

Long-term Forest Cover Focus Paper



Areas of Long-Term Forest Cover | Focus Paper #2

This focus paper was part of a series presented to the Board of Natural Resources in October and November 2015 to inform development of the marbled murrelet long-term conservation strategy alternatives.

■ Introduction

Evidence from most research on marbled murrelet nesting ecology supports the murrelets' requirement for complex-structured forests with large trees. These trees provide large, moss-covered limbs that become nesting platforms. Other research identifies impacts from timber harvest on the availability of nest sites, and on nest success due to increased predation on eggs and nestlings near forest edges. Murrelets therefore rely on conifer-dominated forest stands with large interior areas and high numbers of large, old trees. Forest stands with these characteristics provide nesting opportunities, contain limited amounts of edge, and provide cover from predators and adverse weather (Ralph and others 1995, cited in McShane and others 2004). These types of forest stands can be found on DNR-managed lands within the range of the marbled murrelet. In many cases, these stands are already designated by existing DNR policy to provide conservation benefits. The marbled murrelet long-term conservation strategy identifies forest lands that will be managed as areas of long-term forest cover (LTFC), which may have current murrelet habitat or have the capability to develop into the types of structurally complex forests needed for nesting by the murrelet. These areas will be managed to maintain forest cover over the life of the *State Trust Lands Habitat Conservation Plan* (1997 HCP).

■ How Do DNR-managed Forest Lands Contribute to Marbled Murrelet Conservation?

DNR-managed forest lands are subject to several laws and DNR policies guiding their management. The following documents have the most direct impact on how forests are managed for purposes of marbled murrelet conservation:

- The 1997 HCP, a 70-year agreement between the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Services (the Federal Services) and DNR, describes a set of management strategies that DNR employs to offset any incidental take caused to individual listed animals, and promotes conservation of the species as a whole. The 1997 HCP was amended in 2004 for the Klickitat HCP planning unit to better implement northern spotted owl habitat conservation strategies.¹ The 1997 HCP included an interim strategy for marbled murrelet conservation. In addition, concurrence letters between DNR and USFWS further specified procedures for identifying and protecting marbled murrelet habitat in the North Puget (2007) and South Puget (2009) HCP planning units.
- The 2006 *Policy for Sustainable Forests* contains the vision of the Board of Natural Resources and DNR for the management of current and future forests on state trust lands. Policies are specifically designed to achieve DNR's fiduciary responsibilities by generating revenues for trust beneficiaries, while meeting DNR's obligations under the 1997 HCP.

The analysis area for the marbled murrelet long-term conservation strategy includes just over 1.38 million acres of DNR-managed lands.² These lands are managed for multiple objectives including timber production, conservation, and recreational and resource land uses. With such a large area and variety of land types and land uses, the development of a long-term conservation strategy takes advantage of a landscape-planning approach to conservation.

DNR collects and maintains information on the forest lands it manages. These data are used to determine where, when, and how timber harvest is likely to happen, as well as where on the landscape forests are likely to be maintained and/or conserved over time. For example, some forest stands may be deferred from harvest because they are designated as existing old-growth forests, or serve as gene pool reserves for native trees species. Areas also may be deferred from harvest due to slope stability issues or other local knowledge of ecologically, socially, or culturally important areas. Other forest areas may be managed to maintain forest cover or certain forest structural conditions to achieve wildlife habitat objectives for species covered by the 1997 HCP (including the northern spotted owl, salmonids, and other aquatic and riparian-obligate species). DNR also manages lands under the state Natural Areas Preserves Act, which dedicates natural areas (including natural resource conservation areas and natural area preserves) in perpetuity for education, scientific research, and conservation of native biological diversity. Together,

¹ Washington State Department of Natural Resources. 2004. HCP Amendment No. 1, Administrative Amendment to the Northern Spotted Owl Conservation Strategy for the Klickitat HCP Planning Unit, April 2004.

² Refer to Appendix B, "Analytical Framework Focus Paper," which describes the analysis area in more detail.

these lands are managed to maintain forest cover³ for conservation and provide the building blocks for a landscape approach to the marbled murrelet long-term conservation strategy.

The long-term conservation strategy defines these areas as LTFC, which may provide potential nesting habitat for marbled murrelet or insulate that habitat from impacts from forest management activities, both now and in the future. This approach implements a key objective of the long-term conservation strategy.⁴

■ What Are Areas of LTFC?

Areas of LTFC can be found throughout DNR’s managed forest landscape. These areas are defined and mapped using GIS information from DNR’s databases.⁵ Areas of LTFC come in various shapes and sizes, and when in a strategic location and suitable habitat condition, provide nesting opportunity for the marbled murrelet.⁶ LTFC includes the following types of lands:

- Natural area preserves
- Natural resource conservation areas
- High quality⁷ northern spotted owl habitat (all alternatives), high *and* low quality northern spotted owl (Alternative F only)
- Riparian management zones
- Wetlands
- Areas of slope stability concern
- Gene pool reserves
- Old-growth forests
- Local knowledge of ecological/social and culturally important areas
- Marbled murrelet occupied sites⁸
- Areas specifically designated for marbled murrelet conservation in strategic locations under each of the alternatives

³ “Forest cover” as used here refers to a relatively closed canopy structure, which may provide cover, security and potential nesting habitat to marbled murrelets.

⁴ Refer to Objective #2 of the long-term conservation strategy: “Provide forest conditions in strategic locations on forested state trust lands that minimize and mitigate incidental take of marbled murrelets resulting from DNR’s forest management activities. In accomplishing this objective, DNR and USFWS expect to make a significant contribution to maintaining and protecting marbled murrelet populations.”

⁵ DNR large data overlay, 2015.

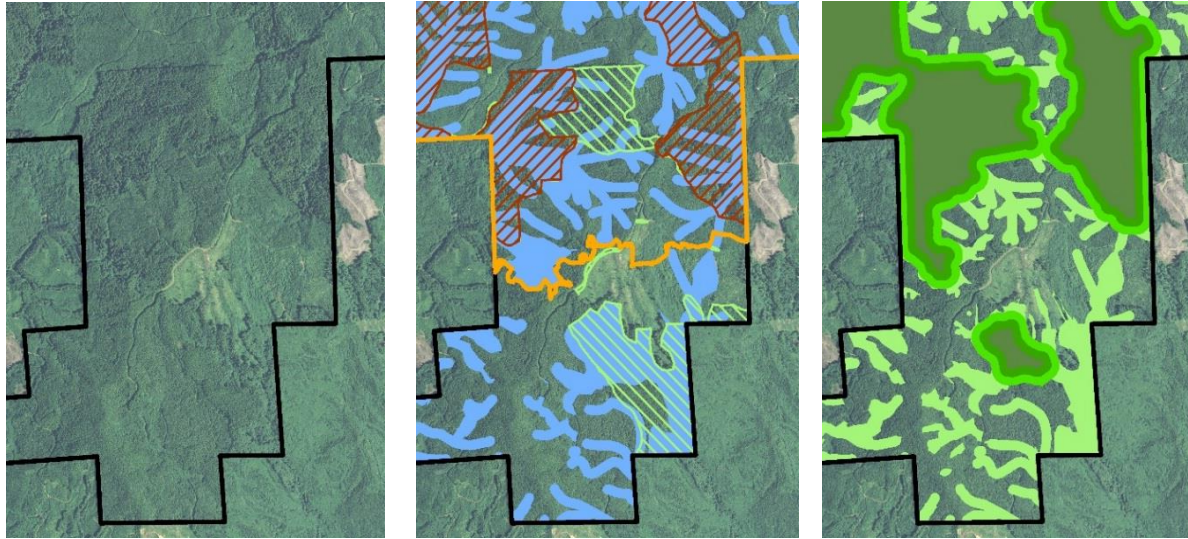
⁶ Refer to Objective #2 of the long-term conservation strategy: “Provide forest conditions in strategic locations on forested state trust lands that minimize and mitigate incidental take of marbled murrelets resulting from DNR’s forest management activities. In accomplishing this objective, we expect to make a significant contribution to maintaining and protecting marbled murrelet populations.”

⁷ Existing northern spotted owl high-quality habitat refers to the following DNR mapped habitat classes as of 2018: old forest, high-quality nesting habitat, and A and B habitat per the definitions in the 1997 HCP (DNR 1997, p. 12).

⁸ Refer to Appendix D, “Occupied Sites Focus Paper.”

Layered together (as illustrated in Figure G-1), these areas create blocks of land that contribute to marbled murrelet conservation, if the structure and complexity of the forest within provides nesting habitat and security from predation.⁹

Figure G-1. Layering Data to Map Areas of LTFC



Block of DNR-Managed Land

Occupied sites, riparian zones, other protected areas

Areas layered together to form LTFC (interior forest in darkest green, edges in lighter greens)

The boundaries of some categories of LTFC are precisely mapped in DNR databases. Examples include gene pool reserves, natural area preserves, and natural resource conservation areas. These boundaries are not expected to change throughout the life of the 1997 HCP. Other categories of LTFC are not precisely mapped but are approximated until field inspections can more accurately define correct boundaries. LTFC associated with riparian areas, wetlands, and unstable slopes are examples for which the boundaries may be adjusted when site-specific information becomes available. Although the exact location of LTFC associated with riparian areas can change with field verification, the total acres of LTFC associated with these deferrals is a reasonably accurate estimate of the total LTFC expected to be retained on the landscape.

⁹ The varying quality of the habitat found within LTFC is analyzed using a mathematical model, described in Appendix E, “P-stage Focus Paper.”

■ How Does LTFC Provide Nesting Security to Murrelets?

LTFC is assumed to conserve habitat by protecting current and potential nest sites from harvest and other land uses in the managed forest. The shape and amount of interior forest patches within LTFC is a critical factor in nesting success and security. Forest edges created from harvest or other types of openings (for example, roads) impact this security. LTFC can be classified into one of three forest zones that support varying levels of marbled murrelet conservation. These zones are influenced by the condition of the adjacent managed forest, which is characterized as “hard-edged,” “soft-edged,” or “no-edge.” In addition, some areas, referred to as “stringers” (described later in this section), are linear in nature and do not include any interior forest. Beyond these areas is the actively managed forest, where most of the harvest and related activities occur.

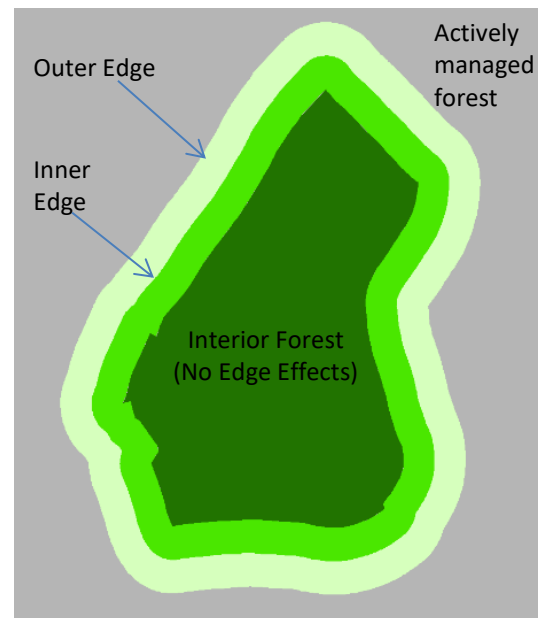
Interior Forest

The interior forest (Figure G-2) is comprised of forested area (patch) that is at least 100 meters from any type of edge. These interior areas are protected from effects associated with harvest edges. Edge effects include changes in microclimate (such as decreasing humidity), windthrow, changes in vegetative species such as reduction in epiphyte¹⁰ presence, and increased risk of predation (Nelson and Hamer 1995, McShane and others 2004, Van Rooyen and others 2011). Further, impacts to murrelets from disturbance (loud noise and activity that can interrupt breeding and nesting behaviors) is reduced in the interior forest portions of LTFC. (Refer to Appendix H, “Potential Impacts and Mitigation Focus Paper,” for a detailed description of edge effects.)

Outer Edge

The outer edge of the interior forest patch is located between 0 to 50 meters from the edge of an actively managed forest (Figure G-2). Because this area is adjacent to the actively managed forest, edge effects are more pronounced in the outer edge.

Figure G-2. Conceptual Illustration of an Area of LTFC and Edges



¹⁰ Plants that grow on the surface of other plants, such as moss.

Inner Edge

The inner edge (Figure G-2) is a forested area located 51 to 100 meters from the edge of the actively-managed forest and adjacent to the interior forest patch. The literature indicates that the edge effects from the actively managed forest extend further than 50 meters into the stand, but diminish until there is minimal effect after 100 meters from the managed area (Burger and others 2004).

Hard, Soft, and no Edges

Depending on the age and height of the trees in the actively managed forest, edges can be characterized as either “hard” or “soft.” Hard edge effects extend through the outer and inner edges, and occur when the actively managed forest is comprised of young stands (0 to 20 years old) that are expected to be generally less than 40 feet high. Higher risk of nest predation, and increased microclimate and windthrow effects are all associated with hard edges.

Soft edges are characterized by managed forest stands that are expected to be generally 20 to 40 years old and 40 to 80 feet high adjacent to long-term forest cover.¹¹ At this stage, interior forest and the outer and inner edges are less affected by predation risk, and microclimate and windthrow effects still factor into edge impacts, but to a lesser degree. Trees in the managed forest that are beyond 40 years of age and 80 feet in height are assumed to have minimal edge effects to the interior forest patch, and therefore are not counted as edge under the analytical framework.

DNR can assess the edge conditions of managed forest lands in the analysis area using forest inventory and GIS data. This information is used to determine potential impacts to murrelet habitat from forest edges, and to calculate necessary mitigation (refer to Appendix H, “Potential Impacts and Mitigation Focus Paper”).

Roads as Edges

New and existing forest roads (logging roads) also create edges. Depending on their location relative to murrelet habitat, and whether they are actively used or are undergoing transition back to forest, roads have effects similar to other hard or soft edges. Roads can attract corvids and affect microclimate. (Refer to Appendix H, “Potential Impacts and Mitigation Focus Paper” for a discussion on how roads and other edges impact habitat and mitigation values.)

Stringers

Areas mapped as long-term forest cover using GIS will show large and small blocks of LTFC, as well as some narrow strips of land. These narrow strips are termed “stringers.” Stringers are defined as areas less

¹¹ The tree height and age associations described here are generalized, and may vary somewhat across the landscape depending on site conditions.

than 200 meters wide (predominately riparian management zones) where adjacent uplands have not been designated as long-term forest cover. Stringers do not have interior forest. Stringers are considered part of LTFC; however, they are not assigned credit for mitigation under the conservation alternatives.

Areas Outside LTFC

Forest lands outside of LTFC are managed for harvest to meet DNR's fiduciary responsibilities to the trust beneficiaries. These forest lands are part of the actively managed forest.

■ How Does LTFC Differ Across the Conservation Alternatives?

DNR and USFWS developed alternative approaches to long-term marbled murrelet habitat conservation. These alternatives are evaluated using a common analytical framework.¹²

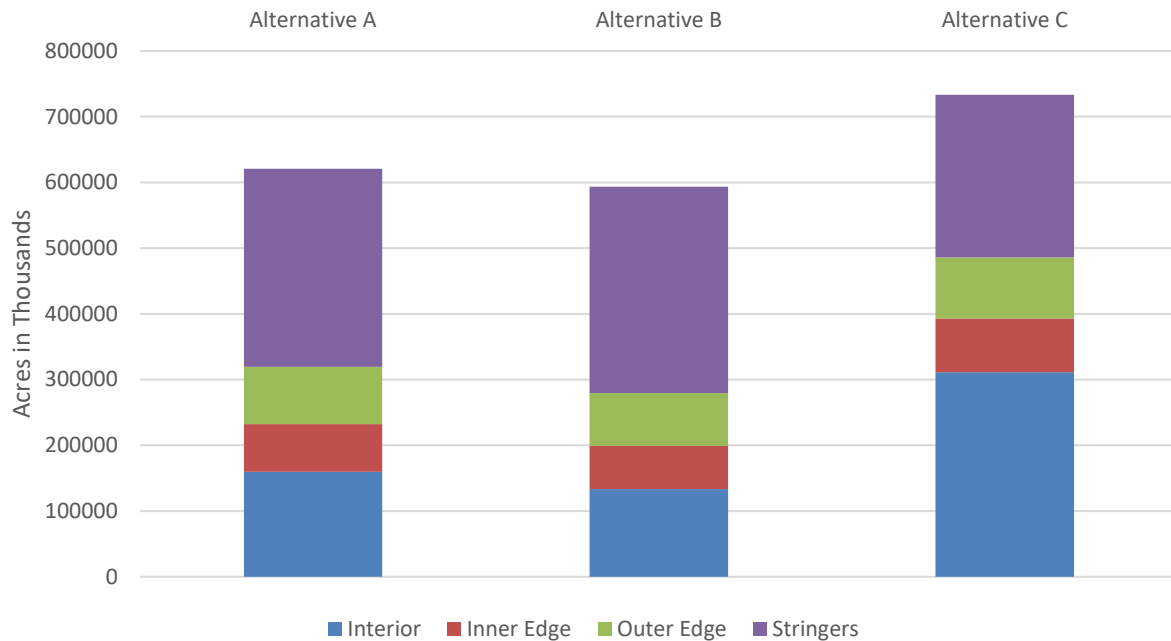
Designating areas of LTFC under each alternative allows potential impacts to be quantified, mitigation to be calculated,¹³ and conservation benefits to be evaluated. The amount and composition of LTFC varies among alternatives (refer to Figure G-3 for an example). The proportion of interior forest to outer and inner edges may vary, or the conservation areas that are included may be different.

These differences in composition mean that the geographic extent of LTFC (how much of, and where, on the landscape it is located) will differ among alternatives. All LTFC is intended to provide conservation benefit to the murrelet. However, the conservation value of one area of LTFC may be higher or lower than another, depending on its relative habitat quality, its location relative to occupied sites or marine populations, and other factors. The analytical framework takes these factors into account when calculating potential impacts and mitigation through the life of the 1997 HCP.

¹² Refer to Appendix B, "Analytical Framework Focus Paper."

¹³ Refer to Appendix H, "Potential Impacts and Mitigation Focus Paper."

Figure G-3. How the Amount and Composition of LTFC May Differ Across Alternatives; Data for Illustration Purposes Only (does not reflect the actual alternatives)



How Will Areas of LTFC be Managed for Purposes of Marbled Murrelet Conservation?

Although the exact make-up of LTFC may differ among conservation alternatives, the management objective of LTFC is the same under every alternative: to provide LTFC. Forest stands within areas of LTFC that have murrelet habitat characteristics, or that have the potential to develop murrelet habitat characteristics, will be conserved over the life of the 1997 HCP. No major harvest activities will be allowed within LTFC. The conservation alternatives being developed may allow some thinning or habitat enhancement within areas of LTFC, consistent with the underlying conservation objectives. For example, riparian areas within LTFC may be thinned consistent with DNR’s Riparian Forest Restoration Strategy. Management of non-timber harvest land uses will also be addressed under the alternatives.

Stands within interior areas of LTFC that have marbled murrelet habitat characteristics, or that have the potential to develop those characteristics, will be protected from potential impacts from harvest, edge effects, and other types of disturbance.

Management will be consistent with the conservation objective that the quality and quantity of habitat within areas of LTFC is expected to improve as forest stands mature. Mature stands that do not currently have murrelet habitat characteristics will also have the potential to develop into habitat over the life of the 1997 HCP.

Literature Cited

- Burger, A. E. and V. Bahn. 2004. Inland habitat associations of Marbled Murrelets on southwest Vancouver Island, British Columbia. *Journal of Field Ornithology* 75:53-66.
- McShane, C.; T. Hamer, H. Carter, G. Swartzman, V. Friesen, D. Ainley, R. Tressler, K. Nelson, A. Burger, L. Spear, T. Mohagen, R. Martin, L. Henkel, K. Prindle, S. Strong, and J. Keany, J. 2004. Evaluation report for the 5-year status review of the marbled murrelet in Washington, Oregon, and California. [EDAW, Inc., Seattle, WA]. Unpublished report. On file with: USDI Fish and Wildlife Service, Pacific Region, 911 NE 11th Ave., Portland, OR 97232.
- Nelson, S. Kim and T.E. Hamer. 1995. Chapter 8: Nest success and the effects of predation on marbled murrelets. *In*: Ralph, C. John; Hunt, George L., Jr.; Raphael, Martin G.; Piatt, John F., Technical Editors. 1995. Ecology and conservation of the marbled murrelet. Gen. Tech. Rep. PSW-GTR-152. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; p. 89-98.
- Nelson, S. K. and A. K. Wilson. 2002. Marbled murrelet habitat characteristics on state lands in western Oregon Corvallis, OR Oregon Cooperative Fish and Wildlife Research Unit Oregon State University Department of Fisheries and Wildlife
- Ralph, C.J., G. L. Hunt, M. G. Raphael and J. F. Piatt. 1995. Ecology and conservation of the marbled murrelet. Albany, California U.S. Department of Agriculture Forest Service Pacific Southwest Research Station General Technical Report PSW-152 69
- Van Rooyen, J. C., J. M. Malt and D. B. Lank. 2011. Relating microclimate to epiphyte availability: edge effects on nesting habitat availability for the marbled murrelet. *Northwest Science*, 85(4):549-561.
- Washington State Department of Natural Resources. February 23, 2007. "North Puget Planning Unit Interim Strategy." Letter to Ken Berg, USFWS.
- Washington State Department of Natural Resources. July 16, 2009. "Final SPPU Murrelet Habitat Identification Concurrence Letter." Letter to Ken Berg, USFWS.