Washington State Department of Natural Resources
Final Habitat Conservation Plan

AMENDMENT

Marbled Murrelet Long-term Conservation Strategy

July 2018

Section 1.0 Introduction

1.1 Overview and Background

This Amendment amends Washington State Department of Natural Resources' (DNR) Final Habitat Conservation Plan for State Uplands (HCP, DNR 1997). Specifically, it replaces the interim marbled murrelet conservation strategy (Interim Strategy) described in the HCP—and under which DNR has operated since 30 January 1997—with the long-term marbled murrelet conservation strategy (Long-term Strategy) envisioned in the HCP.

DNR will continue to operate under the Interim Strategy until DNR's Incidental Take Permit (ITP) has been amended pursuant to this Amendment. Upon amendment of the ITP, DNR's operations will conform to the Long-term Strategy described in this Amendment, and commitments expressed in the Interim Strategy will be extinguished unless expressly incorporated into the Long-term Strategy.

DNR's HCP features an interim conservation strategy for the marbled murrelet (murrelet, *Brachyramphus marmoratus*) because at the time the HCP was developed (mid 1990's), information about murrelet habitat use—both generally and specific to DNR-managed lands—was not sufficient to design and implement a long-term conservation strategy. Further, a recovery plan for the murrelet had not yet been developed. The Interim Strategy emphasizes development of needed information about murrelet habitat relationships and conserves habitat on DNR-managed HCP lands so management would not foreclose future options for the Long-term Strategy.

Major components of the Interim Strategy are: 1) conservation of suitable murrelet habitat (suitable habitat[1]) on DNR-managed lands until spatially explicit habitat relationships studies are completed, 2) surveys of suitable habitat estimated to support at least 95

[1] Suitable habitat is "a contiguous forested area at least five acres in size, containing an average of at least two potential nesting platforms per acre, and within 50 miles of marine waters" (DNR 1997, p. IV.41).

percent of the murrelet occupied sites on DNR-managed lands in each HCP planning unit (reclassified habitat) to determine murrelet occupancy, 3) protection of all murrelet occupied sites on DNR-managed lands, and 4) participation in collaborative scientific studies aimed at improving scientific knowledge of murrelet habitat relationships.

DNR completed the spatially explicit habitat relationships studies directed by the Interim Strategy in five of the six HCP planning units within the murrelet's Washington range: Columbia, North Puget, Olympic Experimental State Forest (OESF), South Coast, and Straits (Table A-1 in Appendix A). A habitat relationships study was not attempted in the South Puget HCP Planning Unit, which contains the Seattle metropolitan area and the least amount of suitable murrelet habitat. All reclassified habitat identified through the habitat relationships studies was surveyed within three of the HCP planning units: Columbia, South Coast, and Straits. Most (72 percent) reclassified habitat was surveyed in the OESF HCP Planning Unit. Surveys were truncated in the OESF HCP Planning Unit after many occupied sites had been identified, protection of sites occupied by murrelets as well as other conservation commitments and operational constraints encompassed much of the reclassified habitat that remained to be surveyed, and DNR biologists felt that murrelet habitat relationships in the OESF HCP Planning Unit had become sufficiently clear to confidently develop the Long-term Strategy. About half (51 percent) of the reclassified habitat was surveyed in the North Puget HCP Planning Unit. Unsurveyed reclassified habitat in the OESF and North Puget HCP planning units, totaling 32,000 acres[2], has been conserved pending adoption of the Long-term Strategy. No habitat was surveyed in the South Puget HCP Planning Unit, where a habitat relationships study was not undertaken.

From 1997 through 2009, DNR participated in several collaborative scientific studies on murrelet habitat relationships and predation risk, led by U.S. Fish and Wildlife Service (USFWS); University of Washington College of Forest Resources (UW); and USDA Forest Service (USFS) Pacific Northwest Research Station, Olympia Forestry Sciences Laboratory. DNR contributed more than $0.8 million[3] to these collaborative projects. DNR also supported at-sea surveys carried out by Washington State Department of Fish and Wildlife (WDFW) to estimate numbers and distribution of murrelets. DNR contributed over $0.3 million to these surveys. Several peer-reviewed scientific publications (Table A-2 in Appendix A) as well as numerous unpublished reports and presentations at professional conferences resulted from this body of work.

[2] Throughout this Amendment, acreages less than 10,000 acres are rounded to the nearest 100 acres, while acreages greater than or equal to 10,000 acres are rounded to the nearest 1,000 acres.
[3] Throughout this Amendment, expenditures are rounded to the nearest $0.1 million.

In 2004, DNR convened a team of 10 biologists and forestry professionals from DNR and other organizations (Science Team) to develop a set of recommendations for DNR to consider when developing the Long-term Strategy. The Science Team completed its work and published its report in 2008 (Raphael et al. 2008). Biological goals that the Science Team identified for DNR were "to manage forest habitat to contribute to 1) a stable or increasing [murrelet] population; 2) an increasing geographic distribution; and 3) a population that is resilient to disturbance." The Science Team made quantitatively and spatially explicit recommendations for the types, amounts, distribution, and configuration of murrelet habitat on DNR-managed lands that it felt were needed to accomplish these goals. The Science Team also re-delineated the boundaries of murrelet occupied sites on DNR-managed lands. Following the Science Team's re-delineation of occupied site boundaries, in 2010, DNR added 16,000 acres of additional habitat to its conservation of occupied sites. The Science Team did not attempt to reconcile its recommendations with DNR's other management responsibilities: with the exception of special consideration of impacts to Wahkiakum and Pacific counties (as requested by DNR), the Science Team's work purely represents a biological conservation perspective.

All of these components of the Interim Strategy—spatially explicit habitat relationships studies on DNR-managed lands, occupancy surveys of reclassified habitat, protection of all occupied sites on DNR-managed lands, participation in collaborative scientific studies to improve the knowledge base from which to proceed, expert synthesis and formulation of biological recommendations, and adoption of enhanced occupied site boundaries—have been brought to bear on development of the Long-term Strategy described in this Amendment. All told, DNR has expended more than $16.8 million to implement the Interim Strategy and prepare the Long-term Strategy.

1.2 Plan Area / Permit Area

The plan and permit areas for this Amendment are the same as the analysis area described in Section 1.3 ("Analysis Area") of the *Revised Draft Environmental Impact Statement for the Long-Term Conservation Strategy for the Marbled Murrelet* (RDEIS) prepared in conjunction with this Amendment (DNR and USFWS 2018), specifically identified in Figure 1.3.1 in the RDEIS. The plan and permit areas encompass the murrelet's entire Washington range and include 1.38 million acres of DNR-managed HCP lands (DNR and USFWS 2018).

1.3 Permit Duration

Upon amendment of DNR's ITP, this Amendment will remain in full force and effect until the end of the initial 70-year term of the HCP, ITP, and IA, as described in Section 19.1

("Term of Permit") of the IA. This period began on 30 January 1997 and will end on 29 January 2067. Pursuant to Sections 19.2 and 19.3 of the IA ("Permit Renewal", "Permit Continuation"), the HCP, ITP, and IA may be extended for up to 30 additional years. This Amendment would remain in full force and effect for the duration of any such extensions.

1.4 Alternatives to the Taking

As an alternative to the incidental taking authorized by the ITP—which is avoided, minimized, and mitigated according to terms of the HCP and IA—DNR could relinquish incidental take coverage for the murrelet, cancel its murrelet conservation strategy, and avoid any incidental taking of murrelets by adopting a "no take" posture for its operations, following the Washington State Forest Practices Rules (Title 222 WAC). This possibility is contemplated in Section 27.0 of the IA ("Termination and Mitigation after Termination"). As described in the RDEIS, DNR did not choose this alternative for the following reasons.

- "Removing HCP coverage would not provide DNR with certainty that it could meet its trust obligations through continued, sustainable timber management.

- Managing under only the forest practices rules would mean potential costly delays to the timber sale process due to required surveys of each stand for marbled murrelet occupancy (a one- to two-year process with up to 18 site visits [Evans Mack and others 2003]) and consultation with USFWS each time potential impacts to habitat are identified.

- Performing the sustainable harvest calculation that DNR relies on to plan its harvest schedules would be very difficult with this level of uncertainty.

- Removing HCP coverage also would be unlikely to contribute to conservation efforts for the marbled murrelet, as DNR would not be setting aside lands to protect and grow murrelet habitat over the long term, but would instead be managing habitat on a piecemeal basis. Managing this way could foreclose future options for habitat development in areas strategically important to the bird's population" (DNR and USFWS 2018, p. 2-2).

DNR and USFWS analyzed seven alternative conservation strategies (other alternatives) that differed from the Long-term Strategy described in this Amendment. The other alternatives are described in detail in Chapter 2 of the RDEIS, wherein the Long-term Strategy is referred to as "Alternative H" or "preferred alternative", and the other alternatives are referred to as alternatives A through G. Like the Long-term Strategy, none of the other alternatives would alter the HCP in any way except to replace the Interim

Strategy with a long-term approach to murrelet conservation. None of the other alternatives differ from the Long-term Strategy in Plan Area, Permit Area, Permit Duration, Covered Activities, or Covered Species. All of the other alternatives share common elements with the Long-term Strategy. To varying degrees, the other alternatives differ from the Long-term Strategy in amount, location, and configuration of land designated for marbled murrelet conservation; restrictions on management and recreation activities; and/or habitat development activities. DNR and USFWS considered, but did not analyze, four other proposed conservation strategies that fell outside the need, purpose, and objectives of this Amendment.

DNR chose the Long-term Strategy described in this Amendment for the following reasons.

- The Long-term Strategy best meets the need, purpose, and objectives of this Amendment. These objectives are:
  1) Trust Mandate: Generate revenue and other benefits for each trust by meeting DNR's trust responsibilities, including making trust property productive, preserving the corpus of the trust, exercising reasonable care and skill in managing the trust, acting prudently with respect to trust property, acting with undivided loyalty to trust beneficiaries, and acting impartially with respect to current and future trust beneficiaries.
  2) Marbled Murrelet Habitat: Provide forest conditions in strategic locations on forested trust lands that minimize and mitigate incidental take of marbled murrelets resulting from DNR forest management activities. In accomplishing this objective, we expect to make a significant contribution to maintaining and protecting marbled murrelet populations.
  3) Active Management: Promote active, innovative, and sustainable management of the forested trust land base.
  4) Operational Flexibility: Provide flexibility to respond to new information and site specific conditions.
  5) Implementation Certainty: Adopt feasible, practical, and cost-effective actions that are likely to be successful and can be sustained throughout the life of the HCP (DNR and USFWS 2018, p. 2-69 to 2-71).

  The other alternatives do not meet the need, purpose, and objectives as well as the Long-term Strategy.
  - Alternative A does not provide long-term management certainty for DNR, does not provide long-term murrelet habitat development, and does not concentrate conservation in strategic locations.

- Alternative B under-mitigates incidental take by 43 percent (DNR and USFWS 2018, Figure 2.4.5, p. 2-69), does not provide long-term murrelet habitat development, and does not concentrate conservation in strategic locations.
- Alternatives C and E over-mitigate incidental take by 37 percent and 48 percent, respectively (DNR and USFWS 2018, Figure 2.4.5, p. 2-69), and introduce unproven approaches, such as timber management in murrelet conservation areas, to achieve their biological objectives.
- Alternative D under-mitigates incidental take by 5 percent (DNR and USFWS 2018, Figure 2.4.5, p. 2-69) and results in an up to 38 percent decline in nesting carrying capacity for the first 20 years following implementation (Peery and Jones 2018, Figure 2(b), p. 53).
- Alternative F over-mitigates incidental take by 179 percent (DNR and USFWS 2018, Figure 2.4.5, p. 2-69) and introduces unproven approaches, such as using silviculture to restore murrelet habitat, to achieve its biological objectives.
- Alternative G over-mitigates incidental take by 137 percent (DNR and USFWS 2018, Figure 2.4.5, p. 2-69), reduces the effectiveness or makes impracticable other HCP conservation strategies, and introduces unproven approaches, such as using silviculture to restore murrelet habitat, to achieve its biological objectives.

- The Long-term Strategy does the best job of balancing mitigation and incidental take, with mitigation slightly exceeding anticipated incidental take to account for uncertainty substantiated by best available science.

- The Long-term Strategy achieves the third highest level of revenue for DNR's trust beneficiaries.

- The Long-term Strategy puts forth a robust combination of protecting existing nesting areas (occupied sites) and strategic, long-term habitat development, as envisioned in USFWS's murrelet recovery plan.

- The Long-term Strategy concentrates long-term habitat development in strategic locations that have a disproportionately high significance for murrelet conservation.

- The Long-term Strategy minimizes incidental take related to management and recreation activities by restricting these activities in murrelet conservation areas.

- The Long-term Strategy does not rely upon unproven approaches or methods to achieve its biological objectives.

- The Long-term Strategy is consistent with DNR's *Policy for Sustainable Forests* (DNR 2006) and all aspects of DNR's regulatory environment.

1.5 Coordination with Federal and State Agencies

DNR collaborated with USFWS to construct the analytical framework that underlies this Amendment. DNR and USFWS staff met regularly from 2012 through 2018 to jointly produce environmental analyses and documents to meet the requirements of both the National Environmental Policy Act and the Washington State Environmental Policy Act.

Several components of the Interim Strategy were accomplished through collaboration with other federal and state agencies. In 1994, DNR paid WDFW $0.4 million to perform murrelet surveys in the OESF HCP Planning Unit. As described in Section 1.1 of this Amendment, DNR participated in and contributed over $1.1 million to collaborative scientific studies of murrelet habitat relationships, ecology, and distribution led by USFWS, UW, USFS, and WDFW. Five of the 10 members of the Science Team were from other federal and state agencies: Oregon State University, USFS, and USFWS. These surveys, scientific studies, and analyses yielded foundational information for development of the Long-term Strategy and in the case of occupied site boundary re-delineation led to conservation enhancements that were immediately implemented to strengthen the Interim Strategy.

Section 2.0 Project Description and Covered Activities

2.1 Project Description

This Amendment replaces the Interim Strategy under which DNR has operated since 30 January 1997 with a long-term marbled murrelet conservation strategy, as envisioned in the HCP.

2.2 Covered Activities

Covered activities are the same as those described in Section 16.0 ("Forest Product Sales and Other Management Activities Other Than Land Sales, Purchases, and Exchanges") and Section 17.0 ("Land Transfers, Purchases, Sales, and Exchanges") of the IA. No activities have been added or deleted.

Section 3.0 Covered Species

3.1 Covered Species

This Amendment covers the marbled murrelet. This Amendment does not cover any other species.

3.1.1 Status and Distribution

The marbled murrelet is classified as threatened by USFWS, and endangered by WDFW. In Washington, "At-sea population monitoring from 2001 to 2015 indicated a 4.4% decline in the murrelet population annually, which represents a 44% reduction since 2001" (Desimone 2016). "The distribution of murrelets in Washington includes the southern Salish Sea and the outer coast" (Desimone 2016). "The known terrestrial nesting habitat distribution includes western Washington coniferous forest within about 55 miles of marine water …" (Desimone 2016). This distribution has not changed since the HCP was adopted in 1997. Status of the murrelet is described in USFWS's most recent 5-year review (USFWS 2009); however, USFWS considers this review outdated and is working to complete another 5-Year review (Deanna Lynch, personal communication). Recent, detailed descriptions of the murrelet's status and distribution can be found in WDFW's *Periodic Status Review for the Marbled Murrelet* (Desimone 2016), USFS's updated *Status and Trend of Marbled Murrelet Populations and Nesting Habitat* (USFS 2018), and the Northwest Forest Plan Interagency Regional Monitoring Program's *Marbled Murrelet Effectiveness Monitoring, Northwest Forest Plan 2017 Summary Report* (Pearson et al. 2017).

3.1.2 Habitat Characteristics and Use

Murrelets use DNR's HCP lands exclusively for nesting. "In Washington, Marbled Murrelets usually nest in older forests dominated by western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*), Douglas-fir (*Pseudotsuga menziesii*) and western redcedar (*Thuja plicata*) trees that have large branches and support substantial moss, epiphytes and debris to form platforms on which a single egg is laid (Hamer and Nelson 1995, Ralph et al. 1995, Nelson 1997, Nelson et al. 2006, Wilk et al. 2016). While most nests are on large limbs (e.g., 30-75 cm width) of trees that are >150 years old (Hamer and Nelson 1995, Burger 2002, Wilk et al. 2016), relatively younger patches of predominantly western hemlock (70-100+ years) with mistletoe infection, moss and epicormic branching have been used for nesting in southwestern Washington (Hamer and Nelson 1995, Nelson and Hamer 1995). Nesting habitat includes forest structure of sufficient height and depth to provide vertical and horizontal cover to the nest and nest

tree. This structure appears to enhance microclimate conditions and minimizes predation risk by providing hiding cover (Raphael et al. 2002b, Meyer et al. 2004, Huff et al. 2006" (Desimone 2016). These habitat affinities were generally known when the Interim Strategy was adopted in 1997, but have been refined over the past 20 years, particularly around younger forest conditions suitable for nesting, relationships between forest nesting habitat and marine foraging areas, and the influence of forest habitat conditions on predation risk.

3.1.3 Occurrence in the Project Area

Murrelets nest throughout the project area. However, not all suitable habitat on DNR-managed HCP lands is occupied by murrelets. DNR and DFW maintain detailed records of murrelet occurrence on DNR-managed lands. Figure B-1 in Appendix B provides an overview of murrelet occupied sites on DNR-managed lands.

3.2 Species in the Plan Area That do Not Need Coverage and Why

Coverage for other listed species and unlisted species of concern that occur in the plan area is provided by the other conservation Strategies in the HCP. These strategies remain in full force and effect.

Section 4.0 Environmental Setting

The environmental setting for this Amendment is described in detail in Chapter 3 of the RDEIS.

Section 5.0 Potential Biological Impacts and Take Assessment

5.1 Direct and Indirect Impacts

"DNR's activities cause direct and indirect impacts to marbled murrelets. Timber harvest and thinning can remove current or potential future habitat and increase deleterious edge effects at nearby habitat. Roads and trails built for access to and through DNR-managed lands can cause direct impacts by removing habitat and also increase disturbance effects by creating forest edges. Other disturbance effects including audio-visual disturbance, predator attraction, and impulsive noise can cause both direct and indirect impacts to nesting [murrelets]. Cumulatively, these impacts can result in reduced habitat quantity and quality" (DNR and USFWS 2018). The Long-term Strategy described in this Amendment protects murrelet occupied sites and adds new areas in which murrelet

habitat will be protected and developed over the life of the HCP with the expectation that these areas will be occupied at some future time by murrelets.

5.2 Anticipated Take of the Covered Species

For purposes of this Amendment, take is described in terms of habitat as a surrogate for murrelets. “The marbled murrelet was federally listed as a threatened species mainly due to the substantial loss of older forest nesting habitat” (USFWS 1997, p. 4). It would not be practicable—and would be less meaningful—to attempt to express take as a number of individual murrelets. Significant methods difficulties present when contemplating reliable enumeration of individual murrelets, a small and secretive forest bird, across the 1.38 million acres of DNR-managed HCP lands in the plan area, let alone relating any such numbers to take concepts.

To describe and compare habitat loss and gain over time and among diverse geographies within the plan area, habitat of various qualities and configurations was quantitatively adjusted to account for probability of occupancy, edge effects, location, and timing (Attachment C-1 in Appendix C). This Amendment anticipates the loss of 11,300 adjusted acres of habitat over the 50 years that remain in the initial 70-year term of the HCP (DNR and USFWS 2018). This take is mitigated by the Long-term Strategy, which includes an anticipated gain of 12,100 adjusted acres of habitat over the same period (DNR and USFWS 2018). The net gain in habitat on DNR-managed HCP lands over the next 50 years is anticipated to be 700 adjusted acres. These figures set a clear standard for monitoring incidental take and mitigation under the Long-term Strategy.

These estimates of habitat loss and gain do not take into account disturbance resulting from permitted activities because disturbance does not result in habitat removal. Disturbance impacts are mitigated through the Long-term Strategy as described in Sub-section 6.3.3 of this Amendment.

5.3 Anticipated Impacts of Take on Critical Habitat

None of the take anticipated under this Amendment involves critical habitat. Per USFWS’s “Final Designation of Critical Habitat for the Marbled Murrelet”, “any lands within critical habitat that are covered by a legally-operative incidental take permit for marbled murrelets based on an approved HCP that addresses conservation of the marbled murrelet are excluded from the critical habitat while the permit is active” (USFWS 1996). DNR-managed HCP lands are covered by such an ITP.

5.4 Anticipated Impacts of the Taking

DNR manages approximately 9 percent of the total land area within the murrelet's Washington range (DNR and USFWS 2018). Habitat on DNR-managed HCP lands (211,000 acres) comprises approximately 14 percent of the total nesting habitat within the murrelet's Washington range (DNR and USFWS 2018). Given these small percentages, DNR's actions have limited potential to influence the trajectory of the Washington murrelet population and certainly cannot control it.

To inform development of the Long-term Strategy, DNR and USFWS commissioned population viability analyses to understand the extent to which DNR's actions could influence both the Washington murrelet population and the population of murrelets nesting on DNR-managed HCP lands (Peery and Jones 2018, Attachment C-2 in Appendix C). Two modeling frameworks were employed "that differed in assumptions about future impacts of environmental factors on murrelets beyond habitat change on DNR lands" (Peery and Jones 2018, p. 3; Attachment C-2 in Appendix C): 1) a "risk" framework that assumed the current rate of population decline[4] would continue even after the population reached nesting carrying capacity, although at a slower rate, due to other environmental factors, and 2) an "enhancement" framework that assumed the rate of population decline would level out at a future point when the population reached equilibrium with nesting carrying capacity and thereafter the population could increase in response to increases in nesting habitat.

For both the risk and enhancement frameworks, and for both the Washington murrelet population and the population of murrelets nesting on DNR-managed HCP lands, the analyses projected that the Long-term Strategy would decrease quasi-extinction probabilities and increase the size of the population at the end of the HCP's initial 70-year term compared to either the modeling baseline or DNR continuing to operate under the Interim Strategy (Peery and Jones 2018, Attachment A-2 in Appendix A). The analyses also projected that the Long-term Strategy would result in no net loss of murrelet habitat, an approximate 85% increase in nesting carrying capacity, and a slight increase in murrelet nest success on DNR-managed HCP lands (Peery and Jones 2018, Attachment A-2 in Appendix A).

[4] Between 2001 and 2015, the Washington murrelet population declined by an average of 4.4 percent per year (Desimone 2016).

Section 6.0 Conservation Program

6.1 Biological Goals

The biological goal of the Long-term Strategy is to avoid, minimize, and mitigate the incidental take of murrelets resulting from DNR's forest management activities, in a manner that increases the habitat capacity of DNR-managed HCP lands over the life of the HCP.

6.2 Biological Objectives

Biological objectives that will be pursued to achieve the biological goal are as follows.

1. Maintain all 592 existing murrelet occupied sites on DNR-managed HCP lands for the duration of the HCP.

2. Increase the habitat capacity of DNR-managed HCP lands by creating a network of 29 special habitat areas. Emphasize distribution of habitat in strategic locations and take full advantage of habitat in areas managed for multiple conservation objectives. Manage these special habitat areas to promote the development of secure, high-quality nesting habitat and to avoid disrupting murrelet nesting and reproduction.

3. Meter the harvest of 3,600 adjusted acres of murrelet habitat for the first decade following implementation to maintain current habitat capacity while greater, future habitat capacity is developed.

6.3 Measures to Avoid, Minimize, and Mitigate Take

The concept of long-term forest cover (LTFC) is central to the Long-term Strategy. LTFC means "Long-term forest cover means lands on which DNR maintains and grows forest cover for conservation purposes, including habitat conservation for the marbled murrelet, through the life of the 1997 HCP" (DNR and USFWS 2018). Under the Long-term Strategy, LTFC includes both murrelet-specific conservation areas and other areas that have multiple conservation objectives (Attachment C-4 in Appendix C). The Long-term Strategy includes a total of 610,000 acres of LTFC: 43,000 acres in areas managed primarily for murrelet habitat, and 567,000 acres in areas that have multiple conservation objectives (Table A-3 in Appendix A).

6.3.1 Murrelet Specific

6.3.1.1 Occupied Sites and Occupied Site Buffers

Protecting and buffering occupied sites achieves the first of the Long-term Strategy's three biological objectives and gives effect to Section II. ("Recovery) D. ("Narrative Outline for Recovery Actions") 3.1.1.1 ("Maintain occupied nesting habitat") and Section II. D. 3.1.1.3 ("Maintain and enhance buffer habitat surrounding occupied habitat") in USFWS's *Recovery Plan for the Marbled Murrelet* (recovery plan, USFWS 1997).

"The loss of occupied nesting habitat appears to be the primary cause of marbled murrelet population declines in Washington … The low reproductive potential of this species, and lack of knowledge concerning its ability to locate and reestablish new nesting areas after elimination of nesting habitat, makes it imperative to maintain all occupied nesting habitat" (USFWS 1997, p. 138).

DNR will protect murrelet habitat and restrict management activities in all recorded murrelet occupied sites on DNR-managed HCP lands as of the date on which the ITP is amended. Protect murrelet habitat means exclude variable retention harvest and restrict management and recreation activities that may remove or damage trees (Table A-4 in Appendix A). Recorded means entered into DNR's murrelet occupied site database. Based on currently recorded murrelet occupied sites, DNR will conserve 59,000 acres within 592 murrelet occupied sites, including the 16,000 acres identified by the Science Team and added by DNR in 2010. Most of these acres (84.5 percent) are within areas that have multiple conservation objectives. DNR will not provide murrelet-specific habitat protection or restrict management and recreation activities in any murrelet occupied sites that are discovered after its ITP has been amended.

"Maintaining buffers around occupied habitat will mediate the effects of edge by helping to reduce environmental changes within the stand, reduce loss of habitat from windthrow and fire, reduce fragmentation levels, increase the amount of interior forest habitat available, and potentially help reduce predation at the nest. To have the greatest benefits, buffer widths should be a minimum of 300-600 feet and should consist of whatever stand age is present" (USFWS 1997, p. 140).

DNR will apply a 328-foot buffer to the outer boundary of all recorded murrelet occupied sites on DNR-managed HCP lands as of the date on which the ITP is amended. Within occupied site buffers, DNR will exclude variable retention harvest and restrict management and recreation activities that may remove or damage trees, or disrupt murrelet nesting (Table A-4 in Appendix A). Based on currently recorded murrelet

occupied sites, DNR will conserve 33,000 acres around 592 murrelet occupied sites. About half of these buffer acres, (17,000 acres, 51.5 percent) are within areas that have multiple conservation objectives. DNR will not buffer any murrelet occupied sites that are discovered after its ITP has been amended.

6.3.1.2 Strategic Locations

Additional murrelet-specific conservation will be concentrated in strategic locations. “Strategic locations are geographic areas within Washington that have a disproportionately high importance for murrelet conservation considering DNR ownership patterns and proximity to federal lands and marine waters.” (DNR and USFWS 2018). In identifying strategic locations, DNR and USFWS considered factors such as proximity to marine waters (≤ 40 miles), proximity to marine areas with higher than average densities of murrelets, abundance of nesting habitat, abundance and distribution of occupied sites, future habitat capacity, protection from disturbance, and proximity to federal lands.

Three strategic locations were identified by DNR and USFWS: Southwest Washington, the OESF and the Strait of Juan de Fuca west of the Elwha River, and North Puget Sound. DNR-managed HCP lands in Southwest Washington are close to marine waters and are disproportionately important as murrelet nesting habitat because federal forest lands are lacking in this area. The OESF and DNR-managed HCP lands along the Strait of Juan de Fuca west of the Elwha River contain an abundance of high quality habitat and are close to marine waters with higher than average densities of murrelets. DNR-managed HCP lands in North Puget Sound provide nesting habitat within easy traveling distance of heavily used murrelet foraging areas in the Salish Sea, around the San Juan Islands. In these strategic locations, development of habitat under the Long-term Strategy will result in a net increase of 23,000 acres of habitat by the end of the HCP’s initial 70-year term (Table A-5 in Appendix 1).

USFWS’s recovery plan acknowledges DNR’s HCP and reinforces the significance of these strategic locations. In Section II. D. 2.1 (“Protect terrestrial habitat essential for murrelet recovery”), the recovery plan characterizes “Suitable habitat within 64 kilometers (40 miles) of the coast on State lands in Washington” as “Essential nesting habitats that occur on forest lands under non-Federal management” and concludes “These areas are critical for improving the distribution of both the population and suitable habitat, especially in southwest Washington” (UWFWS 1997, p. 132).

6.3.1.3 Special Habitat Areas

To accomplish the second of the Long-term Strategy's biological objectives, DNR will create a network of special habitat areas (SHA) that emphasizes the strategic locations described in Section 6.3.1.2 of this Amendment (Figure B-2 in Appendix B). "Special habitat areas are designed to reduce edge and fragmentation and increase interior forest around occupied sites and existing habitat in specific geographic areas to benefit the species" (DNR and USFWS 2018). The SHA network gives effect to Section II. D. 3.2.1 ("Increase the amount and quality of suitable nesting habitat"), Section II. D. 3.2.1.1 ("Decrease fragmentation by increasing the size of suitable stands to provide a larger area or interior forest conditions") and Section II. D. 3.2.1.2 ("Protect 'recruitment' nesting habitat to buffer and enlarge existing stands, reduce fragmentation, and provide replacement habitat for current suitable nesting habitat lost to disturbance events") in USFWS's recovery plan.

"An increase in amount and quality of suitable nesting habitat is important in all zones. However, it is especially important in the Western Washington Coast Range … In these areas, remaining patches of suitable nesting habitat are relatively small and fragmented, involve private and state lands, and are vitally important for maintaining the small populations in these areas; thus, blocking up habitat is needed to increase patch size" (USFWS 1997, p. 142). "Stands (currently 80 years old or older) that will produce suitable habitat within the next few decades are the most immediate source of new habitat and may be the only replacement for existing habitat lost to disturbance (e.g., timber harvest, fires, etc.) over the next century. Such stands are particularly important because of the vulnerability of many existing habitat fragments to fire and wind and the possibility that climate change will increase the effects of the frequency and severity of natural disturbances" (USFWS 1997, p. 143).

The SHA network comprises 29 SHAs that together encompass 59,000 acres. Most (23, 79.3 percent) SHAs contain at least one occupied site (Table A-6 in Appendix A). SHAs range in size from 300 acres to 7,400 acres, averaging 2,000 acres (Table A-6 in Appendix A). Habitat categories in SHAs are occupied site, habitat, future habitat, "security forest", future security forest, and non-forested. Habitat means DNR forest inventory units (FIU) that have been assigned a "P-stage value"[5] of at least 0.25. Future habitat means FIUs that do not currently meet this threshold but are projected to develop a P-stage value of at least 0.25 before the end of the HCP's initial 70-year term. Security

[5] The P-stage model, developed by the Science Team, classifies DNR-managed forestlands based on their relative value as murrelet nesting habitat, using DNR's forest inventory data (i.e., stand origin, stand age, dominant tree species) expressed as a value between 0 and 1. Development and use of the P-stage model are described in detail in Attachment C-3 in Appendix C.

forest means FIUs that will not develop a P-stage value of at least 0.25 before the end of the HCP's initial 70-year term but have a closed canopy and trees greater than 80 feet tall. Future security forest means FIUs that do not yet meet the definition of security forest but are projected to reach that threshold before the end of the HCP's initial 70-year term. Security forest protects habitat from deleterious edge effects including microclimate change, wind throw, predation, and disturbance.

Occupied sites and current habitat comprise 35,000 acres (59.3 percent) of the 59,000 acres within SHAs. Another 8,500 acres (14.6 percent) is future habitat. All but 300 acres of the remaining acreage is either security forest or future security forest (Table A-6 in Appendix A). Within SHAs, DNR will exclude variable retention harvest and restrict management and recreation activities that may remove or damage trees, or disrupt murrelet nesting (Table A-4 in Appendix A).

6.3.2 Non Murrelet Specific

Within the murrelet's Washington range, variable retention harvest[6] already is excluded from 567,000 of acres of DNR-managed HCP lands. These lands are being managed under strategies and prescriptions designed for other purposes that also provide LTFC for murrelets. These lands include the following:

- Riparian areas managed under the HCP riparian conservation strategies
- All remaining old-growth forest (stands 5 acres or larger that originated naturally before 1850 and are in a fully functional stage of stand development) on DNR-managed HCP lands
- Existing northern spotted owl (*Strix occidentalis caurina*) high-quality habitat as of 2018—"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)" (DNR and USFWS 2018)
- Uncommon habitats and special habitat features protected under the HCP multi-species conservation strategy
- Natural Area Preserves and Natural Resource Conservation Areas
- Genetic resources and special habitat features protected under DNR's *Policy for Sustainable Forests* (DNR 2006)
- Inoperable areas and inaccessible areas

[6] Variable retention harvesting is a timber harvest system characterized by stand-specific objectives, a harvest prescription designed to accomplish those objectives, and retention of structural elements such as large live trees, snags, and logs.

Murrelet habitat quality on these lands is variable. Not all contain murrelet habitat, and portions are not forested. Nevertheless, in the aggregate, these lands provide significant mitigation in the form of habitat, future habitat, and security forest.

These lands contain 84.5 percent of the area within occupied sites, 51.5 percent of the area within occupied site buffers, and 70.0 percent of the area within special habitat areas (Table A-3 in Appendix A). These lands not only anchor the Long-term Strategy's murrelet-specific conservation components, but will develop additional habitat capacity around occupied sites and SHAs over time. To complete its second biological objective, the Long-term Strategy reinforces the significance of these lands by adding new, murrelet-specific restrictions on certain management and recreation activities (Table A-4 in Appendix A). Management and recreation activities in these lands must comply with both existing restrictions and, where applicable, new, murrelet-specific restrictions.

6.3.3 Restrictions on Management and Recreation Activities

A wide range of forest management and recreation activities has the potential to negatively affect forest structure, disrupt murrelet nesting, and thereby reduce the effectiveness of the conservation components described in sub-sections 6.3.1.1, 6.3.1.3, and 6.3.2 of this Amendment. To avoid and minimize such impacts, these activities are restricted under the Long-term Strategy (Table A-4 in Appendix A).

6.3.4 Metering

DNR will delay ("meter") harvest of 3,600 adjusted acres of murrelet habitat that it would otherwise be authorized to harvest upon amendment of its ITP until the end of the first decade following implementation. The specific location and quality of habitat to be metered will be at DNR's discretion. These metered acres will become available for harvest at the beginning of the second decade.

Metering will maintain habitat capacity while additional habitat is developed under the Long-term Strategy. Population viability analyses commissioned by DNR and USFWS indicate that metering will slightly improve projected (modeled) viability of the murrelet population on DNR lands, and will prevent the dip in nesting carrying capacity that would otherwise occur during the first decade of the Long-term Strategy (Peery and Jones 2018).

6.3.5 Significant Contribution

As envisioned in the HCP, the Long-term Strategy helps "meet the recovery objectives of the U.S. Fish and Wildlife Service" and makes "a significant contribution to maintaining and protecting marbled murrelet populations" (DNR 1996, p. IV.44). The Long-term Strategy fulfills these commitments by delivering conservation envisioned in USFWS's recovery plan (USFWS 1997) and critical habitat designation (USFWS 1996). Section II. ("Recovery") B. ("Recovery strategy for the Marbled Murrelet") of the recovery plan concludes "Adequately designed and implemented HCPs will be very important in the conservation of marbled murrelets on state and private lands and are likely to be the most effective and acceptable means of protecting most occupied sites on non-federal lands in the near future and potentially providing replacement habitat in the long term. Lands covered by approved HCPs would not require additional protection (e.g., designation as critical habitat)" (USFWS 1997, p. 120). Section II. D. 2.1 ("Protect terrestrial habitat essential for murrelet recovery") sharpens this conclusion. "Habitat conservation plans with appropriate measures to minimize and mitigate incidental take in the short term while providing for maintenance or creation of habitat for the long term probably offer the best means for conservation of the species on non-Federal lands" (USFWS 1997, p. 133). The Long-term Strategy puts forth this combination of occupied site protection and strategic, long-term habitat development.

The Long-term Strategy incorporates most of the specific recommendations in Section II. D. 3. ("Incorporate management recommendations for protected habitat areas") of USFWS's recovery plan that apply to the management of nesting habitat: "3.1.1.1 Maintain occupied nesting habitat", "3.1.1.3 Maintain and enhance buffer habitat surrounding occupied habitat", "3.1.3 Minimize nest disturbances to increase reproductive success", "3.2.1.1 Decrease fragmentation by increasing the size of suitable stands to provide a larger area of interior forest conditions", and "3.2.1.2 Protect 'recruitment' nesting habitat to buffer and enlarge existing stands, reduce fragmentation, and provide replacement habitat for current suitable nesting habitat lost to disturbance events" (USFWS 1997, p. 138-143). The Long-term Strategy's SHA network contributes toward Section II. D. 3.'s landscape-level recommendations: "3.1.1.2 Maintain potential and suitable habitat in larger contiguous blocks while maintaining current north/south and east/west distribution of nesting habitat", "3.2.2.1 Improve and develop north/south distribution of nesting habitat", and "3.2.2.2 Improve and develop east/west distribution of nesting habitat." (USFWS 1997, p. 139-146).

The phrases "help meet the recovery objectives of the U.S. Fish and Wildlife Service" and "make a significant contribution to maintaining and protecting marbled murrelet populations" do not mean that DNR has an obligation to either recover the murrelet or

sustain the Washington murrelet population. Rather, these phrases mean that if DNR designs and implements an effective Long-term Strategy then the habitat thereby provided is likely to contribute to the broader murrelet conservation goals expressed in USFWS's recovery plan.

6.4 Adaptive Management

DNR's Adaptive Management obligations are not changed by this Amendment. Section 24.5 of the IA describes and governs DNR's adaptive management commitments under the HCP including this Amendment. "Adaptive management provides for ongoing modifications of management practices to respond to new information and scientific developments. The monitoring and research provisions of the HCP are in part designed to identify modifications to existing management practices." (DNR 1997, p. B.10). Section 24.5 of the IA identifies two murrelet-specific adaptive management practices, one that was completed during the Interim Strategy ("the habitat definitions will be refined for each planning unit as a result of DNR's habitat relationships study") and another that will be completed when the Long-term Strategy is adopted ("the interim conservation strategy will be replaced with a long-term management plan upon completion of the inventory survey phase") (DNR 1997, p. B.11).

Section V of the HCP ("Plan Implementation") states DNR's expectations "to initiate [murrelet] effectiveness monitoring in all planning units where murrelet nesting habitat is a management goal once the long-term murrelet conservation strategy has been designed and implemented" and "to initiate [murrelet] validation monitoring in the OESF once the long-term murrelet conservation strategy is in place." (DNR 1997, p. V.3).

"Effectiveness monitoring will document changes in habitat conditions, including general forest structure, specialized habitat features (e.g., in-stream large woody debris, marbled murrelet nesting platforms), and spotted owl prey populations, that result from timber harvest and other forest management activities carried out pursuant to the HCP. Only habitat areas addressed by the conservation strategies, i.e., riparian, spotted owl nesting roosting, and foraging (NRF), spotted owl dispersal, and marbled murrelet habitat areas, will be monitored for effectiveness. Within these habitat areas, representative samplings will be monitored, which means not all managed acres or management activities will be monitored" (DNR 1997, p. V.2). Accordingly, murrelet effectiveness monitoring will emphasize and be limited to monitoring the development of murrelet habitat within a representative sample of SHAs.

"Validation monitoring, which will occur only within the OESF Planning Unit, will document spotted owl and marbled murrelet use of areas managed to provide nesting habitat, and

salmonid use of streams crossing DNR-managed lands. For spotted owls and marbled murrelets, validation monitoring will rely upon surveys to detect changes in site occupancy, numbers and locations of breeding pairs, and reproduction, as appropriate for each species" (DNR 1997, p. V.2). Accordingly, murrelet validation monitoring will emphasize and be limited to assessing murrelet use of occupied sites and SHAs in the OESF HCP Planning Unit.

Murrelet research priorities are outlined on pages V.6-8 of the HCP. These priorities were accomplished as part of the Interim Strategy and during development of the Long-term Strategy.

6.5 Reporting

DNR's reporting obligations are not changed by this Amendment. Section 20.0 ("Reporting and Inspections") of the IA and Section V ("Plan Implementation") of the HCP describe DNR's reporting obligations under the HCP, including this Amendment.

Section 7.0 Changed and Unforeseen Circumstances, Uncertainty

7.1 Changed Circumstances

The existing Changed and Unforeseen Circumstances provisions are not changed by this Amendment. Beyond the HCP's adaptive management capacity to address changed circumstances, Section 24.0 ("Extraordinary Circumstances") of the IA describes the process that DNR and USFWS will follow should extraordinary circumstances arise in connection with the HCP including this Amendment (DNR 1997, p. B.9).

7.2 Unforeseen Circumstances

The existing Unforeseen Circumstances provisions are not changed by this Amendment. Section 23.0 ("Unforeseen Circumstances") of the IA describes the process that DNR and USFWS will follow should unforeseen circumstances arise in connection with the HCP including this Amendment (DNR 1997, p. B.9).

7.3 Uncertainty

The Long-term Strategy was intentionally developed to mitigate against the full spectrum of uncertainties surrounding murrelet habitat conservation on DNR-managed HCP lands recognized by DNR and USFWS. These include potential effects of natural disturbances such as wildfires and windthrow, effects of climate change on Washington's forests,

imperfect knowledge of murrelet biology and population dynamics, and uncertainties related to implementation of the Interim Strategy (i.e., difficulties encountered during the North Puget HCP Planning Unit habitat relationships study, lack of a habitat relationships study for the South Puget HCP Planning Unit, incomplete surveys of reclassified habitat in the North Puget HCP Planning Unit, evolution of the murrelet survey protocol over the 13-year period during which DNR was carrying out surveys, and the 10- to 17-year lag between ending surveys of reclassified habitat and development of the Long-term Strategy).

Using best available science, the Long-term Strategy was designed to take these uncertainties into account. The choices that were made at every step over the seven-year period during which DNR worked with USFWS to design the strategy--assumptions, definitions, methods, inclusions and exclusions, amounts--sought to redress known and potential uncertainties. Both agencies recognized these uncertainties as they were encountered and factored them into the interactive process of selecting conservation options. The result is a well-integrated Long-term Strategy that reflects these decisions, is more than sum of its parts, and is robust in the face of uncertainty. Specific mitigation against uncertainty is derived from providing habitat mitigation that exceeds anticipated taking by 700 adjusted acres (6.5%) and by metering the harvest of 3,600 adjusted acres of habitat (about 30% of the anticipated taking) as described in Section 6.3.4 of this Amendment.

Section 8.0 Funding

DNR’s funding obligations are not changed by this Amendment. As expressed in Section V of the HCP (“Plan Implementation”) and Section 18.0 (“Funding”) of the IA, DNR shall submit to the Washington State Legislature, on at least a biennial basis, an agency operating and capital budget for asset management that will be adequate to fulfill DNR’s obligations under the HCP, ITP, and IA including this Amendment. Failure by DNR to ensure adequate funding is provided to implement the HCP shall be grounds for suspension or partial suspension of the ITP. The IA also commits USFWS to include in its annual budget requests sufficient funds to fulfill their respective obligations under the HCP, ITP, and IA.

Section 9.0 References

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