

For live website of the following pages, go to:

<http://www.wsdot.wa.gov/Environment/Biology/BA/BAguidance.htm>

WSDOT Biological Assessment Guidance

- [WSDOT BA Preparation Manual](#)
- [Stormwater Guidance](#)
- [Programmatic Stormwater Monitoring Approach](#)
- [Noise Assessments](#)
- [Marbled Murrelet and Spotted Owl Guidance](#)
- [Indirect Effects](#)
- [Listed Plant Consultations](#)
- [Marine Mammals Consultations](#)

If you would like to receive email updates when biological assessment guidance is added or updated, please sign up for our [BA Authors list](#) (A list for people who prepare biological assessments).

Biological Assessment Preparation for Transportation Projects - Advanced Training Manual - Version 2015

Part 1 - General Information for BA Authors

- Ch. 1 [Introduction](#) (pdf 269 kb) Feb 2015
- Ch. 2 [Understanding the Biological Assessment Process](#) (pdf 449 kb) Feb 2015
- Ch. 3 [Components of a Biological Assessment](#) (pdf 457 kb) Feb 2015

Part 2 - Guidance on Specific BA Topics

- Ch. 4 [Components of a Biological Opinion](#) (pdf 243 kb) Feb 2015
- Ch. 5 [Endangered Species Act and Mitigation](#) (pdf 226 kb) Feb 2015
- Ch. 6 [Impact Avoidance and Minimization Measures](#) (pdf 492 kb) Feb 2015
- Ch. 7 [Noise Impact Assessment](#) (pdf 1.3 mb) Oct 2015
- Ch. 8 [Action Area](#) (pdf 821 kb) Feb 2015
- Ch. 9 [Environmental Setting within the Action Area](#) (pdf 453 kb) Feb 2015
- Ch. 10 [Indirect Effects](#) (pdf 733 kb) Feb 2015

- Ch. 11 [Cumulative Effects](#) (pdf 225 kb) Feb 2015
- Ch. 12 [Effect Determination Language](#) (pdf 477 kb) Feb 2015
- Ch. 13 [Effect Determination Guidance](#) (pdf 456 kb) Nov 2015
- Ch. 14 [In-Water Work](#) (pdf 296 kb) Feb 2015
- Ch. 15 [Performance-Based, Batched, and Programmatic Biological Assessments](#) (pdf 165 kb) Sept 2015
- Ch. 16 [Essential Fish Habitat](#) (pdf 450 kb) Feb 2015
- Ch. 17 [Stormwater Impact Assessment](#) (pdf 885 kb) Feb 2015

Part 3 - Additional Resources for BA Authors

- Ch. 18 [Gathering Information for a Biological Assessment](#) (pdf 230 kb) Feb 2015
- Ch. 19 [Information on Listed Species](#) (pdf 399 kb) Nov 2015
- Ch. 20 [References](#) (pdf 179 kb) Nov 2015
- Ch. 21 [Glossary and Abbreviations](#) (pdf 182 kb) Feb 2015

Stormwater Guidance

On February 16, 2009, the Federal Highway Administration (FHWA), National Marine Fisheries Service (NMFS), United States Fish & Wildlife Service (USFWS) and the Washington State Department of Transportation (WSDOT) signed a [Memorandum of Agreement](#) (MOA) (pdf 130 kb) committing these four agencies to use a common methodology for analyzing the effects of stormwater on Endangered Species Act (ESA)-listed fish species. The methodology includes the Western Washington Highway Runoff Dilution and Loading Stormwater Model (HI-RUN Model), its user guide, and accompanying stormwater assessment guidance that is posted below. A Stormwater Impact Assessment Chapter has been incorporated into Part 3 of the WSDOT Biological Assessment Preparation for Transportation, Advanced Training Manual.

The approach is required in all biological assessments submitted by WSDOT or WSDOT Local Programs.

Note that there is a separate assessment process for Eastern Washington that does not involve the use of the HI-RUN model. Also to Note, the HI-RUN Model User's Guide and Stormwater Chapter were all updates in January 2011. Be sure you are using the most recent version.

Western Washington Stormwater Assessment Guidance

The HI-RUN Model should only be used for stormwater analysis associated with biological assessments, and should not be used as a design tool.

- [HI-RUN Questions & Answers](#) (pdf 57 kb) - June 2011
- [HI-RUN Step-by-Step Example](#) (pdf 1.75 mb) June 2011
- [HI-RUN Model](#) v. 2.0 (Excel 3.2 mb) - use with Office 2010
- [HI-RUN Model](#) v. 2.1 (Excel 2.0 mb) - use with Office 2013
- [HI-RUN Model User's Guide](#) (pdf 2.1 mb) - February 2011
- [HI-RUN User's Input/Output Guide](#) (pdf 322 kb) - March 2010
- [HI-RUN Dilution and Loading Model Documentation](#) (pdf 2.7 mb) - January, 2009
- [RIVPLUM Validation Study](#) (pdf 2.4 mb) - September 2009

Examples for Using the HI-RUN Model

- [Example - Inputs for HI-RUN Model End-of-Pipe Loading Subroutine](#) (pdf 219 kb) - April 2009
- [Example - Illustration of ESA Stormwater Effects Evaluation using Western Washington Stormwater Checklist](#) (pdf 578 kb) - April 2009

[Endangered Species Act Stormwater Design Checklist for Western Washington](#) (doc 162 kb) - January 2010

*Please download to your computer prior to use. Please contact [Marion Carey](#), if you encounter problems or errors when using the HI-RUN Model.

Eastern Washington Stormwater Guidance

- [Stormwater Water Quality Analysis Process for Eastern WA - Flowchart and Guidance](#) (pdf 53 kb) - January 27, 2009

Highway Runoff Manual Endangered Species Act [Stormwater Design Checklist for Eastern Washington](#) (doc 119 kb) - January 2010

Stormwater Whitepapers

- [Untreated Highway Runoff in Western Washington](#) (pdf 1.2 mb)
- [BMP Effectiveness Assessment for Highway Runoff in Western Washington](#) (pdf 455 kb)

- [Potential Effects Of Highway Runoff on Priority Fish Species in Western Washington](#)(pdf 1.3 mb)
- [Recent Analytical Approaches for Evaluation of Stormwater Quality Impacts](#) (pdf 552 kb)

Programmatic Stormwater Monitoring Approach

On October 30, 2009, WSDOT, FHWA, NOAA Fisheries and USFWS agreed to use a Programmatic Monitoring Approach for Highway Stormwater Runoff in Support of Endangered Species Act Section 7 Consultation in Washington State for Projects which result in “ may adversely effect” determinations on listed fish species due to the creation of new impervious surface that may result in water quality related effects to listed fish species. This approach focuses on utilizing the WSDOT NPDES permit monitoring requirements to meet stormwater monitoring needs rather than monitoring individual projects. The compiled data will be used to improve the accuracy and reliability of the current stormwater models. In addition to developing this programmatic monitoring approach, staff from WSDOT and the Services also developed standard terms and conditions that reference that approach. These terms and conditions are contained in the agreement.

FHWA funded local agency projects that are similar in scope to WSDOT projects and meet or exceed the requirements of the Highway Runoff Manual for stormwater treatment may also be able to utilize this approach.

There is no phase-in timeline for using this approach. It should be applied to any project which has utilized the HI-RUN Model as part of their stormwater analysis.

- [Programmatic Approach Agreement](#) (pdf 2.4 Mb) - June 30, 2009
- [Programmatic Monitoring Approach for Highway Stormwater Runoff in Support of Endangered Species Act \(ESA\) Section 7 Consultation](#) (pdf 54 kb) - January 2010

[↑ top](#)

Indirect Effects Stormwater Runoff Analytical Method

On April 14, 2011, WSDOT, FHWA, NOAA Fisheries , USFWS and WSDOT signed a MOA committing these four agencies to use the Indirect Effects Stormwater Runoff Analytical Method in consultations which have development identified as in indirect effect of a transportation project. This analytical method is intended to evaluate water quality impacts associated with stormwater runoff from development identified as an indirect effect of transportation projects The method serves as an

addition to the guidance issued on June 17, 2009 titled *Endangered Species Act (ESA), Transportation and Development; Assessing Indirect Effects in Biological Assessments*. All WSDOT BAs submitted after June 14, 2011 and all Local agency projects submitted after October 14, 2011 are required to use this method for analyzing the water quality impacts associated with stormwater runoff associated with development identified as an indirect effect of transportation projects.

- [Indirect Effects Stormwater Runoff Analytical Method Memo](#) (pdf 60 kb)
- [Indirect Effects Stormwater Runoff Analytical Method Agreement Letter](#) (pdf 58 kb)

Noise Assessment Guidance

Thresholds

The tables below provide summary information on marine mammal, fish, and marbled murrelet injury and disturbance thresholds for impact pile driving, and estimated auditory bandwidths (estimated hearing frequency ranges) for marine mammals and fish.

- [Marine Mammal and Fish Injury and Disturbance Thresholds for Marine Construction Activity](#) (excel 17 kb)
- [Estimated Auditory Bandwidths for Marine Mammals and Fish](#) (pdf 9 kb) - April 2009
- [Airborne Vibratory Noise information](#) (pdf 936 kb) - June 2010
- [Marbled Murrelet Effects Thresholds](#) (pdf 73 kb) - February 2014
- [Interim Criteria for Injury to Fish](#) (pdf 793 kb)

On November 19, 2013, WSDOT hosted a USFWS presentation that introduced marbled murrelet in-air noise masking guidance for marine water pile driving projects. The supporting white paper is anticipated to be released by the USFWS in the near future. The USFWS is using this guidance in marine pile driving consultations.

- [Marbled Murrelet Masking Analysis](#) (pdf 4.46 mb) - November 2013

Calculators

An Hydroacoustic Workshop addressing the fish noise exposure criteria was held on August 11, 2008. The National Marine Fisheries Service's provided a calculator for calculating the distance to the new thresholds for fish.

- [NMFS Calculator](#) (excel 47 kb)

USFWS has created an excel spreadsheet calculator that assists in determining when and to what distance sound pressure levels generated by impact pile driving projects exceed the thresholds.

- [Murrelet and Bulltrout Threshold Calculator](#) March 3 2014 (excel 37 kb)

Pile Driving Information

The tables below provide information on the typical number of pile strikes for steel piles, peak sound pressure levels and sound exposure levels for various sizes and types of piles. The data in these tables can be used to estimate sound pressure and cumulative sound exposure levels (SELcum) for various pile diameters and types. [WSDOT Pile driving monitoring reports](#) can help with site specific information for projects in the same or similar areas. The link to the [CalTrans Pile Driving Compendium](#) is also provided for comparison.

- [Pile Strike Summary Tables](#) (pdf 35 kb)
- [Pile Diameter and Noise Levels](#) (pdf 13 kb)

Agreements

On February 28, 2012, WSDOT, FHWA, and USFWS signed a [MOA](#) agreeing to use new criteria that identify the onset of injury to marbled murrelets from underwater sound pressure levels associated with impact pile driving. All WSDOT and local agency BAs submitted after April 28, 2012 are required to use these new criteria.

As a result of a [multi-agency agreement](#) (pdf 793 kb), fish noise exposure interim criteria was implemented beginning October 1, 2008. All WSDOT projects with pile driving activities that may impact fish are required to use this criteria when assessing potential impacts to fish.

Research Documents

- [Effects of Human-induced Sound on Fish](#) (pdf 166 kb) - Popper & Hastings, 2009
- [Effects of Anthropogenic Sources of Sound on Fish](#) (pdf 612 kb) - Popper & Hastings, 2009
- [Injury of Fish Exposed to Pile Driving](#) (pdf 160 kb) - Popper et al. 2006
- [Effects of Sound on Fish](#) - Hastings & Popper, 2005

Additional Acoustical Resources

- [CalTrans Fisheries - Bioacoustics](#)
- [NOAA Fisheries Acoustics Program](#)
- [NOAA Fisheries Ocean Acoustics](#)
- [Sound in the Sea](#)
- [NOAA's Underwater Acoustics Tutorial](#)
- [Greeneridge Sciences, Inc.](#)

[↑](#) [top](#)

Terrestrial Noise Assessment

Use the information in Chapter 7 of the BA Preparation for Transportation Projects Advance Training manual to help determine the appropriate decibel levels for ambient noise, traffic noise and construction noise.

Marbled Murrelet and Spotted Owl Guidance

The U.S. Fish and Wildlife Service (USFWS) has redefined the marbled murrelet nesting season. In brief, the nesting season has been extended for one week, and it is no longer divided into an early and late season, but is considered a single season. Using data from 137 nests from southern British Columbia to northern Oregon, the nesting season of marbled murrelets in Washington is defined as the period from April 1 to September 23 (the previously defined nesting season was April 1 to September 15). USFWS will still be applying the limited operating period (LOP) of two hours after sunrise to two hours before sunset to facilitate murrelet protection during the nesting season.

After September 4, the potential to encounter a murrelet during the implementation of a single action may be extremely low. It may therefore be feasible, with implementation of an LOP, to justify that the risk of exposure of murrelets is discountable after September 4. Factors that could support a discountable determination during this time period include low quality habitat, and type and duration of activity. In short, proposed construction after September 4 with an LOP in effect will not automatically result in a Not Likely to Adversely Affect (NLTA) determination.

They implemented this new definition in 2013. In 2012, the USFWS implemented a definition of marbled murrelet nesting habitat based on the presence of potential nest platforms. All BAs that are submitted to the USFWS must use these new definitions.

- [Marbled Murrelet Nesting Season and Analytical Framework for Section 7 Consultation in Washington](#) (pdf 838 kb) - June 2012

- [Guidance for Identifying Marbled Murrelet Nest Trees in Washington State](#) (pdf 385 kb) - April 2012

In 2015, the USFWS issued a programmatic Biological Opinion for WSDOT activities. The BO establishes harassment/injury distances for noise-generating activities specific to marbled murrelets and northern spotted owls that replaces the 92 dBA threshold with the distance thresholds. The standard threshold distances described in the BO can be used as a tool to assist the biologist in making effect determinations on typical transportation projects.

It is important to note that the BO is only applicable for use in certain situations because it was developed for a specific program of activities. The threshold and effect distances were determined after factoring a suite of activities and minimization measures specific to the project. The following appendices to the BO are relevant to marbled murrelets and northern spotted owls.

- [Marbled Murrelet Site Evaluation and Effect Determination Guidance](#) (pdf 786 kb)
- [Spotted Owl Site Evaluation and Effect Determination Guidance](#) (pdf 1.2 mb)

Indirect Effects Guidance

On June 17, 2009, the USFWS, NOAA Fisheries Service, FHWA and WSDOT entered into an agreement to use the 2009 Indirect Effects Guidance in the completion of biological assessments. All WSDOT projects are required to use this guidance.

This 2009 Indirect Effects Guidance supersedes the previous version of the guidance (2003 Indirect Effects Guidance).

- [Indirect Effects Guidance Memorandum of Agreement](#) (pdf 2.3 mb) - June 2009
- [ESA Indirect Effects Guidance](#) (pdf 124 kb) - May 2009
- [ESA Indirect Effects Flowchart](#) (pdf 23 kb) - May 2009

Consulting on Listed Plants

WSDOT has developed this [brief guidance](#) (pdf 27 kb) to facilitate consultations related to listed plants. For help on identification of plant species and their habitats, the Washington State Department of Natural Resources' Natural Heritage Program and the Spokane District of the U.S.D.I. Bureau of Land Management prepared a [Field Guide to Selected Rare Plants of Washington](#).

Marine Mammal ESA Consultations

The [National Marine Fisheries Service Marine Mammals](#) Section 7 Consultation tools explain the relationship between the Endangered Species Act and the Marine Mammal Protection Act, effects of noise on marine mammals, sound threshold guidance, and other related topics.



[top](#)