS AND NMFS JURISDICTION, in CHAPTER 19.

3.2.3 Presence of Federally Designated and Proposed Critical Habitat in the Project Action Area

The project biologist must also identify whether any designated critical habitat is located in the project action area. If critical habitat PBFs are present within the action area, they too should be characterized.

In addition, a project biologist may want to include sketches of habitat types in the project vicinity, completed during a site visit, or aerial photos or maps of the project area showing locations of different habitat types. Sketches are particularly useful for identifying subtle in-channel habitat variations that may not be readily apparent in a photograph.

Discussion of essential fish habitat and analysis of project impacts on essential fish habitat should be confined to a self-contained assessment included after the ESA biological assessment is concluded (see PART 2, ESSENTIAL FISH HABITAT).

3.3 Environmental Setting

The project biologist must characterize the habitat features and describe the condition of habitats used by listed species present within both the project vicinity and the project action area. In addition, the biologist should describe how these conditions have affected the status of the species and the functional condition of any physical or biological features or critical habitat features. The current condition of the habitat in the action area and the factors responsible for that condition should be discussed with appropriate supporting documentation.

The discussion of existing environmental conditions (environmental baseline conditions) should include a summary of relevant land use and past and present activities that relate to the species and critical habitats potentially occurring in the action area, as well as those impacts that directly define the action area (development areas, impervious surface area, etc.). This discussion should consider activities that could influence, or have influenced, the project area over time. The description may include information on the following topics:

- General habitat features
- General development patterns in the vicinity of the project
- Past and present uses of the lands surrounding the project area

Additional information may be provided for the following topics, if relevant to subsequent analysis:

- Wetlands
- Local topography and geomorphology
- Geology and soils
- Predominant vegetation types

A more detailed discussion of what to include in this section is provided in PART 2, ENVIRONMENTAL SETTING.

The project biologist completes an assessment of existing environmental or baseline conditions (and documents these characteristics) during a thorough review of literature, studies and existing information in the office coupled with a field review of the action area. This section of the BA should also provide a brief synopsis of the date(s) on which project biologists visited the project site, the habitat parameters that were assessed relevant to the species identified, and the methods used. This information may also appear as part of the action area discussion or in the introduction section of a BA.

3.3.1 Habitat Conditions in Action Area (Terrestrial Species and Marine Species)

If listed terrestrial species are potentially present in the project vicinity, the BA should assess and describe in detail the relevant habitat characteristics essential to the species occurring within the action area (e.g., foraging habitat, nesting habitat, prey availability overwintering areas, and

perch trees). The existing environmental conditions within the action area and specific species analysis area should be identified and discussed in relation to the status of the species as well as anticipated project impacts. Habitat characteristics relevant to designated critical habitat should also be addressed. If PBFs have been defined for a species' critical habitat, these elements should be identified, and if specific PBFs are present within the action area or could be affected by the proposed action, they should be described in detail.

If listed or proposed marine species are potentially present in the project vicinity, the BA should assess and describe in detail the relevant habitat characteristics essential to the species occurring within the action area (e.g., suitable habitat, occupied habitat, sightings, foraging habitat, forage fish spawning areas, prey concentration areas, and haul outs). The existing environmental conditions within the action area should be identified and discussed in relation to the species' status and anticipated project impacts. Habitat characteristics relevant to designated critical habitat should also be addressed. If PBFs have been defined for a species' critical habitat, these elements should be identified, and if specific PBFs are present within the action area or could be affected by the proposed action, they should be described in detail.

3.3.2 Habitat Conditions in Basin or Subbasin (Freshwater Aquatic Species)

For projects that could potentially affect listed freshwater aquatic species, the project biologist should systematically assess the environmental setting conditions or, more specifically, the pertinent aquatic habitat pathway indicators defined in the NMFS and USFWS pathways and indicators matrices (see PART 2, ENVIRONMENTAL SETTING, Tables 9-4 through 9-7). Assess all pathway indicators that relate to potential effects on listed species and critical habitat from the proposed action, including the following:

- Water quality parameters (temperature, sediment loading, chemical and nutrient contamination)
- Habitat access (physical barriers to fish passage)
- Habitat elements (substrate composition, large woody debris, pool frequency measures for salmon or bull trout, pool quality, presence of large pools, off-channel habitats, and refugia)
- Channel conditions and dynamics (width/depth ratio for salmon or bull trout, stream bank condition, floodplain connectivity)
- Flow or hydrology (change in peak/base flows, increase in drainage network due to human activities or roads)
- Watershed conditions (road density and location, disturbance history, and presence of riparian reserves)

If bull trout are present, the subpopulation characteristics in the watershed must be assessed, and the assessment of species and habitat conditions must be integrated (i.e., will anticipated impacts on habitat conditions lead to species impacts?). If PBFs have been defined for a species' critical habitat, these elements should be identified, and if specific PBFs are present within the action area or could be affected by the proposed action, they should be described in detail. This discussion should also describe the functional condition of these PBFs and how it relates to past and on-going activities in the action area.

An overview of this setting information should be provided in a table in the body of the BA. A summary of those pathways or indicators that will be affected by the proposed action should accompany the table in the body of the BA. Detailed description and analysis of all of the indicators and pathways and aquatic environmental setting information should be included in a BA appendix. The USFWS and NMFS matrices apply to freshwater habitats, not marine systems.

3.4 Effects of the Action

After providing project and species information in sufficient detail to define the proposed action and the potential occurrence of species in the project action area, the BA must provide an analysis of the potential effects of the project upon listed and proposed species as well as designated or proposed critical habitat. The analysis should focus on the potential of the listed species or PBFs to be exposed and what the response is expected to be.

Again, depending upon the species or critical habitat addressed in the biological assessment, the biologist may choose to organize this section of the report by terrestrial species followed by aquatic species. The Effects of the Action section presents the analysis of effects required under Section 7 of the ESA. Because consultation on essential fish habitat (EFH) is different from ESA consultation, the discussion of potential project effects on EFH should be presented in a separate document included after the ESA-related assessment has been concluded (see PART 2, ESSENTIAL FISH HABITAT).

The topics addressed in the Effects Analysis section include the following:

- Direct effects
- Potential for the project to result in injury or mortality of listed species
- Anticipated behavioral responses of species to project related impacts
- Delayed consequences
- Potential for the project to result in injury or mortality of listed species
- Anticipated behavioral responses of species to project related impacts
- Effects from Interrelated and Interdependent Actions
- Cumulative Effects

Other considerations or components of this section may include:

- Compliance with existing recovery or management plans
- Potential for the project to result in incidental take of listed species
- Potential for the project to jeopardize continued existence of proposed species or adversely modify critical habitat

For each of the project-related effects, the biologist should determine if a species or critical habitat is likely to be exposed, and identify general response to the impact, followed by a more comprehensive evaluation of its anticipated response to likely project impacts given proposed minimization measures and BMPs. This information can be summarized in the Exposure-Response matrices used to document the analytical framework underlying the discussions and conclusions contained in the BA (Table 3-2) for each listed species and designated critical habitat within the action area.

At this point in the analysis, for each project element or action, the Response to Stressor column would be completed and the Minimization Measures and/or Performance Standards columns would be revisited in order to evaluate or predict the overall effect of the activity or project element in the Resulting Effects of the Action column.

In the Effects Analysis section, the project biologist should also describe anticipated *take* (as defined under the ESA) in terms of these three factors:

- The estimated number of individuals affected
- Whether the affected individuals are adults, juveniles, or both
- How the individuals will be affected, based on the endpoints discussed

For some species, such as fish species, it is difficult or impossible to estimate the number of individuals affected, but the project biologist can address the impact in terms of space and time (e.g., all adult bull trout migrating through river mile 1 to 5 of John Doe Creek in November 2019). Construction activities that are likely to prevent reproduction, foraging during nesting, or migration to a spawning or nesting area may result in *take* of juveniles. The project biologist may be able to estimate the future number of juveniles based on historical records.

Examples of activities that are likely to affect an individual animal's ability to survive, reproduce, forage, or seek shelter include those that interfere with access to spawning grounds, shelter from predators, cold-water refuge (if the species is dependent on cold-water), or foraging habitat.

When assessing impacts on critical habitat, the project biologist addresses the PBFs outlined in the federal listing of the designated critical habitat unit. Discuss the predicted adverse effects and the extent of the effect for each individual PBF. Adverse effects can cause harm to any or all of the PBFs without reaching the level of *adverse modification*, which is equivalent to *jeopardy*. An adverse modification determination indicates that the conservation role of the critical habitat for the species would be compromised and that the critical habitat no longer retained the ability to be functionally established.

Often, BAs lack a logical, adequate analysis of whether a project will or will not cause direct effects or delayed consequences. Similarly, BAs often fail to establish whether these effects are significant or discountable. The potential for project-related adverse effects is often overlooked, particularly for projects with in-water work. For example, receiving a hydraulic project approval (HPA) permit and incorporating the conditions of the HPA into the impact minimization measures of the BA does not guarantee that there will be no adverse effect. The analysis of effects must be detailed and complete, providing enough information to substantiate the rationale underlying the project biologist's effect determination.

Deconstructing the project action into its many constituent parts will help biologists ensure that all project elements are included in their analysis. Characterizing impacts associated with each of these project elements will help ensure that all project-related impacts have been evaluated. Systematically evaluating the potential for exposure and anticipated response for each species related to each project impact will ultimately ensure a robust analysis of effects that avoids the gaps in information or rationale described above.

The analysis of effects should be completed separately for each listed species to facilitate making effect determinations for each species, to be consistent with the new WSDOT BA form, and to acknowledge that the project may affect various species differently. For example, the direct effects, delayed consequences, and cumulative effects should be analyzed for bull trout, then for marbled murrelet, then for Chinook salmon, and so on. The specific subsections included in the analysis of effects, as required under the ESA, are discussed below.

3.4.1 Direct Effects

3.4.1.1 Terrestrial Species

When examining direct effects on specific wildlife and plants, evaluate the potential for exposure by identifying and quantifying all impacts anticipated to result from construction, including but not limited to, disturbances from noise, visual impacts, vibration, and human activity during construction. If a species or designated critical habitat will “co-occur” with direct effects, then there is potential for the species or habitat to be exposed to the impact. For each species, if the potential for exposure can be established, the biologist should complete a response analysis for each applicable impact.

Some useful tools or considerations for completing the analyses are provided below:

- Injury or disturbance thresholds associated with different noise-generating/disturbance activities have been established by USFWS (2013a) for murrelets and spotted owls (refer to PART 2, CONSTRUCTION NOISE IMPACT ASSESSMENT for more information on this topic).
- Refer to the wildlife sensitive periods calendar (CHAPTER 19, WILDLIFE SENSITIVE PERIODS CALENDAR) to determine whether the project occurs during the breeding period or another sensitive period for nearby wildlife. Placing timing restrictions

on a project to avoid work during these sensitive periods can minimize or avoid direct impacts on listed species.

- Biologists may be able to correctly identify listed plants in the field only when species are in bloom (see CHAPTER 19, IDENTIFICATION WINDOW FOR THREATENED AND ENDANGERED PLANTS IN WASHINGTON STATE).

When examining direct effects on habitat for wildlife and plants, identify all habitat types (including suitable and critical habitat) in the project action area that would be affected by the proposed action. Determine whether these habitats are occupied by a listed species. Quantify impacts on habitat in and surrounding the proposed project (e.g., acreage of clearing and grubbing, cut and fill, and number of trees removed). Identify clearly whether the project will have an impact on suitable or critical habitat, or whether species will be disturbed or displaced as a result of these impacts (e.g., their behavior is affected, access to habitats is cut off, or a portion of their habitat is lost). The effects of the action on existing environmental setting should be evaluated and systematically documented.

In addition, ensure that the information in the biological assessment is consistent with the information contained in the Exposure-Response matrices that have been generated for the project.

3.4.1.2 Aquatic Species

When examining direct effects on a specific fish species, identify and quantify all impacts on aquatic systems that are anticipated and could affect the species, including but not limited to sedimentation and the extent and duration of in-water work. Determine the run timing for listed fish in the vicinity of the project by contacting the WDFW local area habitat biologist or other local experts. Impacts on fish can be minimized or avoided by conducting work outside sensitive time periods (spawning, rearing, or migration) or when fish are not present in the vicinity of the project.

Identify and quantify all impacts on aquatic habitats, which in turn could affect the species or critical habitat, including but not limited to placement of riprap (note its position in relation to the OHWM), removal of riparian vegetation, sediment disturbance, and underwater noise impacts related to pile driving. Clearly identify whether the affected habitats are critical habitats or provide habitat for important life history stages (i.e., spawning, rearing, and migrating).

The effects of the action on the environmental baseline conditions and PBFs in the project action area should be evaluated and systematically documented. If bull trout occur in the vicinity of the project, the USFWS baseline indicator checklist should be completed. If salmonids regulated by NMFS occur in the project action area, the NMFS checklist may be completed (see PART 2, ENVIRONMENTAL SETTING). When both NMFS and USFWS freshwater species are present, environmental setting conditions may be summarized in a single combined matrix.

These pathways and indicators matrices apply only to freshwater riverine areas. When evaluating marine or lacustrine systems and species, be sure to identify existing environmental conditions or PBFs in the project action area, describe them in detail and explain how these conditions relate to the species being evaluated, and document how the habitat conditions will be influenced by the proposed action.

If the project will result in beneficial direct effects, such as improvement of spawning substrate in the action area resulting from the addition of suitable spawning gravels, include a discussion of these effects in the Direct Effects section of the BA and also summarize these beneficial effects in the Project Benefits section of the BA.

Ensure that the information in the biological assessment is consistent with the information contained in the Exposure-Response matrices that have been generated for the project.

3.4.2 Delayed Consequences

This section of a BA addresses delayed consequences on species (listed or proposed), suitable habitat, critical habitat, and food resources in the vicinity of the project. Delayed consequences to each species or designated critical habitat are analyzed within the defined project action area. Delayed consequences to species and critical habitats can stem directly or indirectly from future activities related to the project or can result from effects to a prey species, physical or biological features or important habitat elements. Detailed guidance on how to address delayed consequences due to induced growth in a biological assessment is provided in this manual (see PART 2, DELAYED CONSEQUENCES).

If the project will result in beneficial delayed consequences, include a discussion of them in the Delayed Consequences section of the BA and also summarize these beneficial effects in the Project Benefits section of the BA. Beneficial effects might include improved water quality resulting from new stormwater treatment elements installed as part of a project.

In addition, ensure that the information in the biological assessment is consistent with the information contained in the Exposure-Response matrices that have been generated for the project.

3.4.3 Effects from Interrelated and Interdependent Actions/Activities

Authors often mistakenly refer to interdependent or interrelated *effects or impacts*. This section of a BA should discuss interdependent or interrelated *actions or activities* associated with the proposed project and identify the effects associated with them.

An interdependent activity is an activity that has no independent utility apart from the proposed action (50 CFR 402.02). An agency reviewer made the following comment:

Examples of interdependent actions for a timber sale include the construction, maintenance, and use of a road required to access the sale area.

An interrelated activity is an action that is part of a larger action and depends on the larger action for its justification (50 CFR 402.02). The proposed action itself can be part of a larger action, or may require additional related actions for its completion. An agency reviewer made the following comment:

Examples of interrelated activities for a timber sale include the post-timber-harvest activities such as slash burning, site preparation, planting, and brush control.

The *but-for* test can be applied to determine whether an activity is interrelated with or independent upon the proposed action under consultation. An example of an effective application of the *but-for* test that was suggested by agency reviewers is provided below:

An acre of previously vegetated land is cleared, grubbed, and graded to serve as a temporary staging area for heavy equipment used in a road construction project. The staging area would not be cleared, grubbed, and graded **but for** the road construction project.

The two excerpts below provide examples of improper application of the *but-for* test and include reviewer comments:

Easing traffic congestion, increasing traffic safety, and increasing bicycle/ pedestrian safety would not occur but for implementation of the proposed road widening project. The but-for test does not apply to the proposed project actions; it applies only to actions taken as a result of the proposed actions.

The only interrelated effect that the project may have on aquatic resources is the potential for accidental spills. 1) *There is no such thing as “interrelated effect;” proper terminology is “interrelated action or activity.”* 2) *Accidental spills and project-related pollution are direct effects on species or habitat.*

3.4.4 Cumulative Effects

For projects that will require formal consultation (i.e., that are “likely to adversely affect” a listed species) cumulative effect information should be included in the BA. However, cumulative effect information does not influence the size of the action area and is not considered in the final effect determinations for species.

There is a difference between the definitions of cumulative impacts associated with the ESA and NEPA. NEPA requires a cumulative impact analysis to address future federal, state, local, and private actions. ESA requires analysis of only future state, local, and private actions, but not federal. For a more extensive discussion, see PART 2, CUMULATIVE EFFECTS.

Under the ESA, cumulative effects are the effects of future state, local, or private (but not federal) activities (unrelated to the proposed project) that are reasonably certain to occur within the action area of a proposed project. Unlike direct effects and delayed consequences, cumulative

effects do not influence or define the limits of the action area. Rather, the action area defined by the extent of impacts from these other activities defines the geographic scope for the cumulative effects analysis.

A future activity is reasonably certain to occur if examination of economic, administrative, or legal hurdles and plans indicates that it is likely to occur; implementation of the activity need not be guaranteed. A reviewer made the following comment:

An example of an action that could be considered cumulative to the primary action is a future housing development located adjacent to the federal activity of building a highway. Care should be taken to ensure that the development would not involve federal authorization or funding.

Cumulative effects analyses are required by the ESA only for those projects undergoing formal consultation (LTAA BAs; see Table 2-1). Officially, the U.S Army Corps of Engineers defines adverse effect (LTAA) reports as *biological assessments* and NLTAA reports as *biological evaluations* or BEs (which do not require a cumulative effects analysis). However, in practice, the Corps uses these terms interchangeably.

The cumulative effects analysis does not weigh into the project's effect determination for listed and proposed species and habitats. This analysis is included in the BA for evaluation by the Services of the cumulative effects of the project upon the species as a whole.

A cumulative effects analysis should include the following:

- Provide a description of actions that are cumulative to the primary action but not related to it. Cumulative effects include the effects of future, local, state, or private activities, but not federal activities, which are reasonably certain to occur within the action area of the proposed project.
- Provide an analysis of the effects of those actions that explores the environmental results of the actions and how listed species will respond to them.
- Any research findings that are used in the analysis of the effects of an action should be cited. This adds to the credibility of the analysis.

3.4.5 Other Considerations

3.4.5.1 Compliance with Existing Recovery or Management Plans

If recovery or management plans have been established in the project vicinity that would affect the species or ecosystems in the project action area, the BA should address to what degree the project is in compliance with these plans and their management recommendations. It should be noted that the project may not be in compliance with the recovery or management plan. This discrepancy should be addressed in the Analysis of Effects section of the BA. A listing of

available recovery or management plans is provided in PART 3, INFORMATION ON LISTED SPECIES.

3.4.5.2 Potential for Project to Result in Incidental Take of Listed Species

Under the ESA (16 U.S.C. §§ 1531 et. seq.), *take* is defined as:

To harass, harm, pursue, hunt shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct.

See also PART 3, GLOSSARY AND ABBREVIATIONS.

The potential for the proposed action to incidentally *take* a listed species should be discussed in detail in the BA. A *take* analysis should quantify the number of individuals or the amount of a species' habitat (occupied or designated critical habitat) likely to be lost as a result of the proposed project. The terms and conditions of the incidental *take* statement stipulate the number of individuals of a species that may be lost. *Take* is not allowed for the entirety of a listed species' habitat or designated critical habitat. *Take* provisions for proposed species or proposed critical habitat may be given in a conference report. (Conferences are required for federal actions likely to jeopardize proposed species or adversely modify proposed critical habitat, and the results are summarized in a conference report.) The ESA does not limit or provide for the incidental *take* of listed plant species. However, listed plants are afforded some protection under the ESA in that a federal permit is required to remove, reduce population size, or possess endangered plants from areas under federal jurisdiction. A federal permit is also required for any act that would remove, cut, dig up, damage, or destroy any listed species in any other area in knowing violation of any state regulation or in the course of any violation of a state criminal trespass law.

3.4.5.3 Potential for Project to Jeopardize the Continued Existence of a Proposed Species or Result in Adverse Modification of Proposed Critical Habitat

The federal action agency must ensure that its activities are not likely to jeopardize the continued existence of proposed species or result adverse modification of proposed critical habitat.

For proposed species, the BA must analyze the potential for the project to jeopardize the continued existence of the species in relation to the impact analyses provided in the preceding sections (including direct effects and delayed consequences). This jeopardy analysis pertains to the entire species, not to individual animals. However, the provisional effect determination (i.e., NE, NLTAA, or LTAA) that accompanies the jeopardy analysis and conclusion reflects the potential for *take* of individual animals. A determination of LTAA does not necessitate a jeopardy call of *likely to jeopardize the continued existence* of a proposed species.

A clear summary statement of the impacts affecting each proposed species should be included in the Conclusion and Effect Determination section of the BA, which should accompany the final effect statement for proposed species (see PART 2, EFFECT DETERMINATION GUIDANCE). If a

project is *likely to adversely affect* (LTAA) a proposed species, a conference with the Services can be requested to secure provisional incidental *take* provisions. If the species becomes listed prior to completion of the project, the action agency would request that the formal conference be turned into a formal consultation.

In addition, if a proposed species will become listed (or a proposed critical habitat will become designated) prior to the completion of the project, a conference can be requested from the Service on NLTAA effect calls (it is not required, however). This will allow the conference concurrence to turn into a consultation concurrence upon request at the time of listing. By including proposed species in the BA, the conference process is completed in conjunction with the consultation process.

For proposed critical habitat, the BA must analyze the potential for the project to affect proposed critical habitat as well as the project's potential for adversely modifying this habitat. The effect determination conveys whether any impacts on critical habitat or physical or biological features will occur. The adverse modification determination assesses the functionality of the proposed critical habitat for the conservation of a species as a whole. As a result, an LTAA determination does not necessitate a modification determination of *destroy or adversely modify proposed critical habitat*.

A clear summary statement of the impacts affecting proposed critical habitat should be included in the Conclusion and Effect Determination section of the BA, which should accompany the final effect statement for proposed critical habitat (see PART 2, EFFECT DETERMINATION GUIDANCE). If a project is *likely to adversely affect* proposed critical habitat, a conference with the Services can be requested to secure provisional incidental *take* provisions.

The Services are available to assist the federal agency with this determination of effect. A conference can be requested for jeopardy findings on proposed species or adverse modification findings on proposed critical habitat.

3.5 Conclusions

The project biologist concludes the analysis presented in the BA and the Exposure-Response analysis matrices by summarizing the findings for each species and critical habitat addressed in the effects analysis and generating an effect determination for each species (listed and proposed) and for all critical habitat (designated and proposed) potentially affected by the proposed project.

The federal action agency formally makes the effect determination by accepting the analyses, conclusions, and effect determination(s) of the project biologist and forwarding the BA to the Services for review. The action agency may require revisions to the analysis before submitting the BA to the Services for concurrence. Three potential effect determinations may be made:

- No effect (NE)

- May affect, not likely to adversely affect (NLTAA)
- May affect, likely to adversely affect (LTAA)

An action that results in only beneficial effects on a particular species does not warrant a *no-effect* determination for that species. Such an action warrants a *may affect, not likely to adversely affect* determination and requires informal consultation. If a project will have beneficial effects accompanied by adverse effects, the appropriate effect determination is *may affect, likely to adversely affect*, and the project will require formal consultation.

A project typically has several different effect determinations, one for each of the listed species and designated critical habitats affected (e.g., a NE determination for marbled murrelet and spotted owls and an LTAA determination for Chinook salmon).

An example is provided below of a good conclusion statement for a BA that summarizes the anticipated impacts of the proposed action in relation to listed aquatic species. This statement would be followed in the BA by an effect determination:

The determination of effects for protected salmonids is contingent upon implementation of the previously identified impact minimization measures. The proposed action may have the following potential impacts on bull trout and other salmonids:

1) The installation of three rock or large woody material (LWM) stream barbs has the potential to directly disturb or harm fish within the project area (a stream barb is a line of boulders extending part way into the channel to deflect flows, minimizing bank erosion):

- ◆ Because bull trout and other salmonids (namely steelhead and coho) are known to occur in Daisy Creek, the project is proposed to occur during the WDFW-designated open work window (give exact dates) when various life forms of fish are least likely to be present in the action area.
- ◆ Rock used for barb construction will be placed individually by excavator arm rather than by dropping or end dumping to the repair site, to minimize any risk of injury to fish.

2) Stream barb installation will increase the width-to-depth ratio of the channel and cover suitable cobble and gravel substrate. These impacts are expected to adversely affect salmonid habitat, particularly juvenile rearing and adult holding areas. Only the minimum amount of rock needed to construct the barbs will be used. Aspects of the barb installation, however, will improve some setting conditions for salmonids. Barbs with incorporated LWM will reduce channel velocity and bank erosion potential. Barbs can create velocity refugia for salmonids during high water events and produce scour pools that hold rearing fish during low flow periods.

WSDOT has determined that the environmental setting in the proposed project action area will be slightly degraded by:

- ◆ A short-term increase in turbidity from stream barb construction, reopening of an old stream channel, and placement and anchoring of LWM
- ◆ An increase in the width-to-depth ratio of Daisy Creek in the vicinity of the stream barbs.

The environmental setting in the proposed project action area will be maintained by:

- ◆ Permanent stabilization of the west bank and cessation of surface and mass erosion
- ◆ The incorporation of LWM into stream barbs and along the west bank line
- ◆ Creation of low-energy refugia on the downstream side of the stream barbs during high flows.

A concluding statement such as this clearly illustrates the rationale upon which the following final effect determination has been made, and it justifies the subsequent determinations by briefly recapping relevant supporting evidence (e.g., specific information from field surveys, agency coordination, etc.). The final effect determination for bull trout in this BA states:

Considering the information referenced in this report and project information provided in the construction plans, this project merits an effect determination of **may affect** because:

- ◆ There are no barriers to bull trout usage of Daisy Creek
- ◆ In-water work will occur.

This project merits a **likely to adversely affect** determination for bull trout because:

- ◆ Individual fish could potentially be present during the proposed construction.

More detailed guidance is provided in PART 2, EFFECT DETERMINATION GUIDANCE.

3.6 Magnuson Stevens Fishery Conservation and Management Act

The Essential Fish Habitat Assessment should be placed after the ESA assessment but before the references and appendices (See CHAPTER 16 – ESSENTIAL FISH HABITAT for additional guidance and information).

3.7 Reference Citations and Appendices

The following items should be included in the reference section of the final BA or BE:

- All literature citations
- All website citations with URL information
- All personal communication citations

These reference listings should be detailed enough to enable readers to trace the information source, including author, year of publication, title, volume, publisher, city, and state. Some publications require additional information, such as edition, document series and number, sponsoring agency, program, and inclusive page numbers.

Citations for material obtained online should include the author or agency, date of publication (if evident), title or description of the information, date obtained from the internet, and internet address (URL).

Listings for personal communications should include the names of the persons providing and receiving the information, their affiliations, the nature of the communication (e.g., letter, telephone conversation, meeting, email message, or fax), and the day, month, and year of the communication.

Some informational resources may contain details on sensitive information that should not be included in a public document (e.g., nest site locations, congregation areas, or redd sites). The following resources should not be included in any section of the final BA or BE if they contain sensitive information:

- Priority habitat and species maps
- Site-specific resource maps
- Tabular data or survey results

The following items should be included in the appendices of the final BA or BE:

- Pre-BA meeting minutes
- Exposure-Response Matrices
- Photographs with photographic log describing picture content
- Simple project plans
- Survey method, protocols, or results
- Species list from NMFS, USFWS, and the Washington Natural Heritage Program
- General species life history and habitat requirement information
- The hydraulic project approval (HPA) from WDFW, if available; (if an HPA is referenced in the BA (e.g., *construction of the culvert will adhere to the conditions set in the HPA*), the HPA must be provided as an appendix to the BA

so that the Services can understand those conditions; if no HPA is available, do not reference it)

- Hydraulic report (optional)

