WASHINGTON STATE DEPARTMENT OF Natural Resources

U.S. FISH & WILDLIFE SERVICE

The Analytical Framework

Focus Paper #1

Note: This is the first of a series of focus papers that explain key concepts used to develop alternatives for the marbled murrelet long-term conservation strategy. Additional focus papers will become available in November 2015.

The purpose of this paper is to describe the framework of assumptions agreed to by DNR and USFWS to guide the development and evaluation of the marbled murrelet long-term conservation strategy.

What is the analytical framework?

The analytical framework is a methodology agreed upon by DNR and the U.S. Fish and Wildlife Service (USFWS), also referred to as the "Joint Agencies," to provide objective, repeatable, science-based estimates of potential impacts and mitigation to marbled murrelet habitat from DNR's land management activities under the Habitat Conservation Plan (HCP). The analytical framework provides the means to assess how DNR's mitigation measures cover potential impacts. This quantification will enable the Joint Agencies to evaluate whether a proposed conservation strategy meets the issuance criteria for the Incidental Take Permit.

The analytical framework is based on a principal hypothesis of murrelet conservation biology: the quantity and quality of nesting habitat affects the murrelet population.[1] The interaction of habitat quantity and quality determines the overall number of nesting opportunities, and proximity to forest edges[2] reduces nest success (USFWS 1997). This framework is based in current murrelet science, and makes use of detailed landscape data applicable to DNR lands. The analytical framework provides a means to derive objective answers to questions that the Joint Agencies began asking when discussing the specifics of forming a long-term conservation strategy for the murrelet. These questions included:

- How is habitat distinguished from non-habitat?

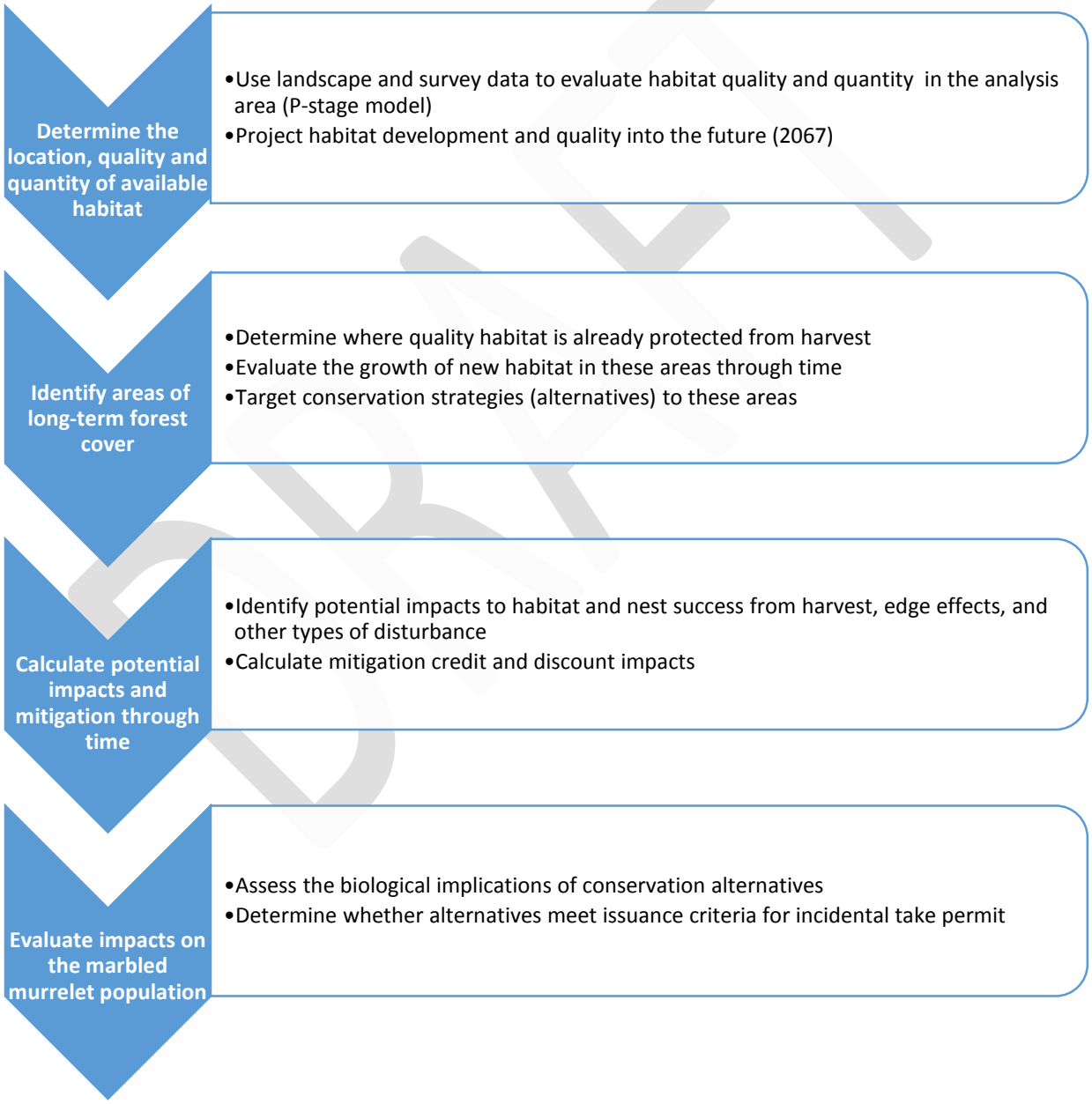
[1] See "Report on Marbled Murrelet Recovery Implementation Team Meeting and Stakeholder Workshop" April 2012. USFWS.

[2] A "forest edge" is an abrupt transition between two populations of trees, where the characteristics of the forest on one side are different from the other.

- How does stand structure and composition affect habitat quality?
- How do forest edges created by timber harvest and forest roads influence habitat quality?
- How does habitat quality influence its value to murrelets?
- How can impacts to habitat be quantified?
- How much habitat conservation meets the requirements of an HCP?

The analytical framework also includes an approach to evaluating impacts on the population of marbled murrelets under different conservation alternatives (a "biological implications" analysis). Figure 1 illustrates the key pieces of the framework.

Figure 1. Key Pieces of the Analytical Framework



What is the analysis area for the analytical framework?

The analysis area for the analytical framework is all DNR-managed lands within 55-miles of all marine waters in western Washington. This 55-mile line is the same as was used in Northwest Forest Plan (USDA, 1994), and is used by USFWS as an estimate of the inland range of the marbled murrelet in Washington.

The total land covered by the analysis area is approximately 16 million acres. DNR manages 9% of this land, or just over 1.3 million acres. DNR organizes its habitat conservation based on ecological units called "HCP Planning Units", including Olympic Experimental State Forest (OESF), Straits, South Coast, Columbia, North and South Puget. (See Figure 2.) Other lands within the analysis area are owned and managed by private industries, municipalities, organizations and individuals, as well as federal agencies. Table 1, below, includes a breakdown of ownership within the analysis area.

Figure 2. Analysis Area for the Analytical Framework

Not all of the lands owned and managed by DNR within the analysis area are marbled murrelet habitat. A key component of the analytical framework is defining what constitutes marbled murrelet habitat on DNR's lands so that conservation strategies, impacts, and mitigation can be evaluated.

Table 1. Land Ownership within Analysis Area

Land within 55 miles of saltwater	Acres	
Total land regardless of ownership	16,056,074	
	Acres	**Percent**
US Forest Service, USFWS, National Park Service land	4,165,681	26%
DNR land	1,377,933	9%
Private and Other	10,512,460	65%

How is habitat defined in the analytical framework?

In order to quantify potential mitigation and impacts, the Joint Agencies need to determine where habitat exists today and into the future on DNR's lands within the analysis area. The approach to assessing potential marbled murrelet habitat was arrived at after constructing a probabilistic model to estimate nesting habitat using survey data and then developing an expert-driven classification of this probabilistic model to give it greater geographical applicability. This classification model, known as "P-stage," was created and peer-reviewed as part of the Science Team Report (Raphael and others 2008), and is refined for use in the long-term strategy. By using this model, the Joint Agencies can:

- Project habitat development into the future, allowing an estimate of how much habitat will grow during the remainder of the HCP;
- Identify habitat and classify its quality at the stand level;
- Use information compatible with DNR's forest inventory data;
- Apply the same habitat model across all DNR-managed lands in the analysis area.

Focus Paper #3, "Estimating the Location and Quality of Stands of Marbled Murrelet Habitat," details the P-stage methodology and how it compares to other habitat models.

What are areas of Long-Term Forest Cover?

The analysis area includes lands already protected by the multi-species HCP in place for DNR trust lands, or other state laws and policies that guide the management of forest lands. Areas of long-term forest cover (LTFC) include lands where DNR maintains and grows forest cover for conservation purposes, including habitat conservation for the marbled murrelet. These areas potentially provide marbled murrelet nesting habitat and support their conservation. The location, size, and quality of these areas will vary among the conservation alternatives being developed. Focus Paper #2, "Areas of Long-Term Forest Cover," gives a detailed description of what lands are included in LTFC.

How are potential impacts defined in the analytical framework?

Based on an assessment of activities that are permitted under DNR's Habitat Conservation Plan, the Joint Agencies identified three categories of potential impacts as **harvest impacts, edge-influenced impacts,** and **disturbance impacts**. These three types are briefly described below; for additional detail on how each type quantifies potential impacts, see Focus Paper #5, "Potential Impacts and Mitigation."

What are harvest impacts?

Harvest impacts result in the removal of potential marbled murrelet habitat (acres with P-stage value) through harvest activities. Harvest mostly occurs in areas outside of LTFC (some thinning may be allowed within LTFC for purposes of improving forested habitats over time). New road construction associated with harvest is another impact. The effects on the marbled murrelet from harvest impacts include possible loss of nesting habitat and loss of potential future reproduction.

What are edge-influenced impacts?

Edge-influenced impacts are associated with the forest edge left after harvest activities. Roads also create edges. Edge effects include microclimate changes, increased predation, and increased windthrow. Each of these effects can have a detrimental impact on marbled murrelet nest success.

What are disturbance impacts?

Disturbance impacts are effects on murrelets that may occur from actions that generate loud noises and activity in close proximity to nesting murrelets. These types of disturbances can result in a potential disruption of murrelet breeding and nesting behaviors.

The Joint Agencies identified 36 DNR activities that may cause disturbance. Examples are:

- Recreational site use
- Sand and gravel sales
- Electronic site maintenance
- Road use and maintenance
- Collection of western greens, Christmas greens, and mushrooms.

A step-by-step description of how disturbance impacts are evaluated is included in Focus Paper #5, "Potential Impacts and Mitigation."

How is mitigation defined in the analytical framework?

To quantify mitigation the Joint Agencies examine how many acres of long-term forest cover have a P-stage habitat value today and at the end of the HCP in 2067. Habitat values are adjusted based on time, edge effects, and other factors including geographic location. DNR's mitigation credit is calculated by subtracting current habitat from the future habitat in order to assign mitigation credit to total growth of habitat over the life of the HCP.

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The alternatives that the Joint Agencies will build will feature different levels of conservation area acreage; this variation will accordingly alter the amount of mitigation credit and the potential impacts. A description of how mitigation credit is calculated is included in Focus Paper #5, "Potential Impacts and Mitigation."

How does the analytical framework relate to the development and analysis of conservation alternatives?

Development of the long-term conservation strategy includes an analysis of different alternatives for managing and protecting murrelets on DNR's trust lands. Five alternatives have been developed for analysis under a draft Environmental Impact Statement (DEIS). The alternatives represent a range of possible habitat conservation approaches for the murrelet.

The analytical framework provides the common playing field for analyzing and comparing these alternatives. For example, although management approaches and amounts of habitat set aside for conservation may differ among alternatives, the same methodology to evaluate their potential impacts will be applied across all alternatives.

Evaluating population impacts

DNR provided the habitat data used in the development of alternatives to Dr. Zach Peery of University of Wisconsin to evaluate the biological implications of different conservation approaches. He modeled relative impacts to the population (both regionally and on DNR lands) from each alternative. This information will be used as part of the environmental impact statement work evaluating the alternatives, and may be used by USFWS for their biological opinion on the conservation strategy.

Literature Cited

Raphael, M. G., S. K. Nelson, P. Swedeen, M. Ostwald, K. Flotlin, S. Desimone, S. Horton, P. Harrison, D. P. Escene and W. Jaross. 2008. Recommendations and Supporting Analysis Marbled Murrelet Science Report Recommendations (Science Team Report) Washington State Department of Natural Resources

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Note: The focus papers referenced in this draft will be made available November 2015.