Chapter 2

THE ALTERNATIVES

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Chapter 2

The Alternatives

In this chapter, the Washington State Department of Natural Resources (DNR) and U.S. Fish and Wildlife Service (USFWS), also referred to as the Joint Agencies, describe eight alternatives being considered for the long-term strategy, including a no action alternative. These alternatives represent a range of conservation strategies for the marbled murrelet on DNR-managed lands. Conservation measures common to all the alternatives are described. Components unique to an alternative or alternatives are compared to one another and to the no action alternative.

2.1 Developing and Screening the Alternatives

For the 2016 draft environmental impact statement (2016 DEIS), the Joint Agencies worked together to develop six alternatives to analyze, including the no action alternative. The Joint Agencies carried these alternatives forward into this revised draft EIS (RDEIS) and also added two new alternatives.

The two new alternatives in the RDEIS are Alternatives G and H. Alternative G is predominately responsive to comments received from Washington Department of Fish and Wildlife (WDFW) and the U.S. Environmental Protection Agency (USEPA). Alternative H, DNR's preferred alternative, also was developed in response to comments received on the 2016 DEIS and direction from the Board of Natural Resources (board).

Text Box 2.1.1. What Are the Main Differences Among the Alternatives?

The alternatives differ in the amount of forestland designated for marbled murrelet conservation, where conservation is located, and how conservation areas will be managed.

The alternatives cover a range of acres and configurations of forestland that DNR manages for marbled murrelet conservation. The alternatives differ in the amount of land that is designated for marbled murrelet conservation, where conservation is located, how conservation areas will be managed (refer to Section 2.3 for a descriptions of conservation areas associated with each alternative), and the amount of marbled murrelet habitat that will be removed. Development of these alternatives was informed by the scoping process described in Chapter 1and by comments received on the 2016 DEIS. Appendix A provides a summary of the scoping process and the scoping comments received.

Comments on the 2016 DEIS were used to inform the RDEIS and will be provided in the final EIS (FEIS) along with the Joint Agencies' responses. Comments and comment responses on the RDEIS also will be included in the FEIS. Chapter 1 describes the changes made to the 2016 DEIS for the RDEIS.

The alternatives were screened by the Joint Agencies for their potential ability to meet the adopted need, purpose, and objectives (refer to Chapter 1) and basic criteria under the Endangered Species Act. A discussion of how each alternative addresses the need, purpose, and objectives is included at the end of this chapter.

How Were the Alternatives Developed?

The Joint Agencies used an analytical framework to guide the process of developing and screening alternatives (refer to Appendix B, "Analytical Framework Focus Paper"). The framework used scientific methods to identify habitat, analyze habitat quality, calculate impacts and mitigation, and estimate marbled murrelet population impacts over the planning period. This work was used to design and compare the action alternatives.

Conservation Approaches That Were Not Developed Into Alternatives

Potential conservation approaches that did not meet the need, purpose, and objectives were not considered feasible and were not developed into alternatives. Following is a description of these approaches.

REMOVING HCP COVERAGE

One approach that did not meet the need, purpose, and objectives was removing HCP coverage for the marbled murrelet and managing instead under the forest practices rules (WAC 222) and existing DNR policies. This approach was rejected for several 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[1] 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.

[1] "Consultation" refers to a joint agency agreement process, and not consultation under Section 7 of the Endangered Species Act.

CEASING TIMBER HARVEST ACTIVITIES

Ceasing timber harvest activities on state trust lands was not considered feasible as doing so would violate DNR's trust obligations set forth in state law and the need, purpose, and objectives (Objective #1; refer to Chapter 1 for a description of state trust lands).

Supplementary Analyses

Although these approaches were not considered feasible and therefore not included as action alternatives, the Joint Agencies did conduct some additional analyses on the following scenarios. These scenarios included the following:

- **No harvest of state trust lands land through the planning period or immediate removal of all DNR-managed habitat:** The board requested analysis of these scenarios to understand how these extremes would affect the marbled murrelet population (refer to Appendix C, "Population Viability Analyses").
- **Including "stringer" habitat**: This scenario involved including stringer habitat in long-term forest cover order to understand the effect this habitat might have on the population. ("Long-term forest cover" is land that provides marbled murrelet conservation through existing DNR policies, plus marbled murrelet-specific conservation areas. "Stringer" habitat is long, relatively narrow (less than 656 feet [200 meters] wide) corridors of long-term forest cover, primarily associated with riparian areas. Refer to sections 2.2 and 2.4, respectively, for more information).
- **Metering harvest of marbled murrelet habitat:** The purpose of this scenario was to model how delaying harvest of marbled murrelet habitat that DNR otherwise would be authorized to harvest upon amendment of its incidental take permit until the end of the first decade following implementation may affect the population over time.[2] Subsequent consideration of this approach led DNR to incorporate metering into DNR's preferred alternative (Refer to Section 2.3, Alternative H).
- **Including a larger buffer (492 feet [150 meters]) on occupied sites**: This analysis was requested by the board to test the sensitivity of Alternative F and how larger buffers change the balance of impacts and mitigation.[3]
- **Excluding northern spotted owl habitat from long-term forest cover**: This analysis was requested by the board to minimize overlap of the marbled murrelet strategy and the northern spotted owl conservation strategy in the 1997 HCP.

All scenarios except the last two in the preceding bulleted list were analyzed using a population viability analysis (refer to Appendix C). Similar population modeling done for the action alternatives is more fully

[2] Analysis of stringers and metering was presented to the board on June 7, 2016.
[3] Analysis of a larger buffer and excluding owl habitat were discussed with the board on August 11, 2016.

described in Section 4.6, "Marbled Murrelet." These supplementary analyses, although not incorporated into an action alternative, informed deliberations about the alternatives.

A new population viability analysis was conducted for the RDEIS. Results are described in Chapter 4 and an updated report is included in Appendix C of the RDEIS.

Alternatives Submitted in 2016 DEIS Comments

Several comments received on the 2016 DEIS suggested new alternatives to consider in the RDEIS or FEIS. Some of these suggestions were incorporated into the two new alternatives in this RDEIS, Alternatives G and H (board directed), as explained under the alternative profiles later in this chapter. The other suggested alternatives are addressed under "Alternatives Considered but not Analyzed in detail" near the end of this chapter.

■ Why Is a Long-Term Strategy Needed Now?

Approval of a long-term conservation strategy for the marbled murrelet is timely. Active forest management is ongoing on DNR-managed lands under the interim strategy, and approving a long-term strategy will avoid foreclosing future options for protecting strategically located marbled murrelet habitat. Approving a long-term conservation strategy also will help ensure sustainable management of state trust lands. Further delay in the development of a long-term conservation strategy would mean the data used to identify habitat and model habitat growth under the proposed alternatives would become out of date, and delay also could have consequences for DNR's compliance with federal permits under the 1997 HCP.

■ How Is Marbled Murrelet Habitat Identified?

Across the analysis area, the Joint Agencies identified DNR-managed forestlands that have the characteristics of murrelet habitat and those areas that should be considered for a long-term conservation strategy.

Habitat characteristics important to the marbled murrelet include large nesting platforms[4] on mature trees, adequate canopy cover, and sufficient interior forest to provide security to nesting murrelets from predation and other forest edge effects (forest edges will be discussed later in this chapter). To identify this habitat, the Joint Agencies built upon previous survey work, habitat relationship studies, and a habitat classification model known as "P-stage" that was first developed by a team of scientists convened by DNR in 2004. (The P-stage model is explained in the following section.)

Role of the Science Team Recommendations

In 2004, DNR convened a team of professionals to compile expert opinion, data, and research on marbled murrelet habitat conservation. These specialists, known as the Science Team, completed a set of

[4] A nesting platform is a large limb or structure at least 50 feet above the ground and at least 7 inches in diameter.

recommendations in 2008 for DNR to consider when developing a long-term conservation strategy for the marbled murrelet. Entitled *Recommendations and Supporting Analysis of Conservation Opportunities for the Marbled Murrelet Long-Term Conservation Strategy* (Science Team Report [Raphael and others 2008]), the report provides a landscape-level examination of proposed conservation areas on DNR-managed lands on the Olympic Peninsula and southwest Washington (with the exception of North and South Puget HCP planning units [DNR 1997]). The analysis was built upon objectives designed to recover marbled murrelets on DNR-managed lands and did not consider DNR's fiduciary responsibility to its trust beneficiaries, with the exception of special considerations for Wahkiakum and Pacific counties. The report's recommendations were not adopted as a long-term conservation strategy or policy by the board.

For the purposes of this RDEIS, concepts from the Science Team Report were applied to the North and South Puget HCP planning units and are included in the RDEIS as Alternative F. Additionally, the report was used extensively in the development of alternatives for this RDEIS:

- The Science Team examined the relationship of the structure and composition of forest stands and their potential contribution to carrying capacity for marbled murrelets. This analysis provided a critical foundation for the habitat model referred to as "P-stage," which the Joint Agencies used to estimate the area of current and future murrelet habitat for all of the alternatives described in this chapter (refer to Text Box 2.2.2).
- The Science Team evaluated occupied sites resulting from surveys on DNR-managed lands. They addressed concerns about the accuracy of occupied site boundaries by re-delineating the boundaries of specific occupied sites as necessary (adding approximately 16,000 acres to occupied sites). The Science Team also made conservation recommendations for occupied sites surveyed under Pacific Seabird Group survey protocols released before 2003. (Refer to Raphael and others 2008 and Appendix E for more information.) The Joint Agencies used these delineations and recommendations for occupied sites in Alternatives B through H, with an exception regarding buffer width for two alternatives.
- Conservation areas recommended by the Science Team on the Olympic Peninsula and in southwest Washington are incorporated into Alternative F. This alternative also included conservation areas designed using Science Team principles in North and South Puget HCP planning units.

Occupied Marbled Murrelet Sites

Previous survey work and habitat relationship studies done by DNR under the interim strategy (referred to as "HCP survey work") resulted in the identification of 42,976[5] acres of occupied sites on DNR-managed forestlands in the analysis area. Occupied sites are habitat patches of varying size in which murrelets are assumed to nest based on field observations. Occupied sites identified through HCP survey work are

[5] The overall acreage of occupied sites is lower in the RDEIS than what was shown in the DEIS because 1) DNR corrected its old growth query and some acres of old-growth forest are now reported under existing conservation and 2) occupied site verification in the North Puget HCP Planning Unit has resulted in boundary adjustments that have reduced the size of some occupied sites. Refer to Appendix O for more information.

maintained as habitat and currently are not subject to harvest. Work by the Science Team identified an additional 16,000 acres of occupied sites, and these sites are included in all of the action alternatives. (Refer to Appendix D for a detailed description of how occupied sites were identified.)

Applying the P-stage Model

In addition to occupied sites, the Joint Agencies identified where other habitat may currently exist on DNR-managed forestlands, or where it is likely to develop during the life of the 1997 HCP. To find these areas, DNR applied the Science Team's landscape-scale habitat classification model called "P-stage." Developed for the 2008 Science Team report (Raphael and others 2008), the P-stage model uses forest inventory data such as forest type, stand origin, and stand age to estimate the location and quality of murrelet habitat (refer to Text Box 2.1.2). Habitat is assigned a P-stage value based on its quality, ranging from relatively low-quality (P-stage 0.25 to 0.36) habitat to higher-quality (P-stage 0.47 to 0.89) habitat. P-stage values increase over time as the forest grows and develops more structure suitable for nesting and secure canopy cover (refer to Figure 2.1.1). Refer to Appendix E for a detailed description of the P-stage model, including a comparison of this model with other available habitat models.

P-stage was used to inform the development of alternatives. For example, P-stage was used to identify areas that currently contain marbled murrelet habitat or that could develop into marbled murrelet habitat over the next five decades. P-stage also was used to estimate the potential impacts of habitat removal and potential mitigation of habitat retention and recruitment of each alternative. (Refer to Chapter 4 and Appendix H for a detailed description.)

In this RDEIS, the terms "marbled murrelet habitat" or "current marbled murrelet habitat" mean forest stands that have a P-stage value of at least 0.25 (refer to Text Box 2.1.3).

When designing the alternatives, the Joint Agencies considered P-stage value in concert with other information, such as proximity of the habitat to marine populations of marbled murrelets, potential for habitat fragmentation, proximity to mature forests that could provide additional security to potential nest sites, and location of neighboring conservation areas (for example, protected federal lands).

Text Box 2.1.2. What Is the P-stage Model?

The P-stage model, developed for the 2008 Science Team Report, classifies DNR-managed forestlands based on their relative value as nesting habitat, both now and into the future. The model uses DNR's forest inventory data (including forest type, stand origin, and stand age) to estimate the location and quality of murrelet habitat throughout the analysis area. Forestland is classified based on the probability it will be used for nesting by marbled murrelets. Among available habitat models, P-stage appears to work best for identifying current and future habitat on DNR-managed forestlands.

Text Box 2.1.3. Marbled Murrelet Habitat

Marbled murrelet habitat or current marbled murrelet habitat is any forest stand with a P-stage value of at least 0.25.

Future marbled murrelet habitat is any forest stand that, according to the P-stage model, develops into a stand with a P-stage value of at least 0.25 over the five-decade analysis period.

Low quality marbled murrelet habitat is any forest stand with a P-stage value of .25 to 0.36, and **high quality** marbled murrelet habitat is any forest stand with a P-stage value of 0.47 to 0.89.

Figure 2.1.1. Ascending P-stage Classes and Associated Habitat Development (P-stage 0.47 not Shown)

2.2 Elements Common to All Alternatives

The eight alternatives (a no action alternative and seven action alternatives) described in this chapter represent a range of conservation approaches for the marbled murrelet. Alternatives share a common framework: they each identify land for marbled murrelet conservation and apply conservation measures to that land. The elements common to all alternatives are described in this section.

■ How Much Land Is Designated for Murrelet Conservation?

Each alternative designates areas for conservation for the marbled murrelet, representing a range of options that are analyzed in this RDEIS. These categories are explained in the next section.

Table 2.2.1. Total Acres of Conservation by Alternative (Rounded to Nearest 1,000)

	Alt. A (no action)	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt G	Alt H
Acres of existing conservation under the 1997 HCP, *Policy for Sustainable Forests*, and Washington State Law	567,000	567,000	567,000	567,000	567,000	567,000	567,000	567,000
Acres of additional, marbled murrelet-specific conservation[6]	33,000	9,000	50,000	51,000	55,000	176,000	76,000	43,000

[6] Acres reported here are those which do not overlap other existing conservation lands.

	Alt. A (no action)	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt G	Alt H
Total approximate acres	600,000	576,000	617,000	618,000	622,000	743,000	643,000	610,000

Existing Conservation Under the 1997 HCP, *Policy for Sustainable Forests*, and Washington State Law

All alternatives include DNR-managed lands that are already deferred from harvest or otherwise conserved, meaning they are subject to existing policy or legal constraints and are excluded from variable retention harvest planning under the sustainable harvest calculation.[7] These lands are deferred from harvest or otherwise conserved under the conservation strategies in the 1997 HCP, to meet policy objectives in the 2006 *Policy for Sustainable Forests*, or in compliance with Washington state law. The strategies and policies under which these lands are managed provide long-term habitat benefits to the marbled murrelet, as described in the following section. The total amount of existing conservation is 567,000 acres, and when there is marbled murrelet habitat or security forest associated with these acres there are benefits to the marbled murrelet. (Because there is considerable overlap between the components, Table 2.2.1 does not provide acreages for the individual strategies.)

Text Box 2.2.1. Do Currently Conserved Lands Provide Habitat?

DNR-managed lands currently contain marbled murrelet nesting habitat that is conserved under the 1997 HCP or by other DNR policies. In addition, some DNR-managed lands contribute to murrelet conservation by increasing security forest or creating larger, more contiguous stands of structurally complex forest.

RIPARIAN CONSERVATION STRATEGIES

The 1997 HCP includes riparian conservation strategies to maintain or restore freshwater habitat for salmon on DNR-managed lands and to aid in the conservation of other riparian and aquatic species. There are two strategies: one for the five westside HCP planning units and another for the Olympic Experimental State Forest (OESF) HCP Planning Unit. Both strategies establish riparian management zones on all salmon-bearing streams and other streams of a certain size.[8] Both strategies specify the silvicultural treatments that can be used in riparian management zones (such as stand thinning) to speed the development of complex forests without sacrificing short-term ecosystem function. The main distinctions between the westside and OESF strategies is in how the riparian management zone is designed and what the specific management objective is to be achieved. In the westside strategy, buffer widths are set by stream type, and riparian forests are managed for a desired future condition of structural complexity including snags, down wood, and canopy layers. In the OESF strategy, buffer widths are based on both stream type and watershed analysis, and DNR manages riparian forests for riparian function (large woody debris recruitment, shade, and prevention of peak flow) at the watershed scale.

[7] The sustainable harvest calculation establishes the volume of timber to be scheduled for sale during a planning decade (RCW 79.10.300). Available at https://www.dnr.wa.gov/shc

[8] *DNR Proprietary HCP Substitution Agreement for Aquatic Resources*, 2008, Appendix 1.

Also, in the OESF, a small amount of variable retention harvest (a type of stand-replacement harvest, refer to Chapter 7) is allowed in the riparian management zone of some Type 3 watersheds. (For more information, refer to the *OESF HCP Planning Unit Forest Land Plan*.[9])

Riparian management zones in the OESF and the other westside HCP planning units are included as existing conservation lands in the alternatives analyzed in this RDEIS because they are managed to maintain forest cover on a long-term basis. Forest stands in these zones may, in some cases, provide habitat for marbled murrelets as well as insulate the habitat from other forest management activities.

DNR implements the westside riparian conservation strategy through the *Riparian Forest Restoration Strategy* (RFRS) and the OESF riparian conservation strategy through the *OESF HCP Planning Unit Forest Land Plan*.

OLD-GROWTH POLICY

The *Policy for Sustainable Forests* protects and defers timber harvests in all existing old-growth forests on forested state trust lands in western Washington as part of implementing the 1997 HCP and meeting other regulatory requirements and policy goals. Old-growth forests of 5 acres and larger that originated naturally before 1850 and are in a fully functional stage of stand development are deferred from harvest, as are very large and structurally unique trees.[10] Old-growth forests provide the types of nesting platforms used by marbled murrelets and are therefore a critical part of the overall long-term conservation strategy.

NORTHERN SPOTTED OWL STRATEGY

The 1997 HCP includes a landscape-scale conservation strategy to protect and restore habitat for the northern spotted owl in strategic locations near the Cascade Range and in the OESF on the west side of the Olympic Peninsula. Northern spotted owl habitat and marbled murrelet habitat often overlap, as both species are associated with mature and old-growth forests. The conservation objective of the HCP northern spotted owl conservation strategy in the five westside planning units is to create habitat that significantly contributes to the species' demography, distribution, and habitat contiguity by providing nesting, roosting, and foraging habitat as well as dispersal habitat in key areas. The northern spotted owl strategy for the OESF is to manage each landscape to maintain or restore threshold proportions of northern spotted owl habitat.

PROTECTION OF HABITAT FOR MULTIPLE SPECIES

As a multispecies document, the 1997 HCP employs additional strategies to ensure that uncommon habitats (such as large, structurally unique trees) are protected throughout the HCP planning units and to leave other trees (when harvests are conducted) to maintain habitat and biodiversity.

[9] Refer to https://www.dnr.wa.gov/oesf-forest-land-plan.
[10] *Policy for Sustainable Forests* (DNR 2006, p. 34).

NATURAL AREAS

Natural area preserves and natural resources conservation areas (briefly described in Chapter 1 and Chapter 3) often include mature forest habitat that is managed for long-term conservation for multiple species, including the marbled murrelet. Conservation, education, and low-impact recreation are some of the uses allowed in these areas, and harvest activities generally are not allowed.

OTHER CONSERVATION COMMITMENTS IN THE POLICY FOR SUSTAINABLE FORESTS

The *Policy for Sustainable Forests* (described in Chapter 1) provides for the identification and protection of genetic resources (stands of native trees well adapted to local conditions) and special ecological features (for example, rare ecosystem types) throughout the analysis area. These lands often contain marbled murrelet habitat or provide security forest functions or buffers to that habitat (Refer to Text Box 2.2.2).

Text Box 2.2.2. What Is Security Forest?

Security forest is a closed-canopy forested stands with trees that are greater than 80 feet tall. Located adjacent to P-stage habitat, security forest protects the habitat from edge effects including microclimate change, windthrow, and predation (Chen and others 1993, Van Rooyenand and others 2011, Raphael and others 2002, Malt and Lank 2009) and other types of disturbances.

EXISTING CONSERVATION BY TYPE

Table 2.2.2 provides a summary of the approximate number of acres providing existing multiple species conservation benefits within the analysis area. These lands form a general foundation of marbled murrelet conservation common to all of the alternatives. Some of these lands may not be forested or contain marbled murrelet habitat. But generally, when they are forested, these lands may contribute to murrelet conservation by providing security forest if next to an occupied site, or in other situations, future habitat. All acreage numbers are approximate based on current data from a variety of DNR databases.

Table 2.2.2. Designations of Types of Conservation Within the Range of the Marbled Murrelet (Rounded to Nearest 1,000; Only Non-Overlapping Acres Are Reported)

Type of conservation	Source	Approximate acres of long-term forest cover
Forested natural areas (Natural Area Preserves and Natural Resources Conservation Areas)	RCW 79.70, 79.71	89,000
Long-term conservation commitments for multiple species[11]	1997 HCP, *Policy for Sustainable Forests*	469,000

[11] Includes mostly forested habitat, with a small amount of non-forested habitat such as balds, cliffs, caves, cultural sites, historic sites, and talus slopes. These conservation commitments also include leave tree areas, inoperable areas, old growth, eagle roosts, research plots, areas of local ecological importance, riparian areas, and forested wetlands.

Type of conservation	Source	Approximate acres of long-term forest cover
Existing northern spotted owl Habitat—high-quality[12]	1997 HCP	8,000
Total		567,000[a]

[a] Throughout this RDEIS, numbers are rounded to the nearest thousand so totals may not always match.

DISPOSED LANDS

At times, DNR sells or otherwise transfers ownership or management of DNR-managed lands. Depending on the transaction agreement, a deed restriction may be placed on these lands requiring them to continue to be managed under the terms of the 1997 HCP. Disposed lands that continue the commitments of the HCP and contain current or future marbled murrelet habitat will continue to contribute to the long-term conservation strategy.[13] Although DNR receives mitigation credit (refer to Appendix H) for the disposed lands, these lands are not included in the acres of currently conserved land identified in Table 2.2.2.

Disposed lands being managed under the 1997 HCP include approximately 14,000 acres of long-term forest cover. Of these 14,000 acres, approximately 3,000 acres is marbled murrelet habitat. These 3,000 acres of habitat include 430 acres of occupied sites. Table 2.2.3 shows acres with a P-stage value receiving mitigation credit within the disposed lands.

Table 2.2.3. Acres With P-stage Value on Disposed Lands Carrying 1997 HCP Commitments

P-stage	Acres
0.25	1,069
0.36	602
0.47	155
.062	789
.089	86
1.0	429
Total	3,130

EXISTING CONSERVATION STRATEGIES AND THE MARBLED MURRELET LONG-TERM CONSERVATION STRATEGY

The existing strategies will continue, but also will be subject to the marbled murrelet long-term conservation strategy when the marbled murrelet strategy is more protective. For example, the current northern spotted owl strategy would allow harvest of high-quality northern spotted owl habitat once certain habitat thresholds are exceeded in (for example) nesting, roosting and foraging areas (although in

[12] 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).
[13] 1997 HCP Implementation Agreement (DNR 1997, Appendix B), section 17.4.

most cases these habitat thresholds are decades from being reached). However, this high-quality habitat could not be harvested if it is in an area where such harvest is not allowed under the marbled murrelet long-term conservation strategy.

Marbled Murrelet-Specific Conservation Areas

Each alternative builds on the existing foundation of currently conserved lands described in the previous section by adding strategic conservation areas specifically for the marbled murrelet. These areas are generally referred to in the RDEIS as "marbled murrelet-specific conservation areas." These areas include occupied sites, buffers, special habitat areas[14], emphasis areas, marbled murrelet management areas, and other patches of high-quality habitat. The size of these different types of conservation areas ranges from the smallest of the existing occupied sites to the largest marbled murrelet management area. Each alternative designates one or more of these conservation areas, described as follows.

OCCUPIED SITES

Occupied sites are areas previously identified through surveys as showing signs of occupancy by murrelets (refer to Appendix D). Sites vary in size, depending on survey information, geographic location, and habitat quality. Alternative A uses those occupied sites that were identified during the HCP survey work. Alternatives B through H use occupied sites that were expanded from this original set by the Science Team Report.

OCCUPIED SITE BUFFERS

Alternative A, E, F, G, and H apply a 328-foot (100-meter) buffer to the outer extent of all occupied sites. Under alternatives C, D, and E, buffers are reduced to 164 feet (50 meters) for sites 200 acres or greater in size in the OESF HCP Planning Unit. All occupied sites in the other five planning units receive a 328-foot (100-meter) buffer. Alternative B does not apply any buffers to occupied sites.

RECLASSIFIED HABITAT IDENTIFIED UNDER THE INTERIM STRATEGY

The 1997 HCP required that DNR identify higher-quality habitat types that would receive murrelet surveys to determine occupancy (DNR 1997, p. IV.40)[15]. This habitat was called reclassified habitat. All habitat found to be occupied by marbled murrelets is protected under the interim strategy, and the majority of the un-occupied, reclassified habitat also is protected. Some habitat was released for harvest under the criteria defined in the interim strategy. Alternative A designates habitat not released under the interim strategy as long-term forest cover (defined in the next section). No other alternative specifically protects reclassified habitat.

[14] In the draft amendment to the HCP for the marbled murrelet conservation strategy, DNR uses the term "marbled murrelet conservation area" instead of "special habitat area."

[15] Some of this habitat has not been surveyed; however, through concurrence letters from USFWS, DNR has been exempted from completing surveys. Refer to Appendix I.

SPECIAL HABITAT AREAS

Special habitat areas are designed to increase marbled murrelet productivity by reducing edge and fragmentation. In general, special habitat areas rely on the exclusion of active forest management to achieve a goal of reducing edge and fragmentation and growing new habitat over the long-term. Special habitat areas are designed to increase interior forest around occupied sites in specific geographic areas to benefit the species. Special habitat areas that include occupied site(s) also contain surrounding marbled murrelet habitat, modeled future murrelet habitat, and non-habitat that may function as security forest. Special habitat areas that do not contain occupied sites do contain high-quality current and modeled future murrelet habitat and non-habitat that may function as security forest. (Security forest provides additional protection to nesting habitat from wind, predators, and other types of disturbance.) Over the long term, additional marbled murrelet habitat is expected to develop in special habitat areas due to forest maturation.

The number of special habitat areas with associated occupied sites varies by alternative. The majority of special habitat areas have at least one marbled murrelet-occupied site within their borders, some have multiple occupied sites, and several do not contain an occupied site within their borders.

Alternatives C, D, E, G, and H designate special habitat areas, although the size and location of these areas varies by alternative (refer to Appendix F). Under Alternatives C, D, E, and G active forest management is excluded from special habitat areas to achieve the goal of reducing edge and fragmentation and growing new habitat over the long term. Under Alternative H, some thinning is allowed within special habitat areas. For example, thinning of non-habitat within occupied site buffers is allowed only to enhance or maintain security forest with windfirm canopies. Outside of occupied site buffers, thinning of non-habitat is allowed only within northern spotted owl habitat management areas with the goal of improving stands to develop into northern spotted owl habitat.

Individual special habitat areas are smaller in size than emphasis areas or marbled murrelet management areas.

EMPHASIS AREAS

The goal of emphasis areas is to protect occupied sites, reduce fragmentation, and grow new habitat over the long term in specific geographic areas to benefit the species. The majority of emphasis areas have multiple occupied sites within their borders and thus are larger than special habitat areas. In all emphasis areas, occupied sites receive a 0.5-mile buffer in which forest cover is maintained, improving and increasing the amount of security forest adjacent to the occupied sites. Emphasis areas also protect all existing habitat within their borders and have the goal of recruiting additional habitat, where the capability exists.

Emphasis areas allow some active forest management within their borders to achieve their goals. This active management includes both variable density thinning to facilitate the development of future habitat and variable retention harvest when such activities do not delay achievement of future habitat goals for the emphasis area. Alternatives C, E, and G designate emphasis areas.

MARBLED MURRELET MANAGEMENT AREAS

Marbled murrelet management area (MMMA) goals are to protect occupied sites and to increase future marbled murrelet habitat within their borders. MMMAs are larger in size than either special habitat areas or emphasis areas. MMMAs are located in geographic areas that will increase support for the species. MMMAs were originally designated in the Science Team Report, which includes maps of these areas for four of the six HCP planning units. For this RDEIS, MMMAs were added for North and South Puget HCP planning units (refer to Appendix F). MMMAs allow thinning that facilitates development of future marbled murrelet habitat. Only Alternatives F and G designate MMMAs. Some management activities are allowed in these areas, consistent with habitat development and protection.

HIGH-QUALITY HABITAT STANDS

High-quality habitat stands are existing stands of marbled murrelet habitat with P-stage values of 0.47 to 0.89. These stands are not otherwise identified as occupied sites or as part of the other conservation areas described in the preceding sections. Alternatives C, E, and G designate these habitat stands for conservation, in addition to special habitat areas and emphasis areas.

Polygons of Habitat Identified by WDFW

WDFW and USFWS conducted an analysis of DNR's large data overlay outputs to identify areas in which the P-stage model did not identify potential existing habitat or applied a lower P-stage value than thought appropriate based on expert opinion. They used site visits and ortho-photographic imagery to conduct this analysis. The polygons identified through this analysis are only included in Alternative G.

The large data overlay is DNR's complex geographic information system (GIS) model comprised of hundreds of individual data sources describing DNR-managed lands; refer to Chapter 7 for more information.

Current P-stage Habitat in the OESF

Alternative G includes *all* current marbled murrelet habitat in the OESF HCP Planning Unit.

Conservation Areas Comparison

Table 2.2.4 shows a comparison of acres by type of conservation area under the alternatives. Acres reported in this table are only those which do not overlap the existing conservation commitments reported in Table 2.2.2. For example, there are 43,000 (Alternative A) to 59,000 (alternatives B through H) total acres of occupied sites on DNR-managed lands, of which either 7,000 acres (Alternative A) or 9,000 acres (alternatives B through H) are not located in existing conservation areas.

Table 2.2.4. Approximate Acres of Marbled Murrelet-Specific Conservation, by Alternative (Rounded to the Nearest 1,000)

Murrelet-specific conservation acres (2016)	Alternative							
	A	B	C	D	E	F	G	H
Occupied sites	7,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
Occupied site buffers	12,000	n/a	13,000	13,000	13,000	16,000	16,000	16,000
Habitat identified under interim strategy	14,000	n/a	n/a	n/a	n/a	3,000	n/a	n/a
Marbled murrelet management areas	n/a	n/a	n/a	n/a	n/a	76,000	13,000	n/a
Emphasis areas	n/a	n/a	14,000	n/a	14,000	n/a	16,000	n/a
Special habitat areas	n/a	n/a	9,000	29,000	14,000	n/a	12,000	18,000
High-quality P-stage (0.47 to 0.89) habitat patches	n/a	n/a	6,000	n/a	5,000	n/a	11,000	n/a
Existing northern spotted owl habitat—low-quality[16]	n/a	n/a	n/a	n/a	n/a	72,000	n/a	n/a
Total	**33,000**	**9,000**	**50,000**	**51,000**	**55,000**	**176,000**	**76,000**	**43,000**

■ Putting It All Together: Long-term Forest Cover

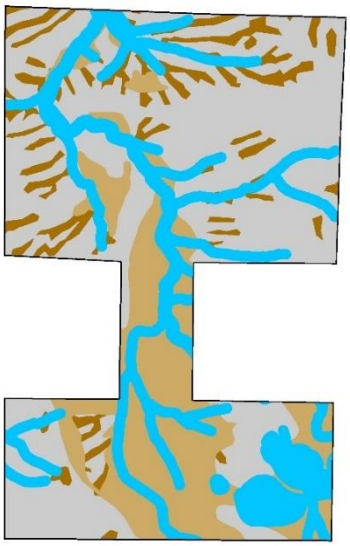
The combination of lands that provide marbled murrelet conservation through existing DNR policies (for example, riparian zones), plus marbled murrelet-specific conservation areas, provides a network of long-term forest cover for the murrelet on DNR-managed lands. Long-term forest cover means lands on which DNR maintains and grows forest cover for conservation purposes, including habitat conservation for the marbled murrelet, through the life of the 1997 HCP. (Refer to Figure 2.2.2 and Appendix G for a more detailed description of long-term forest cover.) The conservation lands included in long-term forest cover often overlap (refer to Figure 2.2.2). For example, some acres of high-quality northern spotted owl habitat also may be within a special habitat area. Summary data provided throughout the RDEIS does not double-count these overlapping acres for the purposes of assigning take or mitigation or analyzing impacts. Note that the amount of long-term forest cover that is mapped now may change over time as field inspections more accurately map lands in some categories. It is expected that these potential changes would not be significant.

Figure 2.2.2 illustrates this important long-term forest cover concept. For example, assume that the total DNR-managed acreage within the left map is 1,000 acres. The left map further identifies 200 acres in riparian areas, 100 acres in steep slopes, and 100 acres in northern spotted owl habitat. The map in the center then adds 300 acres of marbled murrelet-specific conservation, much of which overlaps these other

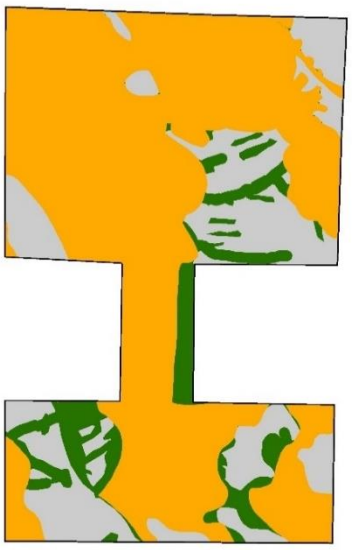
[16] For the purpose of this RDEIS, northern spotted owl low quality habitat refers to the following DNR mapped habitat classes as of 2018: dispersal habitat, movement plus habitat, structural habitat, sub-mature habitat, and next best stands.

areas. The map on the right combines all the different long-term forest cover designations, for a total of 700 acres of long term forest cover within the 1,000 acre block of DNR-managed land.

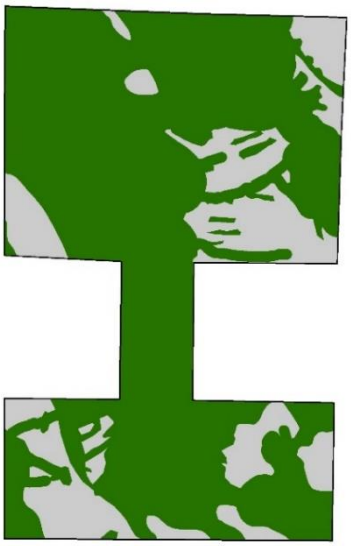
Figure 2.2.2. Illustration of Different Components of Long-term Forest Cover on a Block of DNR-Managed Land



Existing conservation areas: riparian (blue), steep slopes (brown), owl habitat (light brown)



+ Marbled murrelet-specific conservation areas (orange) layered on existing conservation (green)



= Long-term forest cover (green)

■ Do the Alternatives Include New Conservation Measures to Protect the Marbled Murrelet?

A variety of management and land use activities occur on DNR-managed forestlands, including lands within long-term forest cover. Some of these activities have the potential to negatively impact the marbled murrelet or its habitat.

Certain impacts to marbled murrelets can be classified as incidental take. Under the Endangered Species Act, the definition of take includes harm to a listed species.[17] The Endangered Species Act's implementing regulations define harm to include "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" (50 CFR 17.3). Incidental take as defined under the Endangered Species Act regulations is take of a listed species that results from, but is not the purpose of, carrying out an otherwise lawful activity. The harvest of marbled murrelet habitat is an example of incidental take. One approach to mitigate incidental take can be to provide habitat in other locations that offsets it temporally and spatially. The USFWS is responsible for conducting a detailed analysis of the take and mitigation prior to issuing an incidental take permit.

Existing and ongoing activities, such as use of recreation facilities and existing forest roads, are expected to continue throughout long-term forest cover, as defined in the 1997 HCP. The Joint Agencies conducted an analysis of common, ongoing forest management activities and incorporated a level of "disturbance take" into the take and mitigation framework for the long-term conservation strategy (refer to Appendix H for more information).

The Joint Agencies also identified new, intensified, or expanded forest management activities that could create new impacts to marbled murrelets through the life of the 1997 HCP, including disturbing the birds during nesting and breeding season. To address these potential impacts, the action alternatives propose new conservation measures. Most conservation measures apply specifically to marbled murrelet conservation areas. Where other HCP conservation strategies, DNR requirements or policies, or state law

Text Box 2.2.3. What Activities Occur on DNR-Managed Lands?

A variety of activities and land uses occur on the 1.38 million acres of DNR-managed forestlands in the analysis area. These activities include but are not limited to the following:

- Timber management and timber harvest
- Road building and maintenance
- Forest health treatments and salvage
- Wildfire control
- Passive and active recreation (hiking, biking, camping, hunting and fishing, off-road vehicle use)
- Leases for exploring valuable minerals and energy sources
- Development of utilities transportation corridors
- Tribal and cultural uses including collection of timber and non-timber products
- Research

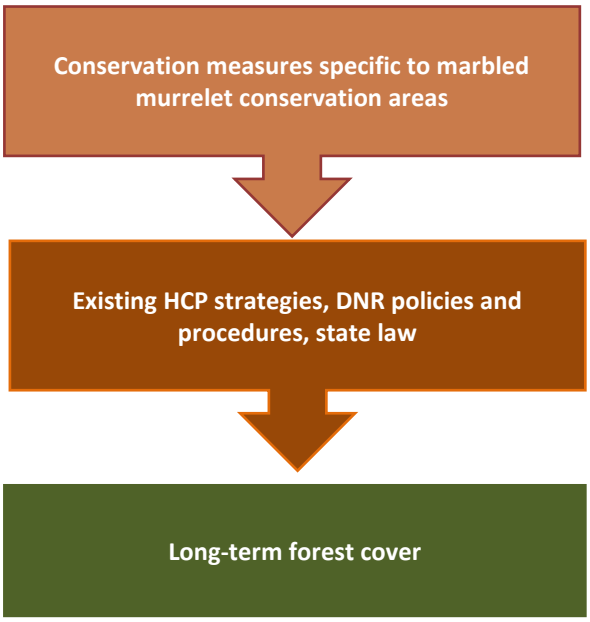
The Joint Agencies took these many diverse activities and uses into account when designing conservation measures to reduce impacts to marbled murrelets.

[17] 16 U.S.C. §1532(19).

also apply to long-term forest cover, the most restrictive requirement will be followed (refer to Figure 2.2.3).

Alternative A, the no action alternative, does not include these proposed new conservation measures. Management and land use activities under Alternative A would instead be governed by the existing management strategies in the 1997 HCP.

Figure 2.2.3. Hierarchy of Requirements Applicable to Long-Term Forest Cover



■ Proposed Conservation Measures (Action Alternatives)

The following conservation measures are common to all the action alternatives, with some variation where noted in the following sections. The measures address activities that are most likely to cause impacts to nesting murrelets or their young, including activities that could attract predators or activities that generate noise.

For purposes of these conservation measures, **the nesting season is defined as April 1 through September 23** (USFWS 2013). Daily timing restrictions are used to minimize potential impacts of an activity during daily peak activity periods for the murrelet during this nesting season. The daily timing restrictions are one hour before official sunrise to two hours after official sunrise and from one hour before official sunset to one hour after official sunset.

Harvest and Harvest-Related Infrastructure and Forest Management

HARVEST

Timber harvest activities on lands located inside long-term forest cover but outside murrelet conservation areas will be consistent with the specific management objectives of those lands. Those objectives are defined by the conservation strategy or policy applicable to the land (for example, the westside riparian conservation strategy or old-growth forest policy in the *Policy for Sustainable Forests*). Variable retention harvest will be prohibited in the following:

- Occupied sites and their buffers, including the 0.5 mile buffer of occupied sites in emphasis areas
- Special habitat areas
- MMMAs (except where harvest is consistent with the Science Team recommendations for the OESF HCP Planning Unit)
- Other blocks of high-quality habitat identified by an alternative

Where different strategies overlap, the most restrictive requirement will apply (Figure 2.2.3).

THINNING AND RELATED SILVICULTURE

Thinning and related silviculture prescribed by an underlying plan or policy, such as the HCP riparian conservation strategies, *OESF HCP Planning Unit Forest Land Plan*, or natural areas management plans, will continue if these areas are not otherwise part of a designated marbled murrelet conservation area. Some thinning and related silviculture may be allowed in marbled murrelet conservation areas when those activities are consistent with maintaining murrelet habitat and providing security forest. Specific measures for thinning and silviculture are summarized in Table 2.2.5 and are described under each alternative profile in the next section.

Table 2.2.5. Thinning Requirements in Long-Term Forest Cover (LTFC)
(Variable Density Thinning or Pre-Commercial Thinning)

Element of LTFC	LTFC outside of emphasis areas, special habitat areas, and MMMAs	Emphasis areas	Special habitat areas	MMMAs
Occupied sites	Not allowed	Not allowed	Not allowed	Not allowed
Occupied site buffers	Allowed to enhance or maintain security forest with windfirm canopies	Allowed to enhance or maintain security forest with windfirm canopies	Not allowed in habitat in any alternative. Under Alternative H, allowed in non-habitat only to enhance or maintain security forest with windfirm canopies	Allowed to enhance marbled murrelet habitat with windfirm canopies
0.5-mile occupied site buffers	n/a	Allowed to enhance or maintain security forest	n/a	n/a
Current murrelet habitat	Not allowed	Not allowed	Not allowed	Not allowed
Future murrelet habitat	Allowed	Allowed	Not allowed	Allowed
Non-murrelet habitat	Allowed	Allowed	Not allowed for alternatives C, D, E and G Allowed for Alternative H and must be within a northern spotted owl habitat management area	Allowed

Element of LTFC	LTFC outside of emphasis areas, special habitat areas, and MMMAs	Emphasis areas	Special habitat areas	MMMAs
Potentially unstable slopes	Allowed consistent with geologic assessment	Allowed consistent with geologic assessment	Not allowed for alternatives C, D, E and G Allowed for Alternative H consistent with geologic assessment and to accelerate development of northern spotted owl habitat	Allowed consistent with geologic assessment
Riparian areas	Allowed consistent with riparian conservation strategies	Allowed consistent with riparian conservation strategies	Not allowed for alternatives C, D, E and G Allowed for Alternative H to accelerate development of northern spotted owl habitat	Allowed consistent with riparian conservation strategies
Northern spotted owl habitat (refer to Table 2.4.1 for northern spotted owl habitat definitions)	Allowed in low-quality owl habitat. Allowed in high quality owl habitat only if thinning maintains habitat conditions	Allowed in low-quality owl habitat. Allowed in high quality owl habitat only if thinning maintains habitat conditions	Not allowed	Allowed in low-quality owl habitat. Allowed in high quality owl habitat only if thinning maintains habitat conditions
Natural area preserves and natural resources conservation areas	Allowed consistent with management plan	Allowed consistent with management plan	Not allowed	Allowed consistent with management plan

FOREST HEALTH TREATMENTS

Forest health treatments will be allowed throughout long-term forest cover in accordance with site-specific management prescriptions, other marbled murrelet conservation measures, and state law. Daily

timing restrictions during the nesting season will be followed. Prescribed burning will be kept greater than 0.25 miles from occupied sites during the nesting season.

FOREST ROADS

DNR builds and maintains forest roads throughout long-term forest cover to provide access to harvestable timber stands. These roads also are used for access to fishing, hunting, and camping sites and hiking trails; and for motorized and non-motorized recreational activities. Forest roads create forest edges, which can attract common predators of murrelet eggs and young, including Steller's jays and other corvids. Motorized vehicle use also may cause noise disturbance to nesting murrelets. Use of existing forest roads is covered by the 1997 HCP. Construction or reconstruction of forest roads in marbled murrelet conservation areas would be subject to the conservation measures in Table 2.2.6.

Table 2.2.6. Forest Road Conservation Measures for New Road Construction and Existing Road Reconstruction in Conservation Areas

Activity	LTFC outside of marbled murrelet conservation areas	Occupied sites and buffers	Emphasis areas	Special habitat areas	MMMAs
New road construction, waste area construction, or rock pit expansion	Allowed consistent with other conservation strategies and policies	Allowed under alternatives B, E, F, and H only if necessary; consult with USFWS to minimize impacts. Not allowed under alternatives C, D, and G unless otherwise required by state or federal laws or emergency (for example, a culvert or bridge replacement)	Allowed consistent with other conservation strategies and policies, refer to restrictions for occupied sites and buffers	Allowed under alternatives E, F, and H only if necessary; consult with USFWS to minimize impacts. Not allowed under alternatives C, D, and G unless otherwise required by state or federal laws or emergency (for example, a culvert or bridge replacement).	Allowed consistent with other conservation strategies and policies, refer to restrictions for occupied sites and buffers
Road reconstruction	Allowed consistent with other conservation strategies and policies	Allowed only if necessary; consult[17] with USFWS to minimize impacts. Must meet forest practices road standards. If within 328 feet (100 meters) of an occupied site, must follow daily timing restrictions if the activity takes place within the nesting season.			

Activity	LTFC outside of marbled murrelet conservation areas	Occupied sites and buffers	Emphasis areas	Special habitat areas	MMMAs
Road decommissioning and abandonment	Allowed consistent with other conservation strategies and policies	Allowed. If within 328 feet (100 meters) of an occupied site, must follow daily timing restrictions if the activity takes place within the nesting season.			

HARVEST-RELATED INFRASTRUCTURE

The building and installation of infrastructure needed for harvest activities are limited in conservation areas as follows:

- Tailholds, guylines, and rigging in occupied sites must be installed outside the nesting season. In occupied sites, occupied site buffers, and special habitat areas, impacts to platform trees from tailholds, guylines, and rigging must be avoided when possible.
- New landings are prohibited in occupied sites, occupied site buffers, and special habitat areas under Alternatives A through G. Under Alternative H, landings are allowed in occupied sites and occupied site buffers when no other location is feasible, however if the landing is within habitat, DNR will consult with USFWS to minimize and mitigate impacts. Landings should be avoided in other conservation areas; otherwise, landings should be installed outside the nesting season or follow daily timing restrictions if installing during nesting season. Landing installation will minimize removal of platform trees and require approval by the DNR regional manager in the region in which the installation takes place.
- Yarding corridors should not be located in conservation areas unless no other route is feasible. If a yarding corridor through an occupied site or special habitat area is deemed necessary, DNR will consult with USFWS.

Refer to Chapter 7 for definitions of common logging terms such as tailholds and yarding.

SALVAGE AND RECOVERY

Sometimes, natural disturbance events such as a wind event can result in forest stands being blown down or otherwise damaged or killed. Salvage and restoration within marbled murrelet-specific conservation areas may occur under the proposed alternatives, if such action will contribute to the recovery of habitat or security forest. Salvage or recovery will require a site-specific restoration plan prepared with input from the region's wildlife biologist. Salvage must take place outside the nesting season when feasible. When not feasible, the activity will follow daily timing restrictions. If standing platform trees must be removed, DNR will consult with USFWS. DNR may conduct reforestation or regeneration activities after

salvage consistent with the site-specific marbled murrelet habitat restoration plan. These activities may include silvicultural treatments such as site preparation and vegetation management.

Noise-Generating Activities

In 2013, USFWS published a biological opinion (USFWS 2013) that contained an analysis of noise-generating activities with the potential to disturb or disrupt nesting marbled murrelets. The action alternatives were designed with consideration of the analytical approach used in the 2013 biological opinion and include the following conservation measures as a result.

BLASTING

Impulsive noise can negatively impact murrelets (USFWS 2013) by affecting the hearing of the young or adults and/or disrupting normal nesting behaviors. Blasting of hard rock materials occurs throughout DNR-managed lands, associated either with DNR's own rock pits (sources of material for road building and maintenance), road construction activities, or resource extraction from leased rock pits. Two different conservation measures are proposed to address potential impacts from blasting in long-term forest cover (refer to Table 2.2.7).

Table 2.2.7. Conservation Measures to Address Blasting Impacts
(Associated With Forest Road Construction, Maintenance, or Extraction of Valuable Materials)

Alternatives B, E, and F	Alternatives C, D, G, and H
If needed during the nesting season, blasting is allowed within the following, but DNR will consult with USFWS to avoid, minimize, and mitigate impacts to murrelet nests. • Special habitat areas • The 0.5-mile buffer of occupied sites within emphasis areas • 0.25 mile of occupied sites	During the nesting season, blasting is prohibited within the following: • Occupied sites • Occupied site buffers • Special habitat areas • The 0.5-mile buffer of occupied sites within emphasis areas • 0.25 mile of occupied sites

CRUSHING AND PILE-DRIVING

Within 360 feet (110 meters) of occupied sites, crushing and pile-driving activities will take place outside the nesting season when feasible; if the activity must take place during the nesting season, it must follow daily timing restrictions.

AERIAL ACTIVITIES

Low-flying airplanes and helicopters are operated or contracted by DNR for a number of activities in or adjacent to marbled murrelet conservation areas, including aerial spraying of herbicides or fertilizers to prepare sites or manage vegetation, helicopter logging operations, maintenance of communication towers, and road and trail maintenance such as bridge replacement. Under some circumstances, aircraft overflights can disrupt the normal nesting behaviors of marbled murrelets. To reduce the likelihood of those potential impacts, all action alternatives except Alternative H apply the USFWS-recommended

disturbance distance buffers during the nesting season from occupied sites, special habitat areas, and the 0.5-mile buffer of occupied sites in emphasis areas as follows:

- **Chinook 47d helicopters**: 265 yards or less
- **Boeing Vertol 107, Sikorsky S-64 (SkyCrane) helicopters**: 150 yards or less
- **Other small helicopters and fixed-wing aircraft**: 110 yards or less

Alternative H applies the USFWS-recommended disturbance distance buffers during the nesting season to occupied sites.

Aerial application of herbicides will follow daily timing restrictions during the nesting season.

Recreation

A wide variety of recreational activities occur on DNR-managed lands. Existing recreation is covered under the HCP as a *de minimis* use, and DNR regularly consults with USFWS for new activities that could potentially impact murrelet habitat. The action alternatives propose three approaches to avoid, minimize, and mitigate the impacts from *new or expanded* recreation activities for the murrelet as follows:

Table 2.2.8. Conservation Measures to Address Recreation Impacts

(Recreation Facilities, Trails and Leases Include New or Expanded Facilities, Such as Campgrounds, Day Use Areas, Sno-park Sites, and Trailheads; New or Expanded Motorized Trails; and New or Expanded Non-motorized Trails)

Alternative	Conservation Measure
Alternative H	Existing facilities, trails, and recreation leases are allowed within occupied sites, occupied site buffers, and special habitat areas. All proposed new or expanded recreation facilities, trails, and recreational leases in occupied sites, occupied site buffers, and special habitat areas will be evaluated by DNR for potential murrelet habitat impacts, including potential removal of habitat and disturbance to nesting birds from facility or trail development or use in these areas. If impacts are identified, and DNR decides to pursue these activities, DNR will consult with USFWS. Facility or trail siting and design may be restricted or conditioned by the agencies to avoid, minimize, and mitigate murrelet impacts. Conversion of any existing non-motorized trails to motorized use within these areas is prohibited. DNR may decommission or abandon illegal trails in occupied sites, occupied site buffers, and special habitat areas. Maintenance or improvements is allowed within the footprint of existing facilities, trails, trailheads, and recreational leases within occupied sites, occupied site buffers, and special habitat areas (including upgrades to deal with health and safety or environmental damage). These activities should take place outside the nesting season, or following daily timing restrictions during the nesting season.
Alternatives B, E, and F	All proposed new or expanded recreation facilities, trails, and recreational leases in special habitat areas and MMMAs occupied sites and their buffers, including the 0.5-mile occupied site buffer within emphasis areas, will be evaluated by DNR for potential murrelet habitat impacts,

Alternative	Conservation Measure
	including potential removal of habitat and disturbance to nesting birds from facility or trail development or use in these areas. If impacts are identified, and DNR decides to pursue these activities, DNR will consult with USFWS. Facility or trail siting and design may be restricted or conditioned by the agencies to avoid, minimize, and mitigate murrelet impacts. Routine maintenance, as well as maintenance and improvements to facilities and trails located in these areas, is allowed to deal with health, safety, or environmental issues. Illegal facilities and trails may be decommissioned or abandoned within murrelet habitat. All construction, decommissioning, and maintenance activities within occupied sites, buffers, special habitat areas, or MMMAs shall follow daily timing restrictions during the nesting season, or take place outside the nesting season when feasible.
Alternatives C, D, and G	No development of any new or expanded recreation facilities, trails, and recreational leases is allowed in special habitat areas, occupied sites, or their buffers, including the 0.5-mile occupied site buffer within emphasis areas. Conversion of any existing non-motorized trails to motorized use is prohibited within these areas. DNR, in consultation with USFWS, may decommission or abandon illegal trails in these areas. Maintenance or improvements are allowed within the footprint of existing facilities, trails, and recreational leases within special habitat areas, emphasis areas, and occupied sites and buffers (including upgrades to deal with health and safety or environmental damage). These activities should take place outside the nesting season, or following daily timing restrictions during the nesting season.

Other Non-Timber Harvest Land Uses

In addition to the activities described in the preceding sections, DNR-managed lands accommodate uses that have the potential to result in impacts to nesting murrelets or removal of potential murrelet habitat. For all action alternatives, the following conservation measures are proposed to avoid, minimize, and mitigate potential impacts from non-timber harvest activities.

EASEMENTS AND RIGHTS-OF-WAY

DNR grants easements and rights-of-way for federal and non-federal projects (for example, utility corridors, public roads, or private road access to inholdings). Easements are subject to the conditions of their contracts and the 1997 HCP and are not affected by the alternatives in this RDEIS.

LEASES AND CONTRACTS

DNR grants leases, contracts, and special use permits on its lands to external parties for a variety of activities, including valuable materials sales, oil and gas exploration, mining and prospecting, recreational events, communications facilities, and other special uses. Contracts and leases are subject to the conditions of their contracts and the 1997 HCP and are not affected by the alternatives in this RDEIS.

RESEARCH

Non-invasive research will be allowed in long-term forest cover at all times. Invasive activities (those causing prolonged audiovisual disturbance or involving heavy equipment) must occur outside the nesting season within conservation areas and current and future habitat in long-term forest cover. Cutting of trees for research purposes is prohibited in conservation areas and current and future habitat in long-term forest cover, unless approved by both DNR and USFWS.

EMERGENCY OPERATIONS

All fire suppression activities, including aerial fire operations and aircraft, are allowed in long-term forest cover following "minimum impact suppression tactics" guidance.[18]

Other Forest Management Activities

For activities not listed in this section, DNR will follow the existing language of the 1997 HCP and the 1997 HCP Implementation Agreement.

■ How Will New Conservation Measures be Applied to Lands Already Managed Under an Existing HCP Strategy, Law, or Policy?

Management of lands already deferred from harvest or otherwise conserved will generally continue under their governing laws, policies, and management strategies as described earlier in this chapter. The 1997 HCP defines what levels of activity are *de minimis* or otherwise covered (DNR 1997, p. IV.191 through 210). Under Alternative A, the no action alternative, the current 1997 HCP, and subsequent concurrence letters (refer to Appendix I) define how forests are managed for conservation purposes. DNR frequently consults with USFWS on management activities that could impact marbled murrelet habitat.

If, as described in the preceding section, a marbled murrelet conservation area with special conservation measures overlaps one of these existing deferred lands, then the most restrictive measure will apply. If, for example, a new road would be allowed through a riparian management zone in accordance with the RFRS but there is a restriction on road building through an occupied site within that riparian management zone (as in Alternatives C and D), road building would avoid that occupied site. Conversely, if some riparian harvest is allowed under the RFRS, and the land is not otherwise designated as murrelet habitat, the harvest may proceed, with mitigation provided.

[18] Refer to *NWCG Guidance on Minimum Impact Suppression Tactics*, 2003.

■ What Happens Outside Long-Term Forest Cover?

Forestlands outside long-term forest cover will continue to be managed per DNR policies and rules, including the 1997 HCP, sustainable harvest calculation, forest practice rules, and other state and federal laws (refer to Chapter 1). Once the board approves a final HCP amendment that includes a long-term marbled murrelet conservation strategy and amended incidental take permit from USFWS, all DNR-managed lands within the planning area will be subject to the incidental take permit. Any harvest of murrelet habitat in areas outside of long-term forest cover will be considered potential incidental take that is mitigated by habitat within long-term forest cover (now and in the future) and other marbled murrelet-specific conservation approaches through the life of the 1997 HCP. Section 2.4 and Chapter 4 summarize potential impacts and mitigation expected under each alternative.

Text Box 2.2.4. Is All Forestland Outside Long-term Forest Cover Subject to Harvest?

Not necessarily. The sustainable harvest calculation (refer to Chapter 1) determines the harvest level for lands that are not otherwise deferred by state law or DNR policy, including the 1997 HCP. There are many constraints on harvest, including policies that require hydrologic maturity or protect habitat for other species. Operational costs also affect where and when a harvest will occur.

2.3 Profiles of the Alternatives

This section describes each alternative in detail. Descriptions will focus on the location, composition, distribution, and quality of marbled murrelet conservation among the HCP planning units in the analysis area.

■ Location

In the following section, maps showing where long-term forest cover is located, as well as the location of any murrelet-specific conservation areas (for example, special habitat areas), are provided at the scale of the entire analysis area. Appendix F includes maps for each planning unit or at smaller scales when necessary. The maps provided in this section were created using DNR geographic information system GIS data from 2018. The polygons drawn to represent the boundaries of long-term forest cover are based on the best estimates of the location of these areas for purposes of environmental analysis. These maps are built with the expectation that the final marbled murrelet long-term conservation strategy that the board adopts and USFWS evaluates for the HCP amendment will include more precisely refined polygons.

Where Are Strategic Locations for Marbled Murrelets?

For Alternatives C through H, DNR-managed lands can be segregated into two types of landscapes: high value landscapes and marginal landscapes. The high value landscapes can be further separated into strategic locations and other high value landscapes.

Strategic locations are geographic areas within Washington that the Joint Agencies view as having a disproportionately high importance for murrelet conservation. These areas are important for one or more of the following reasons:

- Proximity to marine waters (within 40 miles), including proximity to marine "hotspots" (Raphael et al. 2015), which are areas with higher-than-average murrelet density
- Proximity to known occupied sites
- Abundance of habitat
- Abundance and distribution of occupied sites
- Capacity for developing future habitat based on forest types
- Protection from disturbance
- Proximity to federal lands

The Joint Agencies identified strategic locations for the marbled murrelet through the process of developing the analytical framework for the long-term conservation strategy (refer to Appendix B) and DNR's preferred alternative (Alternative H). The strategic locations are as follows (Refer to Figure 2.3.1):

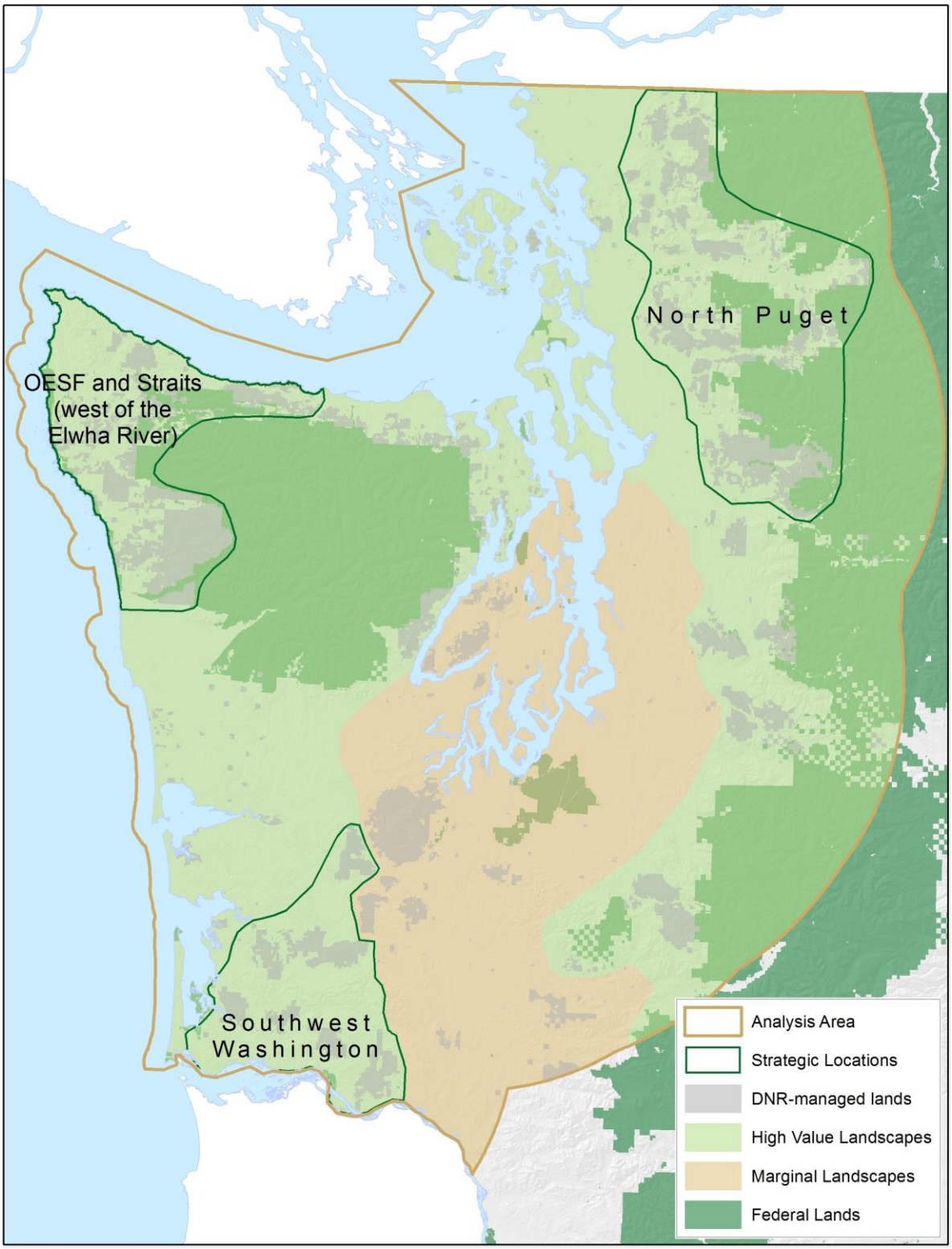
- Southwest Washington
- OESF and Straights (west of the Elwha River)
- North Puget

Strategic locations were identified based on the specific characteristics of each geographic location:

- The Southwest Washington strategic location captures areas that are in close proximity to marine waters, but where federal ownership is lacking.
- The OESF and Straits west of the Elwha River strategic location contains an abundance of high quality habitat, is in close proximity to marine waters, and also is close to areas identified by Raphael and others (2015) as "marine hot spots."
- The North Puget strategic locations provides forested landscapes within commuting distance to nest sites from marine foraging areas around the San Juan Islands, which were identified by Raphael and others (2015) as "hot spots" due to heavy murrelet use and prey availability.

The OESF and Straits west of the Elwha strategic location and the North Puget strategic location contain the most acres of land contributing to marbled murrelet conservation.

Figure 2.3.1 Landscapes and Strategic Locations for the Marbled Murrelet



The 1997 HCP did not reflect these strategic locations because insufficient information was available on the murrelet at that time. Instead, the 1997 HCP subdivided DNR-managed lands into ecological units called "HCP planning units." These planning units were delineated by clustering Water Resource Inventory Areas that drain to common water bodies. HCP planning units encompass all DNR-managed lands covered by the 1997 HCP, but do not emphasize strategic locations for the marbled murrelet specifically. Refer to Figure 1.3.1 for a map depicting the HCP planning units.

Other high value landscapes may also contain important marbled murrelet habitat and are located within 3 miles (five kilometers) of an occupied site.

Marginal landscapes are less valuable for long-term marbled murrelet conservation. To define marginal murrelet landscape, the Joint Agencies considered multiple factors:

- Areas that are further than three miles (five kilometers) from known occupied sites
- Areas with fewer observations of murrelet nesting behavior
- Areas that are further from murrelet critical habitat on federal lands
- Current habitat distribution
- Areas with diminished capability for developing future habitat

There is only one marginal landscape identified in the RDEIS (Figure 2.3.1). This marginal landscape include more than 224,000 acres of DNR-managed lands located primarily in the Puget Trough lowlands from the Kitsap Peninsula south to the Columbia River (refer to Figure 2.3.1). This landscape currently contain low amounts of murrelet habitat (about two percent) in small, scattered patches; is located further than three miles (five kilometers) from any known occupied murrelet sites; and has a relatively low capacity for developing future habitat within the life of the 1997 HCP.

An example of what makes this landscape marginal for marbled murrelet habitat is Capitol State Forest, a large block of DNR-managed land within the landscape. Capitol State Forest encompasses more than 95,000 acres of DNR-managed lands, but currently contains relatively little murrelet habitat (less than 2,000 acres). DNR conducted marbled murrelet surveys at more than 450 survey stations located within Capitol State Forest. Murrelet presence was detected at only one survey station, and no murrelet occupancy behaviors were observed during any of the surveys. Capitol State Forest has been intensively managed for timber production for many decades, and is comprised of forest dominated by second-growth Douglas-fir plantations, which have a low capability to develop into murrelet habitat during the life of the 1997 HCP. Due to the limited and fragmented nature of habitat in Capitol State Forest, and no known occupied murrelet sites, the Joint Agencies consider Capitol State Forest to be marginal for murrelet conservation.

Quality and Quantity of Habitat

Long-term forest cover includes both habitat (forested areas with a P-stage value) and non-habitat. Non-habitat might be young or immature forest that may not develop into habitat through the life of the 1997 HCP, but still provides security to habitat by buffering interior forest stands from predation, wind, and other disturbances. Some areas of non-habitat in the first decade of the analysis period will mature into habitat by the final decade of the 1997 HCP. The quality of habitat (measured by P-stage value) also improves over time within long-term forest cover.

Under every alternative, more habitat becomes available through the life of the 1997 HCP.

Text Box 2.3.1. Does More Habitat Develop Over Time?

Yes. Under every alternative, more and higher-quality nesting habitat becomes available through the life of the 1997 HCP as forests grow and mature within long-term forest cover.

Alternative Descriptions

The following section contains a description of each of the alternatives. For each alternative, a description of amount of long-term forest cover, types of conservation areas included, and acres of both marbled murrelet specific and total murrelet habitat are provided. Each alternative description also includes a chart showing starting and final decade habitat by landscape and a map showing the conservation areas for that alternative. As described in Section 2.2 and shown in Table 2.2.1, there are 567,000 acres of existing conservation common to all of the alternatives.

Alternative A

Alternative A is the no action alternative. It continues DNR operations as authorized under the 1997 HCP and incidental take permits for all of the west-side planning units. It conserves habitat identified under the HCP interim strategy and also continues implementation of the 1997 HCP as described in subsequent joint concurrence letters for marbled murrelet conservation. This alternative includes approximately **600,000** acres of long-term forest cover, with specific murrelet conservation lands that include the following:

- All HCP-surveyed occupied sites, with 328-foot (100-meter) buffers
- All reclassified habitat in the OESF HCP Planning Unit
- Resumption of inventory surveys where they were not completed
- All reclassified habitat in the Straits, South Coast, and Columbia HCP planning units that has not been identified as "released" for harvest under the interim strategy
- In the North Puget and South Puget HCP planning units, all suitable habitat that has not been identified as "released" for harvest subject to the 2007 and 2009 concurrence letters, all newly identified habitat, and all potential habitat.[19] Refer to the following section for further information on this habitat.

Table 2.3.1 provides a summary of marbled murrelet conservation acres and total conservation acres under Alternative A.

Table 2.3.1. Marbled Murrelet-Specific Conservation Acres, Acres in Existing Conservation, and Total Acres by Conservation Area Type in Long-term Forest Cover, Alternative A

Type of conservation area	Marbled Murrelet Specific Conservation Acres (estimated)	Acres in Existing Conservation by Conservation Area Type	Total Acres in each Conservation Area Type
Occupied sites	7,000	36,000	43,000
Occupied site buffers	12,000	16,000	28,000
Habitat identified under the interim strategy	14,000	72,000	86,000
Total acres	33,000	n/a	n/a

[a] Total conservation acres cannot be summed because there is overlap between the types of conservation areas.

[19] The P-stage model was not used under the 1997 HCP to identify habitat. To allow Alternative A to be compared with the action alternatives, the P-stage model was applied to North and South Puget planning unit habitat to approximate suitable habitat located in these planning units.

FOREST MANAGEMENT UNDER THE NO ACTION ALTERNATIVE

Timber harvest in and adjacent to occupied sites is limited under the no action alternative, but these limits vary by HCP planning unit. Common elements to all HCP planning units include the following:

- All HCP-surveyed occupied sites are deferred from harvest.
- 328-foot (100 meter) buffers are applied to all occupied sites.
- Daily timing restrictions may be applied for forest management activities during the critical nesting season adjacent to all occupied sites. (These restrictions are evaluated on a case-by-case basis.)
- Forests in the OESF HCP planning unit will be managed under the OESF forest land plan.

HOW IS MURRELET HABITAT DEFINED UNDER THE INTERIM STRATEGY?

Depending on the planning unit, the interim strategy identifies areas of "reclassified habitat" and "potential" or "suitable habitat" for marbled murrelet conservation. For the four westernmost planning units, habitat types were designated based on habitat relationship studies in which DNR collected a wide variety of forest data from 54 study plots located in stands with a range of habitat quality characteristics. DNR then surveyed each of these plots to determine which were occupied by marbled murrelets and used that relationship between forest characteristics and occupancy to predict occupancy across the west side using a habitat relationship study predictive model (Prenzlow Escene 1999). DNR sorted the acres identified by the model to determine habitat quality from low to high. As explained earlier in this chapter, higher-quality habitat types that would receive murrelet surveys to determine occupancy (DNR 1997, p. IV.40) were called reclassified habitat.

Southwest Washington, the OESF, and the Straits Planning Units

All reclassified habitat within the OESF and Southwest Washington, defined as those portions of the Columbia and South Coast HCP planning units west of Interstate 5 and that portion of the South Coast planning unit south of Highway 8 and south of Highway 12 between the towns of Elma and Aberdeen, is deferred from harvest. Reclassified habitat in Straits, the northwestern portion of South Coast, and the far eastern portion of the Columbia HCP planning unit *is* available for harvest if 50 percent of the habitat will remain within the watershed administrative unit and if the habitat is greater than 0.5 mile from an occupied site. Per Step 4 of the interim strategy DNR has, on a case by case basis, released for harvest reclassified habitat in the area where this release is allowed.

North and South Puget Planning Units

In the North and South Puget HCP planning units, the habitat relationship study predictive model did not accurately predict habitat. An alternative approach to using this model was developed by the Joint Agencies in 2007 and 2009 in "concurrence letters." These concurrence letters (Appendix I) established a stepwise process for how murrelet habitat is identified and managed in the North and South Puget HCP planning units. Habitat meeting the definition of "suitable habitat" that has not been surveyed for marbled murrelet presence is deferred from harvest. Suitable habitat is defined as a forested area 5 acres in size or larger with at least two platforms per acre and within 50 miles of marine waters.

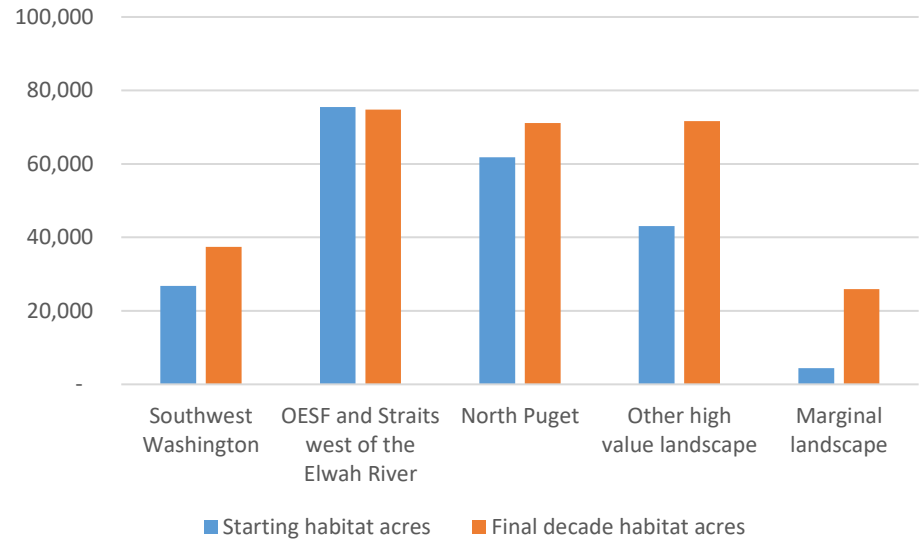
All un-surveyed suitable habitat is protected with a 300-foot managed buffer, or a 165-foot no-touch buffer until surveys are complete.[20] Once surveys are complete, buffers and timing restrictions on forest management activities are not required for areas found to be unoccupied by murrelets. Surveyed suitable habitat within the North Puget HCP planning unit can be released for harvest if 50 percent of the habitat will remain within the watershed administrative unit, and if the habitat is greater than 0.5 mile from an occupied site.

For all new forest management activities, DNR will screen project areas to locate and conserve newly identified suitable habitat. Newly identified suitable habitat is managed slightly different from known suitable habitat. Prior to adoption of a long-term conservation strategy, any newly identified suitable habitat will not require buffers or harvest timing restrictions. Unique to the North Puget HCP planning unit, limited road construction or yarding corridors are allowed within low-quality, newly identified suitable habitat if, after survey, the site is not found to be occupied.

HABITAT COMPOSITION AND DISTRIBUTION

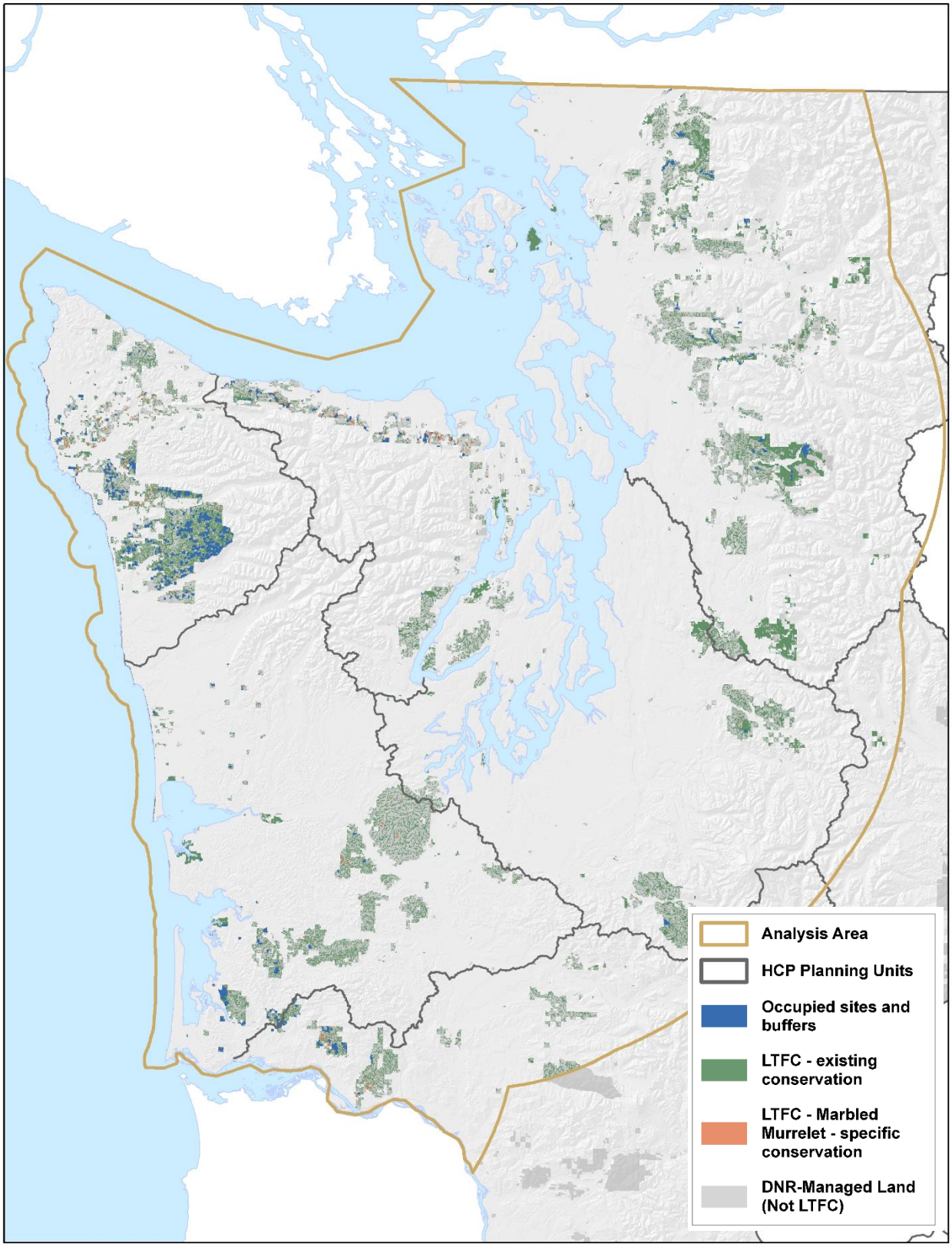
Figure 2.3.2 depicts the quantity of habitat (acres of land with a P-stage value) at the beginning of the planning period (2015) compared with the final decade of the planning period (beginning 2057). In order to compare Alternative A with the other alternatives, this information is reported by landscapes instead of HCP planning unit.

Figure 2.3.2. Habitat Growth by Strategic Location and Landscape, Alternative A



[20] WAC 222-16-080(1)(h)(v).

Figure 2.3.3. Habitat Location, Alternative A



Alternative B

Alternative B focuses on protecting the known locations of marbled murrelet-occupied sites on DNR-managed lands. Under this alternative, long-term forest cover totals approximately **576,000** acres and includes occupied sites delineated by the Science Team recommendations, as well as occupied sites identified by DNR staff in the North and South Puget HCP planning units (Table 2.3.2). Table 2.3.2 also shows acres of habitat in existing conservation and total acres of habitat by conservation type (occupied sites in this alternative) under Alternative B. This alternative is the only one that does not provide buffers on occupied sites. Harvest and thinning would be prohibited in occupied sites. Impact exceeds mitigation by 6,325 adjusted acres[21] (refer to Table 4.6.5).

Table 2.3.2. Marbled Murrelet-specific Conservation Acres, Acres in Existing Conservation, and Total Acres by Conservation Area Type in Long-term Forest Cover, Alternative B

Type of conservation area	Marbled Murrelet Specific Conservation Acres (estimated)	Acres in Existing Conservation by Conservation Area Type	Total Acres in each Conservation Area Type
Occupied sites	9,000	50,000	59,000
Total	9,000	n/a	n/a

[a] Total conservation acres cannot be summed because there is overlap between the types of conservation areas.

HABITAT COMPOSITION AND DISTRIBUTION

Figure 2.3.4 depicts the quantity of habitat (acres of land with a P-stage value) at the beginning of the planning period (2018) compared to the final decade of the planning period (beginning in 2057). The figure also illustrates the distribution of habitat acres among the landscapes. Although Alternative B contains the lowest total number of acres of habitat among the alternatives, the amount of habitat conserved still increases over time.

[21] In calculating the balance between take and mitigation, the Joint Agencies "discount" or "adjust" acres of habitat for factors that influence the benefit of habitat to murrelets, for example whether the acres are in an edge condition, where they are located on the landscape, when the new habitat development occurs, and whether the habitat is subject to disturbance. Refer to Appendix H for more information.

Figure 2.3.4. Habitat Growth by Strategic Location and Landscape, Alternative B

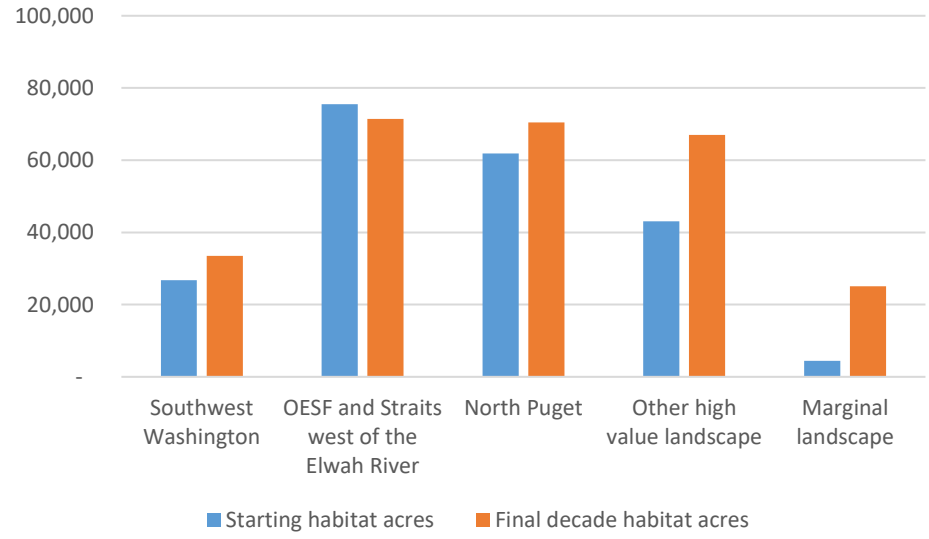
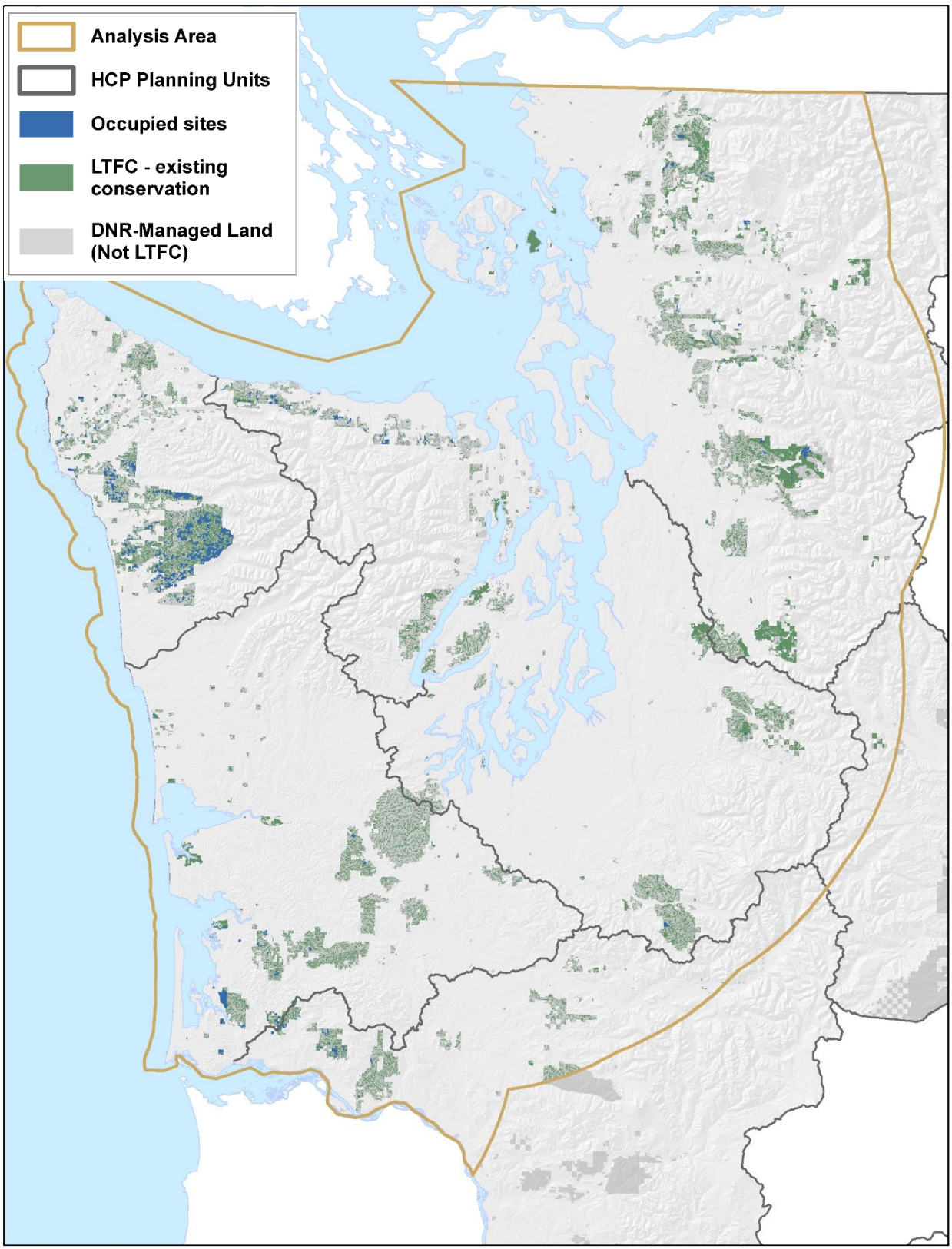


Figure 2.3.5. Habitat Location, Alternative B



Alternative C

Alternative C includes approximately **617,000** acres of long-term forest cover. This alternative contains both marbled murrelet emphasis areas and special habitat areas, as well as other high-quality habitat patches (with a P-stage value of 0.47 or greater). This alternative also applies a 328-foot (100 meter) buffer to all occupied sites except in the OESF HCP planning unit, where this buffer is 164 feet (50 meters) for occupied sites greater than 200 acres. Mitigation exceeds impact by 3,339 adjusted acres (refer to Table 4.6.5). Within each of the seven emphasis areas:

- Lands within 0.5 mile of occupied sites are conserved to provide security forest conditions that function to reduce the effects of habitat fragmentation.
- All current habitat (P-stage value of at least 0.25) is conserved.
- All future habitat (all lands that will reach a P-stage value by the final decade of the HCP) is conserved.
- Thinning is allowed in occupied site buffers (outside of special habitat areas) to develop security forest or enhance habitat.
- Thinning is allowed in areas expected to develop into future habitat.
- Active management (including variable retention harvest) is allowed on lands that are not designated as future habitat or long-term forest cover.

Table 2.3.3. Marbled Murrelet-Specific Conservation Acres, Acres in Existing Conservation, and Total Acres by Conservation Area Type in Long-term Forest Cover, Alternative C

Type of conservation area	Marbled Murrelet Specific Conservation Acres (estimated)	Acres in Existing Conservation by Conservation Area Type	Total Acres in each Conservation Area Type
Occupied sites	9,000	50,000	59,000
Occupied site buffers	13,000	14,000	27,000
Emphasis areas	14.000	24,000	38,000
Special habitat areas	9,000	20,000	29,000
High-quality murrelet habitat (P-stage 0.47 through 0.89)	6,000	38,000	44,000
Total	50,000	n/a	n/a

[a] Total conservation acres cannot be summed because there is overlap between the types of conservation areas.

Special habitat areas are smaller than emphasis areas and are designed to reduce edge and fragmentation around more isolated occupied sites that are not within an emphasis area. Within the 20 special habitat areas under Alternative C, no harvest or thinning activities are allowed.

HABITAT COMPOSITION AND DISTRIBUTION

Figure 2.3.6 depicts the quantity of habitat (acres of land with a P-stage value) at the beginning of the planning period (2018) compared with the final decade of the planning period (beginning of 2057). The

figure also illustrates the distribution of habitat acres among the strategic locations. All landscapes either maintain or increase acres of habitat by the final decade in comparison to the starting amount.

Figure 2.3.6. Habitat Growth by Strategic Location and Landscape, Alternative C

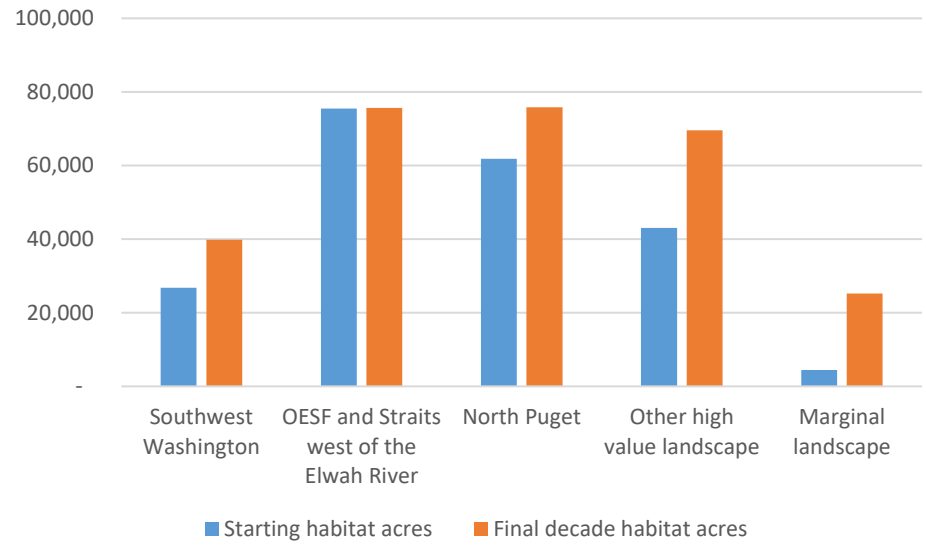
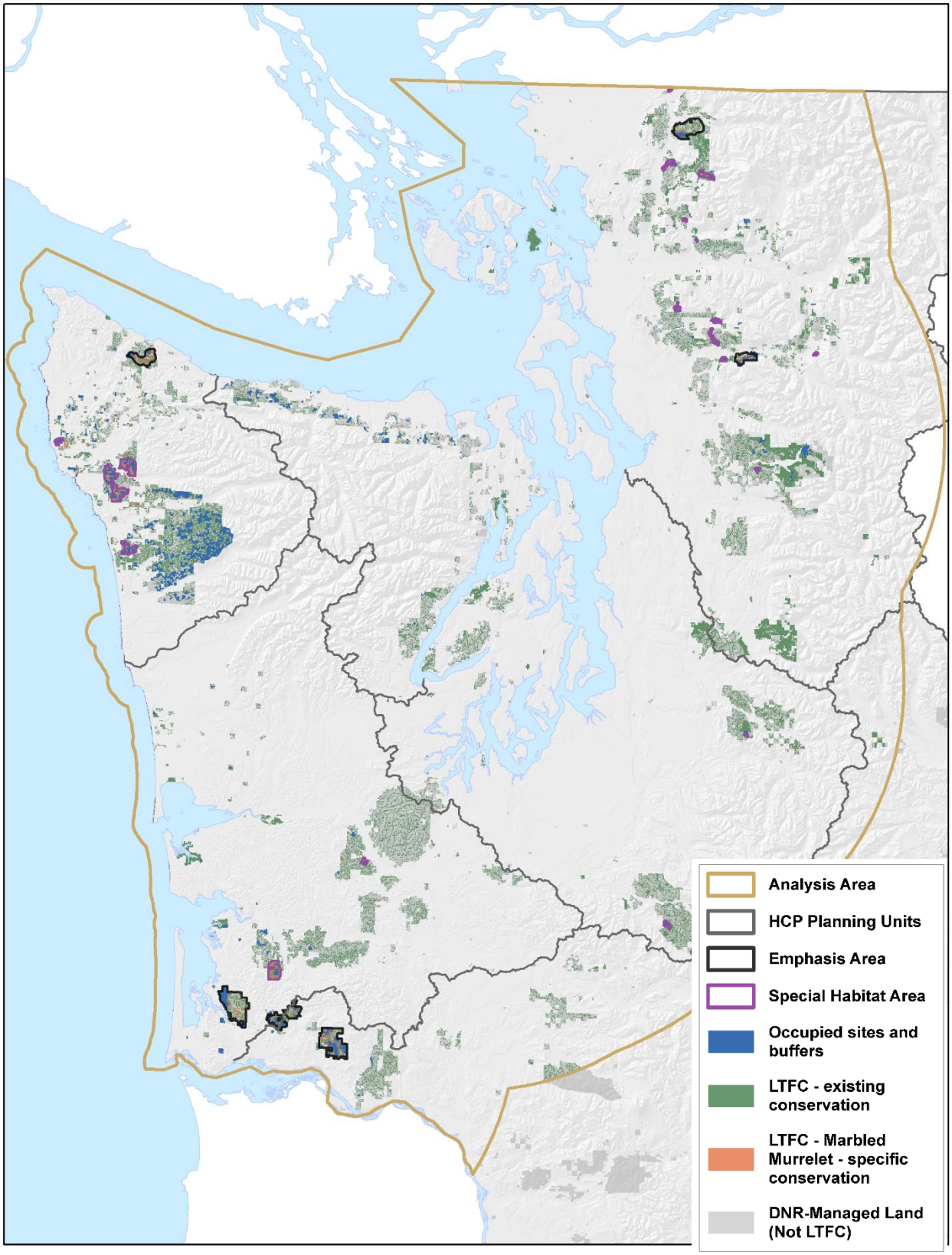


Figure 2.3.7. Habitat Location, Alternative C



Alternative D

Alternative D concentrates marbled murrelet conservation into 32 special habitat areas. Long-term forest cover totals approximately **618,000** acres. The boundaries of the special habitat areas were identified based on existing landscape conditions (management history, watershed boundaries, and natural breaks or openings). These special habitat areas were designed to reduce edge and fragmentation effects. They are generally smaller but more numerous than emphasis areas and reduce fragmentation and edge effects by prohibiting variable retention harvest and thinning treatments. Special habitat areas include the following:

- Occupied sites with 328-foot (100-meter) buffers, except in the OESF HCP Planning Unit in which sites greater than or equal to 200 acres have 164-foot (50-meter) buffers.
- Adjacent P-stage habitat (both existing and expected to develop through 2067).
- Adjacent non-habitat areas intended to provide security to existing and future habitat (security forests).

Alternative D focuses on reducing fragmentation around occupied sites and would allow more acres of current or future habitat (habitat that has or will develop a P-stage value) to be harvested outside long-term forest cover than Alternative C. Impact exceeds mitigation by 651 adjusted acres (refer to Table 4.6.5).

Table 2.3.4 provides a summary of the acres in each type of murrelet conservation area and the total amount of conservation by conservation type under Alternative D.

Table 2.3.4. Marbled Murrelet-Specific Conservation Acres, Acres in Existing Conservation, and Total Acres of Conservation by Conservation Area Type in Long-Term Forest Cover, Alternative D

Type of conservation area	Marbled Murrelet Specific Conservation Acres (estimated)	Acres in Existing Conservation by Conservation Area Type	Total Acres in each Conservation Area Type
Occupied sites	9,000	50,000	59,000
Occupied site buffers	13,000	14,000	27,000
Special habitat areas	29,000	54,000	83,000
Total	51,000	n/a	n/a

[a] Total conservation acres cannot be summed because there is overlap between the types of conservation areas.

HABITAT COMPOSITION AND DISTRIBUTION

Figure 2.3.8 depicts the quantity of habitat (acres of land with a P-stage value of at least 0.25) at the beginning of the planning period 2018) compared with the final decade of the planning period (beginning of 2057). The figure also illustrates the distribution of habitat acres among the landscapes

Figure 2.3.8. Habitat Growth by Strategic Location and Landscape, Alternative D

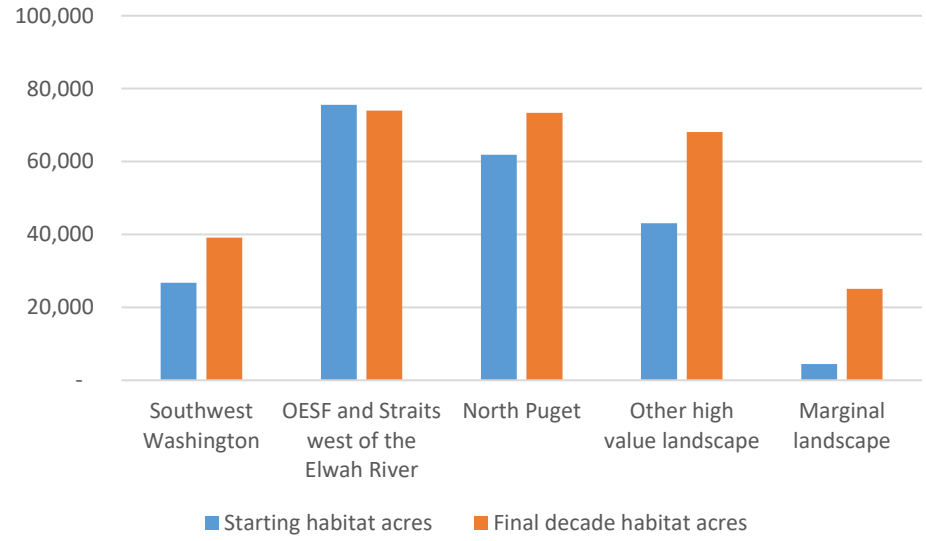
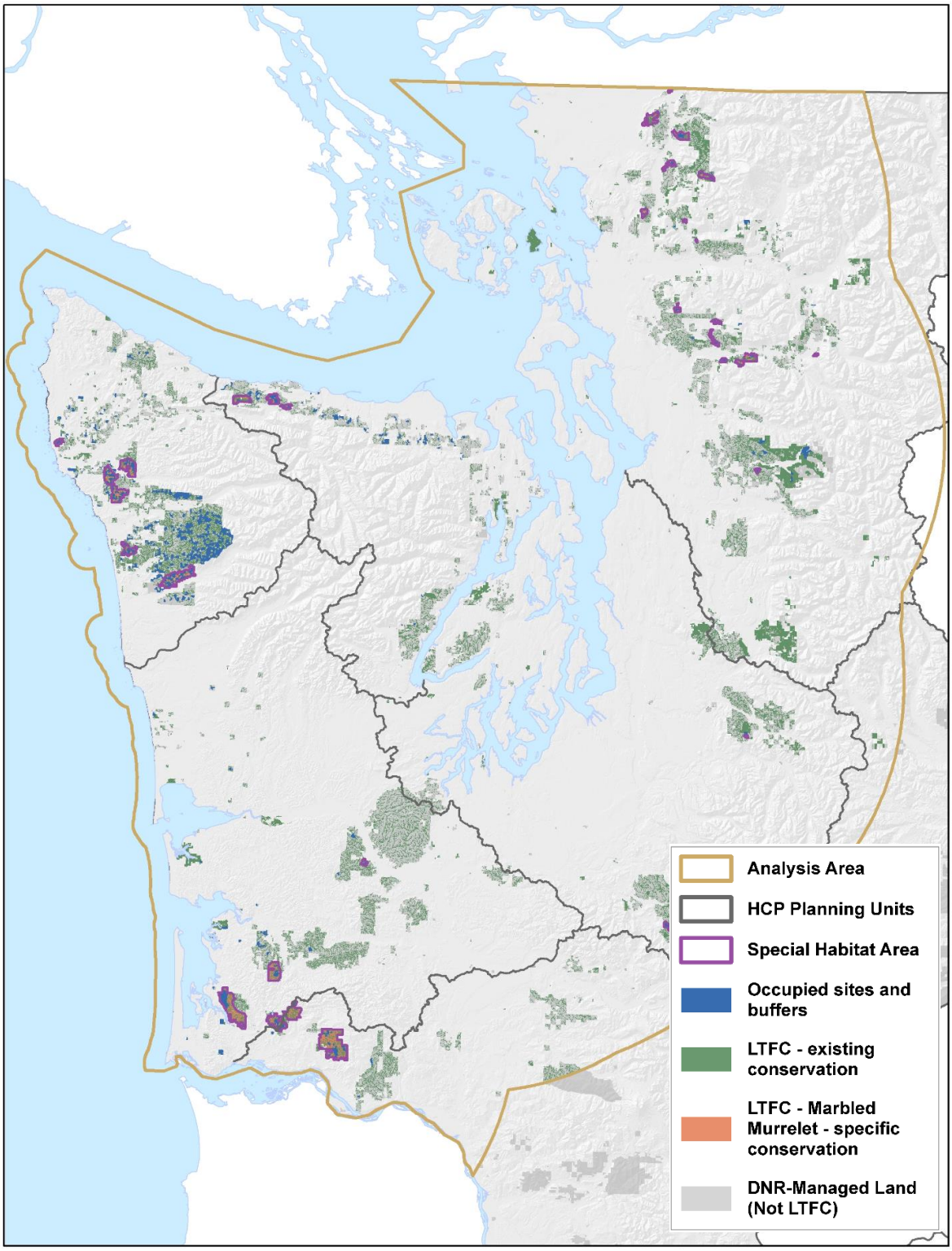


Figure 2.3.9. Habitat Location, Alternative D



Alternative E

Alternative E combines the conservation approaches of Alternatives C and D (including conservation measures) for a total of approximately **622,000 acres** of long-term forest cover. Mitigation exceeds impact by 4,116 adjusted acres (refer to Table 4.6.5). This alternative includes the following murrelet-specific conservation lands:

- Occupied sites with 328-foot (100-meter) buffers, except in the OESF where sites greater than or equal to 200 acres have 164-foot (50-meter) buffers.
- All habitat with a P-stage value of 0.47 and greater throughout the analysis area.
- Emphasis areas as designated under Alternative C.
- Special habitat areas as designated under Alternative D. (Where emphasis areas and special habitat areas overlap, an emphasis area will be the designation.)

Table 2.3.5 provides a summary of the acres in each type of murrelet conservation area, acres of existing conservation by conservation area type, and total conservation acres under Alternative E.

Table 2.3.5. Marbled Murrelet-Specific Conservation Acres, Acres in Existing Conservation, and Total Acres by Conservation Type in Long-Term Forest Cover, Alternative E

Type of conservation area	Marbled Murrelet Specific Conservation Acres (estimated)	Acres in Existing Conservation by Conservation Area Type	Total Acres in each Conservation Area Type
Occupied sites	9,000	50,000	59,000
Occupied site buffers	13,000	14,000	27,000
Emphasis areas	14,000	24,000	38,000
Special habitat areas	14,000	31,000	45,000
High-quality murrelet habitat (P-stage 0.47 through 0.89)	5,000	39,000	44,000
Total	**55,000**	**n/a**	**n/a**

[a] Total conservation acres cannot be summed because there is overlap between the types of conservation areas.

HABITAT COMPOSITION AND DISTRIBUTION

Figure 2.3.10 depicts the quantity of habitat (acres of land with a P-stage value) at the beginning of the planning period (2018) compared with the final decade of the planning period (beginning of 2057). The figure also illustrates the distribution of habitat acres among the landscapes.

Figure 2.3.10. Habitat Growth by Strategic Location and Landscape, Alternative E

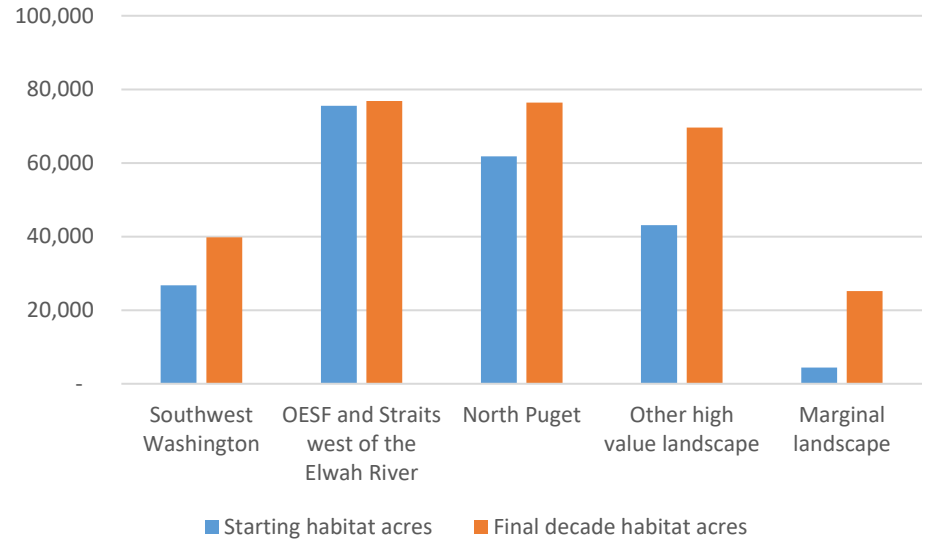
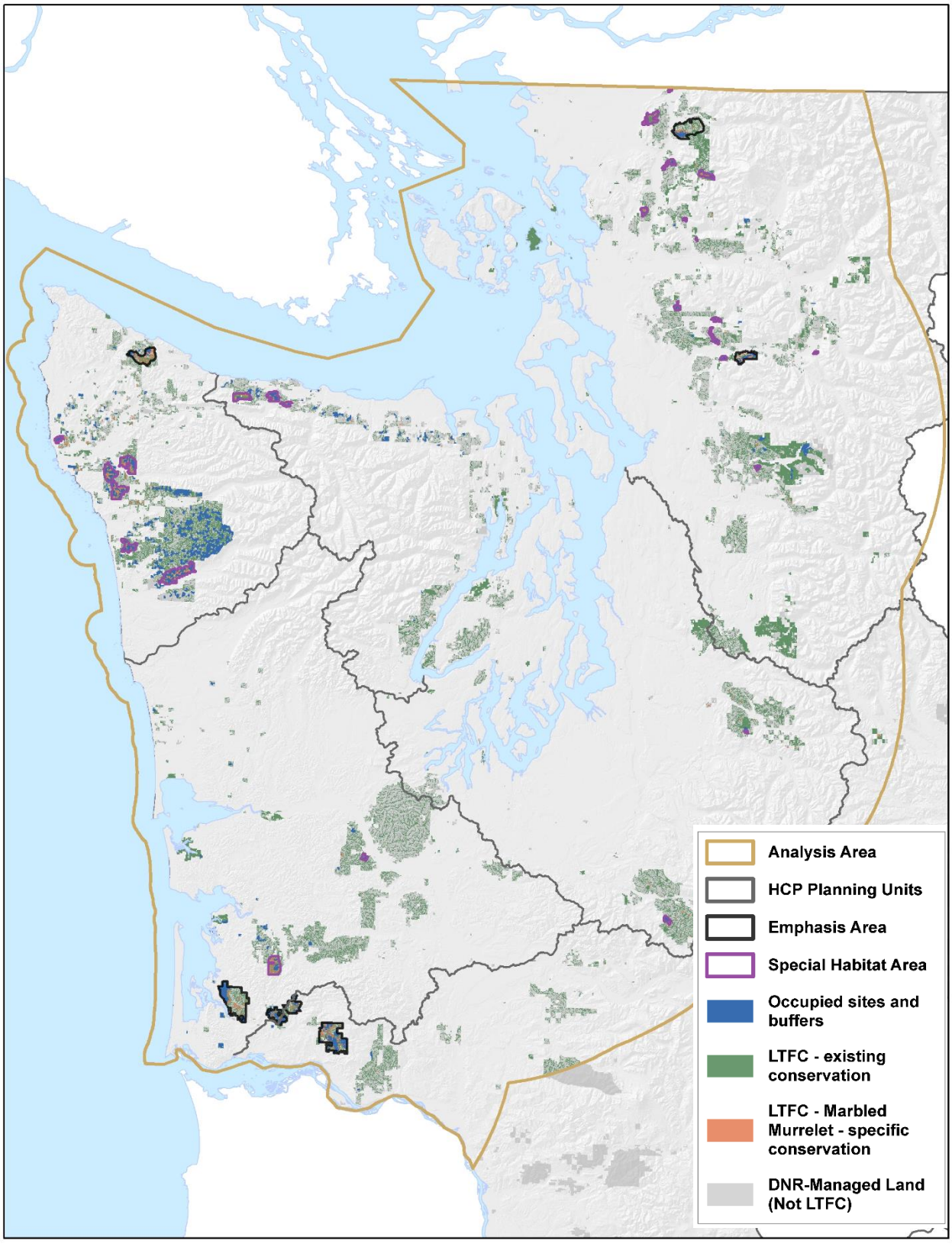


Figure 2.3.11. Habitat Location, Alternative E



Alternative F

Alternative F proposes to protect approximately **743,000** acres of long-term forest cover by designating the marbled murrelet management areas recommended in the Science Team Report and establishing marbled murrelet management areas (MMMAs) in the North and South Puget planning units (which were not part of the Science Team Report). All occupied sites would also be protected, including a 328-foot (100 meter) buffer. Additionally, all northern spotted owl old forest habitat (as defined in the 1997 HCP) in the OESF HCP Planning Unit would receive a 328-foot (100 meter) buffer. Existing mapped low-quality northern spotted owl habitat in designated owl conservation areas (nesting/roosting/foraging, dispersal, and OESF) is included as long-term forest cover. (Alternatives A through E only include high-quality owl habitat as long-term forest cover.)[22] Thinning would not be allowed in occupied sites but would be allowed within buffers to enhance habitat or maintain canopy cover. Elsewhere in MMMAs, thinning would be allowed in future P-stage habitat to enhance habitat development. Mitigation exceeds impact by 12,726 adjusted acres (refer to Table 4.6.5).

Table 2.3.6 provides a summary of the acres in each type of murrelet conservation area, acres of existing conservation, and total conservation acres by conservation area type for Alternative F.

Table 2.3.6. Marbled Murrelet-Specific Conservation Acres, Acres in Existing Conservation, and Total Acres by Conservation Area Type in Long-Term Forest Cover, Alternative F

Type of conservation area	Marbled Murrelet Specific Conservation Acres (estimated)	Acres in Existing Conservation by Conservation Area Type	Total Acres in each Conservation Area Type
Occupied sites	9,000	50,000	59,000
Occupied site buffers	16,000	17,000	33,000
MMMAs	79,000	128,000	207,000
Northern spotted owl low-quality habitat	72,000	113,000	185,000
Total	**176,000**	**n/a**	**n/a**

[a] Total conservation acres cannot be summed because there is overlap between the types of conservation areas.

[22] Note that "settlement" northern spotted owl habitat would not be included as long-term forest cover.

HABITAT COMPOSITION AND DISTRIBUTION

Figure 2.3.12 depicts the quantity of habitat (acres of land with a P-stage value) at the beginning of the planning period (2018) compared with the final decade of the planning period (beginning of 2057). The figure also illustrates the distribution of habitat acres among the landscapes.

Figure 2.3.12. Habitat Growth by Strategic Location and Landscape, Alternative F

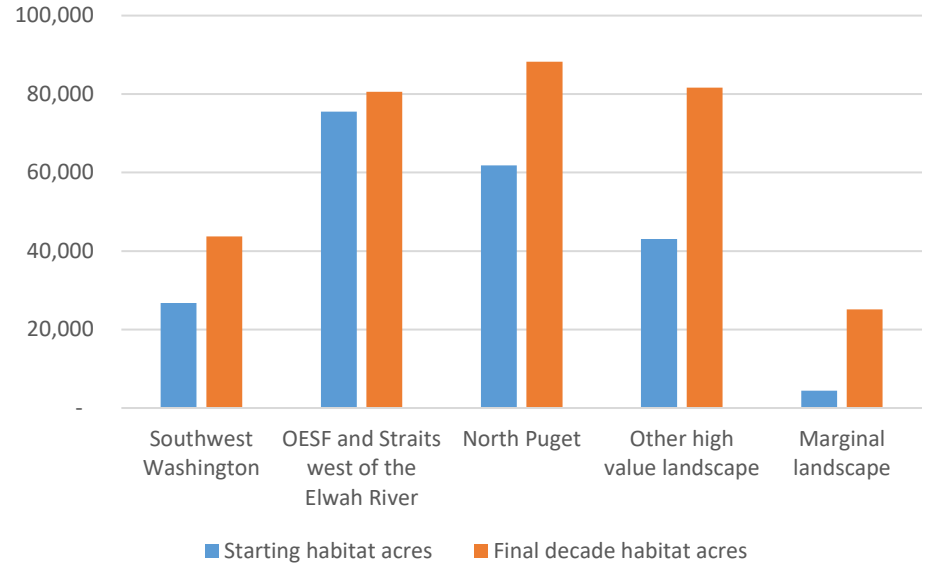
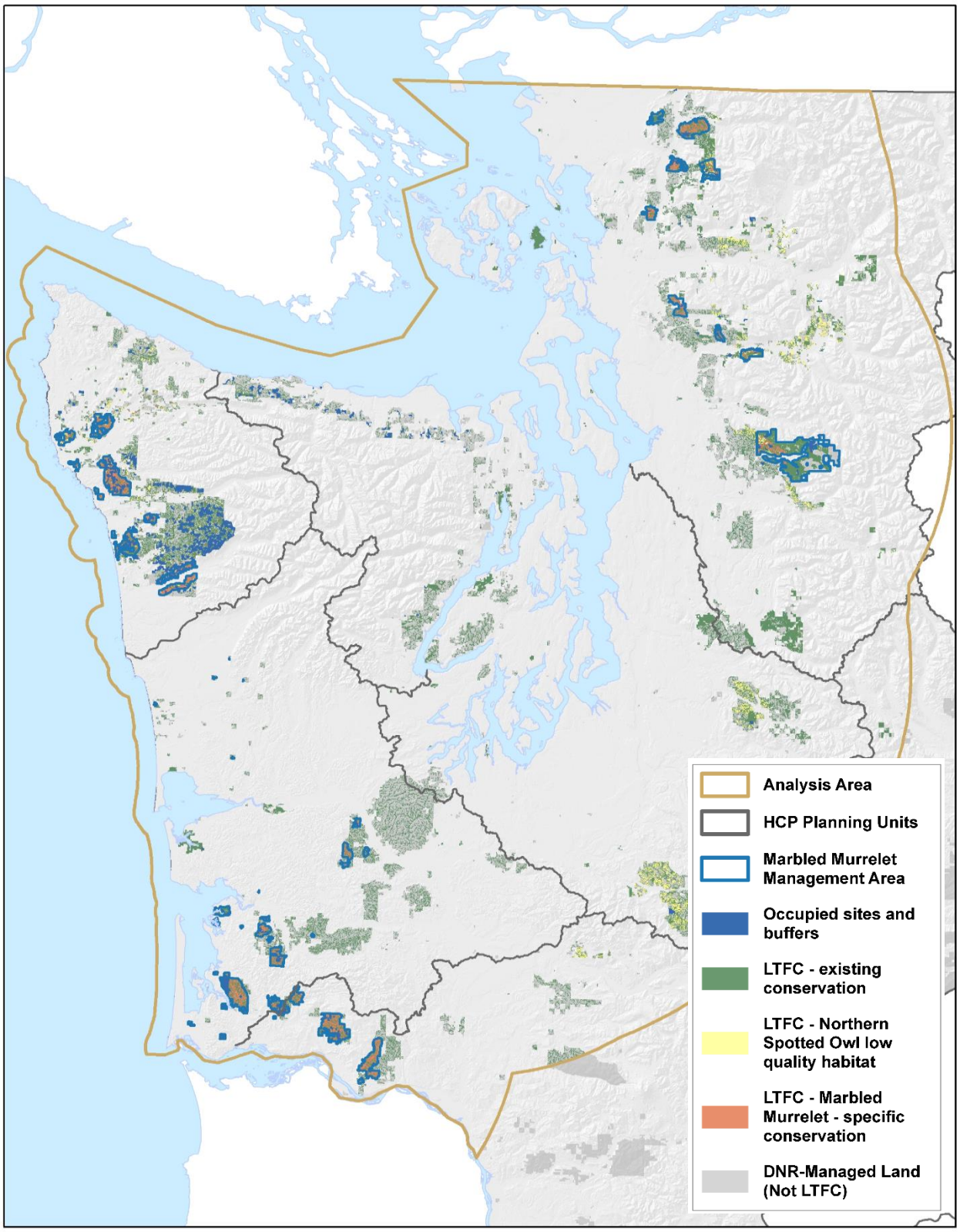


Figure 2.3.13. Habitat Location, Alternative F



Alternative G

Alternative G is a new alternative for the RDEIS. This alternative was developed in response to comments received, predominately from WDFW and USEPA, on the 2016 DEIS.

Alternative G includes approximately **643,000** acres of long-term forest cover. This alternative includes both emphasis areas and marbled murrelet management areas and applies 328-foot (100 meter) buffers to all occupied sites. Mitigation exceeds impact by 8,626 adjusted acres (refer to Table 4.6.5). Alternative G includes the following murrelet specific conservation lands:

- Occupied sites with 328-foot (100 meter) buffers
- All habitat with a P-stage value of 0.47 and higher throughout the analysis area
- In the OESF, all current habitat (P-stage at least 0.25 in decade zero)
- Emphasis areas as designated under Alternative C
- Special habitat areas as designated under Alternative D (Where emphasis areas and special habitat areas overlap, an emphasis area will be the designation.)
- Areas where the P-stage model did not identify potential existing habitat or applied a lower P-stage value than thought appropriate based on expert opinion (polygons of habitat identified by WDFW)
- The marbled murrelet management area in the Elochoman block, as drawn for Alternative F, managed as an emphasis area
- The following marbled murrelet management areas in the North Puget HCP Planning Unit:
    - Spada Lake/Morningstar (numbers 113 to 117)
    - Whatcom (numbers 104 and 105)
    - Middle Fork Hazel/Wheeler Ridge (number 102)
    - Marmot Ridge (numbers106 and 109)

Table 2.3.7 provides a summary of the acres of murrelet-specific conservation area, acres in existing conservation, and total conservation by conservation area type under Alternative G.

Table 2.3.7. Marbled Murrelet Specific Conservation Acres, Acres in Existing Conservation, and Total Acres by Conservation Area Type in Long-term Forest Cover, Alternative G

Type of conservation area	Marbled Murrelet Specific Conservation Acres (estimated)	Acres in Existing Conservation by Conservation Area Type	Total Acres in each Conservation Area Type
Occupied sites	9000	50,000	59,000
Occupied site buffers	16,000	17,000	33,000
High-quality murrelet habitat (P-stage 0.47 through 0.89), and low-quality habitat (P-stage 0.25 to 0.36) in the OESF	11,000	53,000	64,000
Emphasis areas	12,000	32,000	44,000

Type of conservation area	Marbled Murrelet Specific Conservation Acres (estimated)	Acres in Existing Conservation by Conservation Area Type	Total Acres in each Conservation Area Type
Special Habitat Areas	16,000	29,000	45,000
Polygons identified by WDFW	160	1,300	1,500
Marbled murrelet management areas	13,000	37,000	50,000
Total	76,000	n/a	n/a

[a] Total conservation acres cannot be summed because there is overlap between the types of conservation areas.

HABITAT COMPOSITION AND DISTRIBUTION

Figure 2.3.14 depicts the quantity of habitat (acres of land with a P-stage value) at the beginning of the planning period (2018) compared with the final decade of the planning period (beginning of 2057). The figure also illustrates the distribution of habitat acres among the landscapes.

Figure 2.3.14. Habitat Growth by Strategic Location and Landscape, Alternative G

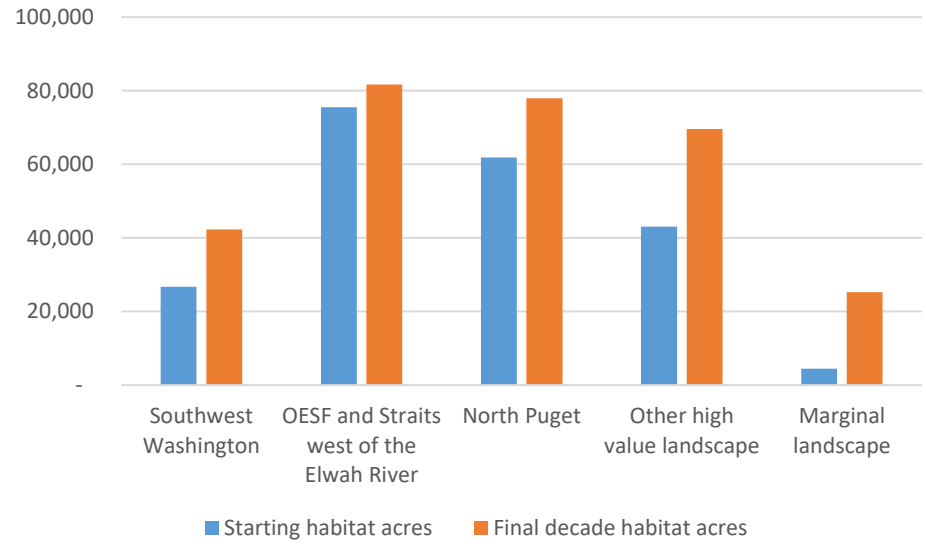
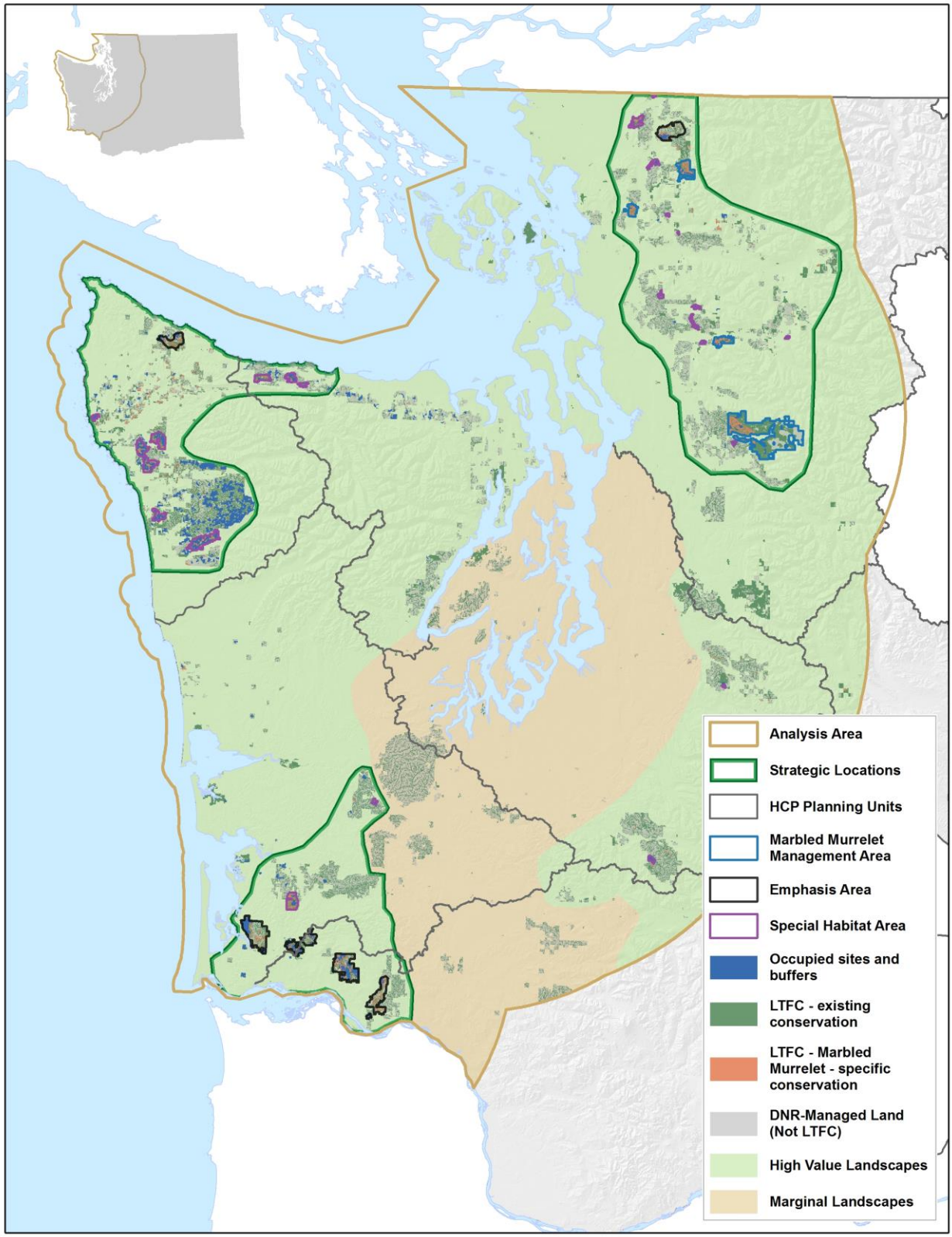


Figure 2.3.15. Habitat Location, Alternative G



Alternative H

Alternative H, DNR's preferred alternative, best meets DNR's need, purpose and objectives of the project by integrating DNR's obligations to provide marbled murrelet conservation under the Endangered Species Act with DNR's fiduciary obligations to provide revenue to its trust beneficiaries. Alternative H is based on direction from the board to minimize impacts to murrelets, offset impacts and address uncertainty, and reduce disproportionate financial impacts to trust beneficiaries. Alternative H protects all existing occupied sites, captures existing habitat within special habitat areas, and meters harvest of habitat outside conservation areas in strategic locations.

Alternative H focuses its marbled murrelet-specific conservation into 29 special habitat areas that are distributed across strategically important locations for the marbled murrelet (refer to Section 2.3 for a description of strategic locations). Of the 29 special habitat areas, 23 contain an occupied site. All the special habitat areas include current habitat, future habitat, and security forest. Alternative H also applies 328-foot (100 meter) buffers on all occupied sites and increasing the amount of interior forest habitat in long-term forest cover.

Alternative H accounts for uncertainties that were not addressed in the analytical framework. Those uncertainties include the possibility of natural disturbances impacting P-stage habitat protected in long-term forest cover in the future such as windthrow, fire, and disease. To account for the possibility of these natural disturbances occurring, the mitigation in Alternative H exceeds impact by 735 adjusted acres (refer to Table 4.6.5).

In addition, Alternative H delays (meters) harvest of approximately 3,600 adjusted acres of current habitat that DNR otherwise would authorize for harvest upon amendment of its incidental take permit 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. Metering will maintain habitat capacity while additional habitat is developed under the long-term conservation strategy. These metered acres will become available for harvest at the beginning of the second decade.

Alternative H includes approximately **610,000 acres** of long-term forest cover. Table 2.3.8 provides a summary of the acres of murrelet-specific conservation area, acres in existing conservation, and total conservation acres by conservation area type under Alternative H.

Table 2.3.8. Marbled Murrelet Specific Conservation Acres, Acres in Existing Conservation, and Total Acres by Conservation Area Type in Long-term Forest Cover, Alternative H

Type of conservation area	Marbled Murrelet Specific Conservation Acres (estimated)	Acres in Existing Conservation by Conservation Area Type	Total Acres in each Conservation Area Type
Occupied sites	9,000	50,000	59,000
Occupied site buffers	16,000	17,000	33,000
Special Habitat Areas	18,000	40,000	58,000
Total	43,000	n/a	n/a

[a] Total conservation acres cannot be summed because there is overlap between the types of conservation areas.

HABITAT COMPOSITION AND DISTRIBUTION

Figure 2.3.16 depicts the acres of habitat (acres of land with a P-stage value) at the beginning of the planning period (2018) compared with the final decade of the planning period (beginning of 2057). The figure also illustrates the distribution of habitat acres among the landscapes.

Figure 2.3.16. Habitat Growth by Strategic Location and Landscape, Alternative H

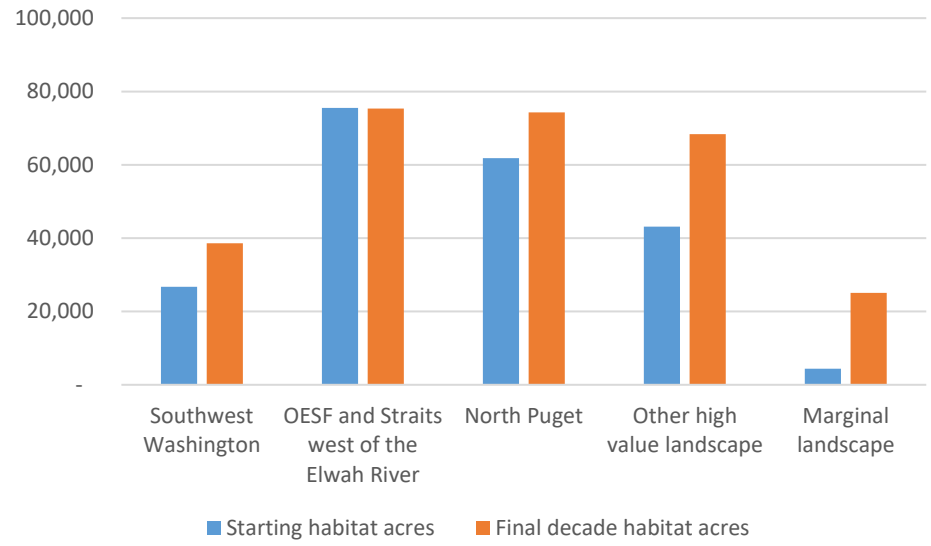
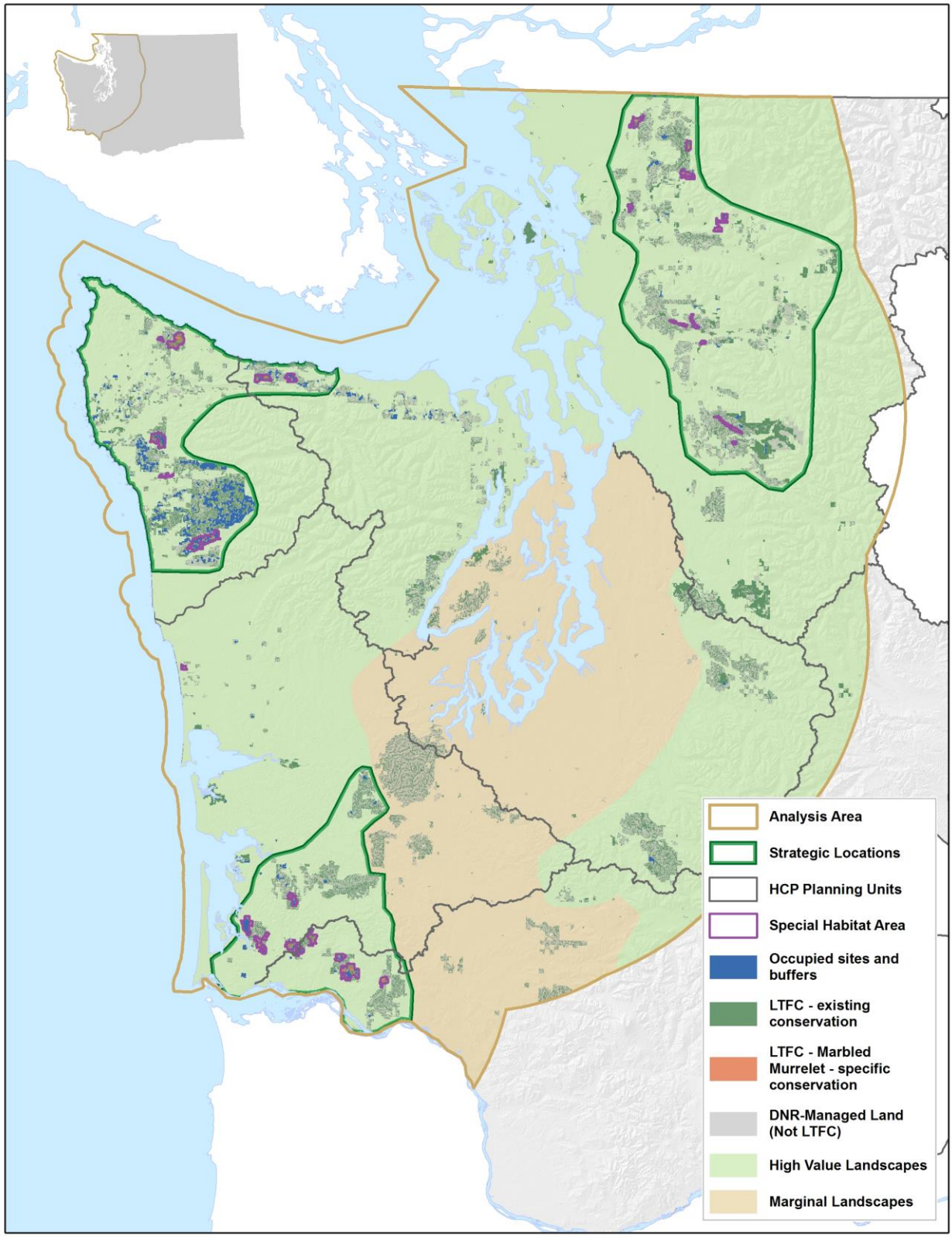


Figure 2.3.17. Habitat Location—Alternative H



2.4 Comparing the Alternatives

This section provides a summary of how long-term forest cover is composed under each alternative, including acres conserved and acres available for harvest.

■ Comparing Major Components of the Alternatives

Table 2.4.1. Comparing the Proposed Alternatives

		Alternative							
Contributing components of the marbled murrelet conservation strategy		**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Approximate acres of long-term forest cover		600,000	576,000	617,000	618,000	622,000	743,000	643,000	610,000
Existing conservation	Natural areas[a]	✓[b]	✓	✓	✓	✓	✓	✓	✓
	Riparian management zones[c]	✓	✓	✓	✓	✓	✓	✓	✓
	Conservation commitments made in the *Policy for Sustainable Forests*	✓	✓	✓	✓	✓	✓	✓	✓
	Existing northern spotted owl habitat – high quality[d]	✓	✓	✓	✓	✓	✓	✓	✓
	Existing northern spotted owl habitat – low quality[e]						✓		
Marbled murrelet habitat conservation areas	Occupied sites – HCP surveyed[f]	✓							
	Occupied sites – Science Team mapped[g]		✓	✓	✓	✓	✓	✓	✓
	Buffers on occupied sites	328 feet (100 meters)	0	328 feet (100 meters) on all, except in OESF where sites greater ≥200 acres have 164 feet (50 meters)			328 feet (100 meters)	328 feet (100 meters)	328 feet (100 meters)
	Habitat types identified under the interim strategy[h]	✓							

Contributing components of the marbled murrelet conservation strategy		Alternative							
		A	B	C	D	E	F	G	H
	Marbled murrelet management areas						✓	✓	
	High-quality murrelet habitat (P-stage 0.47 through 0.89)			✓		✓		✓	
	Emphasis areas[i]			✓		✓		✓	
	Special habitat areas[j]			✓	✓	✓		✓	✓
	WDFW/USFWS identified polygons							✓	
	Current P-stage habitat							✓	
Forest management *within* long-term forest cover	Harvests that create large openings, such as variable retention harvest		No harvests allowed						
	Limited management (includes silvicultural treatments such as thinning, salvage, and reforestation)		Treatments are generally allowed in operable, non-marbled murrelet habitat (outside of special habitat areas under Alternatives C, D, and E; thinning allowed in special habitat areas in non-murrelet habitat under Alternative H)						
	Marbled murrelet habitat enhancement treatments	✓	✓	Habitat enhancement treatments are allowed in non-habitat within emphasis areas, with the objective of developing habitat within the life of the HCP			✓	✓	✓
	Non-timber harvest land uses	Per 1997 HCP and concurrence letters	Management of existing land uses and related infrastructure will continue per existing law and policy, with ongoing disturbance impacts to long-term forest cover identified and mitigated. New or expanded non-timber land uses are subject to conservation measures (described in Section 2.2).						
Forest management *outside* long-term forest cover	Harvest, thinning, silviculture, and non-timber uses	Forest stands managed consistent with the Sustainable Harvest Calculation, RFRS, 1997 HCP, *Policy for Sustainable Forests,* forest practices rules, forest land plans, and Multiple Use Act.							

[a] Natural areas include natural areas preserves and natural resource conservation areas.
[b] The "✓" symbol represents the land included in the long-term forest cover definition for the alternative. Notes are added to clarify the inclusion or exclusion of an area.
[c] Riparian management zones per the RFRS for the five westside HCP planning units and per the riparian conservation strategy for the OESF.

[d] Existing northern spotted owl high-quality habitat refers to the following DNR mapped habitat classes as of 2015: old forest, high-quality habitat, and A and B habitat per the definitions in the 1997 HCP (DNR 1997, p. 12).
[e] Existing northern spotted owl low-quality habitat refers to the following DNR-mapped habitat classes as of 2015: sub-mature, movement roosting and foraging, movement, young forest marginal and dispersal habitat per the definitions in the 1997 HCP (DNR 1997, p. 12) and the 2008 *South Puget Forest Land Plan*.
[f] Occupied sites as defined by DNR survey boundaries where murrelet breeding behaviors are observed or there is evidence of nesting consistent with the *Pacific Seabird Group Survey Protocol*.
[g] Occupied sites as mapped by the Science Team (Raphael and others 2008).
[h] Refers to "reclassified habitat" in Step 4 of the interim strategy (DNR 1997, p. 40) and various marbled murrelet habitat types defined in the 2007 concurrence letters for North and South Puget HCP planning units. Long-term forest cover for Alternative A includes all reclassified habitat in the OESF and Straits HCP planning units, as well as all reclassified habitat with a current P-stage value in southwest Washington.
[l] Emphasis areas represent larger blocks of habitat and non-habitat areas that will be managed for both marbled murrelet conservation and harvest.
[j] Special habitat areas augment acres of long-term forest cover around certain occupied sites and create blocks of cohesive habitat with reduced fragmentation.

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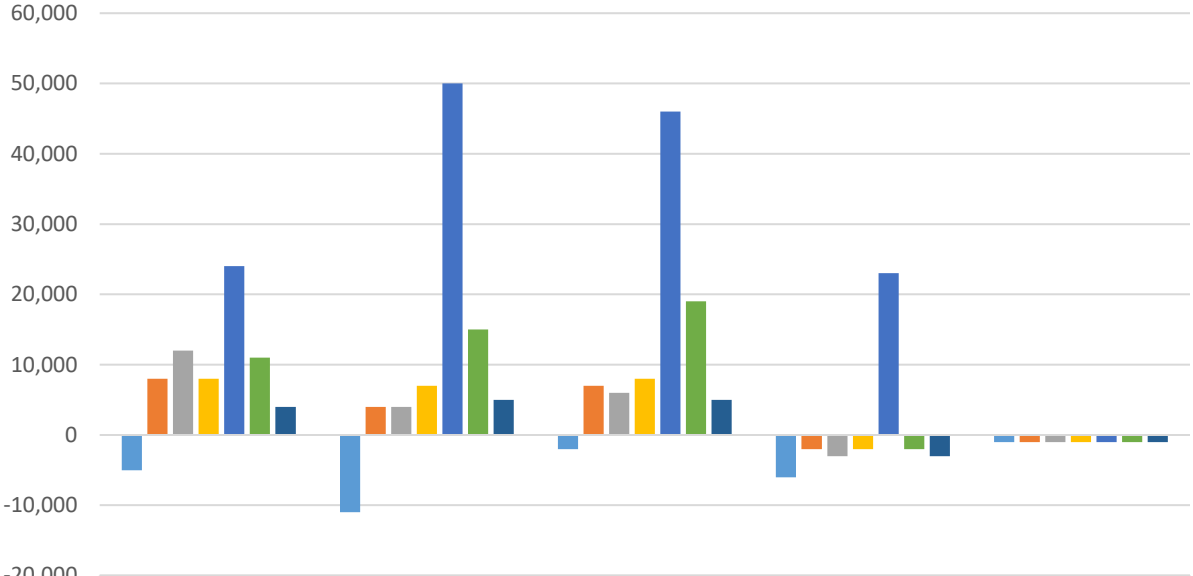
■ How Much Land is Available for Harvest?

Under each alternative, a full range of management options (harvest, thinning, and related silviculture) (active management) is expected to be available on DNR-managed forestland *outside* long-term forest cover. Within long-term forest cover, harvest is generally prohibited, and thinning is limited as described in the conservation measures in the previous section. Sections 3.11 and 4.11, "Socioeconomics," analyze in detail what lands may be available for harvest in the analysis area under each alternative. Figure 2.4.1 shows the estimated change in total acres of long-term forest cover under each alternative by landscape compared with the no action alternative. (Acres are from the final decade of the planning period.)

Text Box 2.4.1. Under the Action Alternatives, Could DNR Harvest in Some Areas That Are Currently Protected?

Yes. Some land currently deferred from harvest under the no action alternative may become available for harvest under one or more of the action alternatives because of a shifting emphasis in conservation to areas with potentially higher habitat value to the murrelet.

Figure 2.4.1. Estimated Change in Long-Term Forest Cover Acres From Alternative A (No Action), by Alternative and Landscape



	Southwest Washington	OESF and Straits west of the Elwah River	North Puget	Other high value landscape	Marginal landscape
Alt B	-5,000	-11,000	-2,000	-6,000	-1,000
Alt C	8,000	4,000	7,000	-2,000	-1,000
Alt D	12,000	4,000	6,000	-3,000	-1,000
Alt E	8,000	7,000	8,000	-2,000	-1,000
Alt F	24,000	50,000	46,000	23,000	-1,000
Alt G	11,000	15,000	19,000	-2,000	-1,000
Alt H	4,000	5,000	5,000	-3,000	-1,000

Compared to the no action alternative, Alternative B would increase the land available for active forest management by approximately 25,000 acres. Alternatives C through E and Alternative H reduce the land available for harvest by approximately 10,000 to 20,000 acres, Alternative G reduces the land available for harvest by approximately 42,000 acres, and Alternative F reduces available land by approximately 142,000 acres. Appendix F contains maps for each HCP planning unit showing strategic locations and where changes in land available for active forest management occur on the landscape.

It is important to understand that some acres currently deferred from harvest under the no action alternative (generally, reclassified murrelet habitat) may become available for harvest under one or more of the action alternatives. These acres may become available because the action alternatives change the emphasis of conservation, focusing in some cases on areas with higher-quality habitat than are identified under Alternative A or, in the case of Alternative B, focusing only on occupied sites and not broader habitat conservation areas.

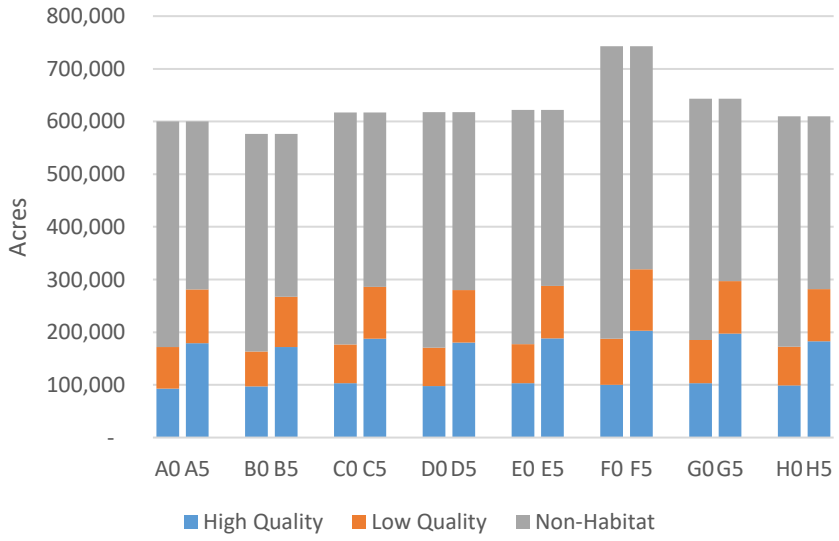
How Does Habitat Compare Across the Alternatives?

In Chapter 4, differences in habitat quality and configuration among the alternatives as they relate to the marbled murrelet are explored in detail. This section provides a more general comparison of habitat quality among the alternatives.

Habitat Composition and Quality

As illustrated in the previous sections, long-term forest cover contains both habitat (forestlands with a P-stage value) and non-habitat (forestlands with no P-stage value, but that contribute to conservation as security forest or buffers). As forests mature and develop into habitat through time, how much habitat is "captured" by long-term forest cover increases, and the quality of that habitat changes. Figure 2.4.2 demonstrates how habitat quality in long-term forest cover among alternatives changes between the start of the planning period (2018) and the end decade of the planning period (2057–2067). In the figure, the alternative is indicated by letter and the decade by number, such that A0 means Alternative A, Decade 0 and A5 means Alternative A, Decade 5.

Figure 2.4.2. Increases in Habitat Quality in Long-Term Forest Cover Over Time, by Alternative



Under all of the alternatives, the amount and quality of marbled murrelet habitat increases significantly by the end of the planning period. As shown in Figure 2.4.2, the largest increase in habitat quantity comes from stands of non-habitat (P-stage value of 0) developing into low-quality habitat. On average, under all of the alternatives between 24 and 26 percent of non-habitat within long-term forest cover develops into low-quality habitat by the end of the planning period.

Habitat Configuration

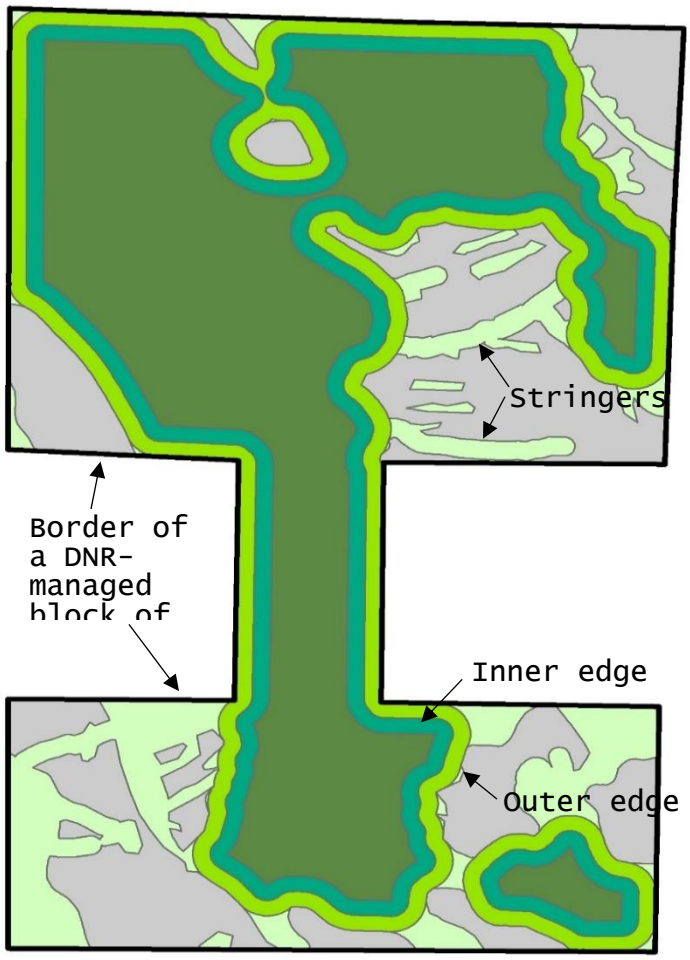
The configuration of habitat conserved in long-term forest cover also varies among the alternatives. A measure of configuration is the size of interior forest habitat patches relative to edge habitat. For the purposes of this RDEIS, long-term forest cover has been categorized into one of the following configurations (refer to Figure 2.4.3):

- **Interior forest:** The interior forest is comprised of forested area (patch) that is at least 328 feet (100 meters) from any type of edge. These interior forest areas are protected from effects associated with harvest edges.
- **Inner edge:** The inner edge is a forested area 167 to 328 feet (51 to 100 meters) from the edge of the actively managed forest and is adjacent to the interior forest patch.
- **Outer edge:** The outer edge of the interior forest patch is located between 0 and 164 feet (0 to 50 meters) from the edge of the actively managed forest. The literature indicates that edge effects from the actively managed forest extend further than 50 meters into the stand but diminish until there is minimal effect after 328 feet (100 meters) from the managed area (Burger and others 2004).
- **Stringer:** This term refers to long, relatively narrow (less than 656 feet [200 meters] wide) corridors of long-term forest cover, primarily associated with riparian areas. These areas can still provide security forest for the marbled murrelet and are not subject to take. However, because they lack interior forest, they are unlikely to be used for successful nesting and are therefore not assigned mitigation value for purposes of calculating the balance between potential take and mitigation under each alternative (refer to Appendix H).

Text Box 2.4.2. What Is "Edge" and How Does It Affect Murrelets?

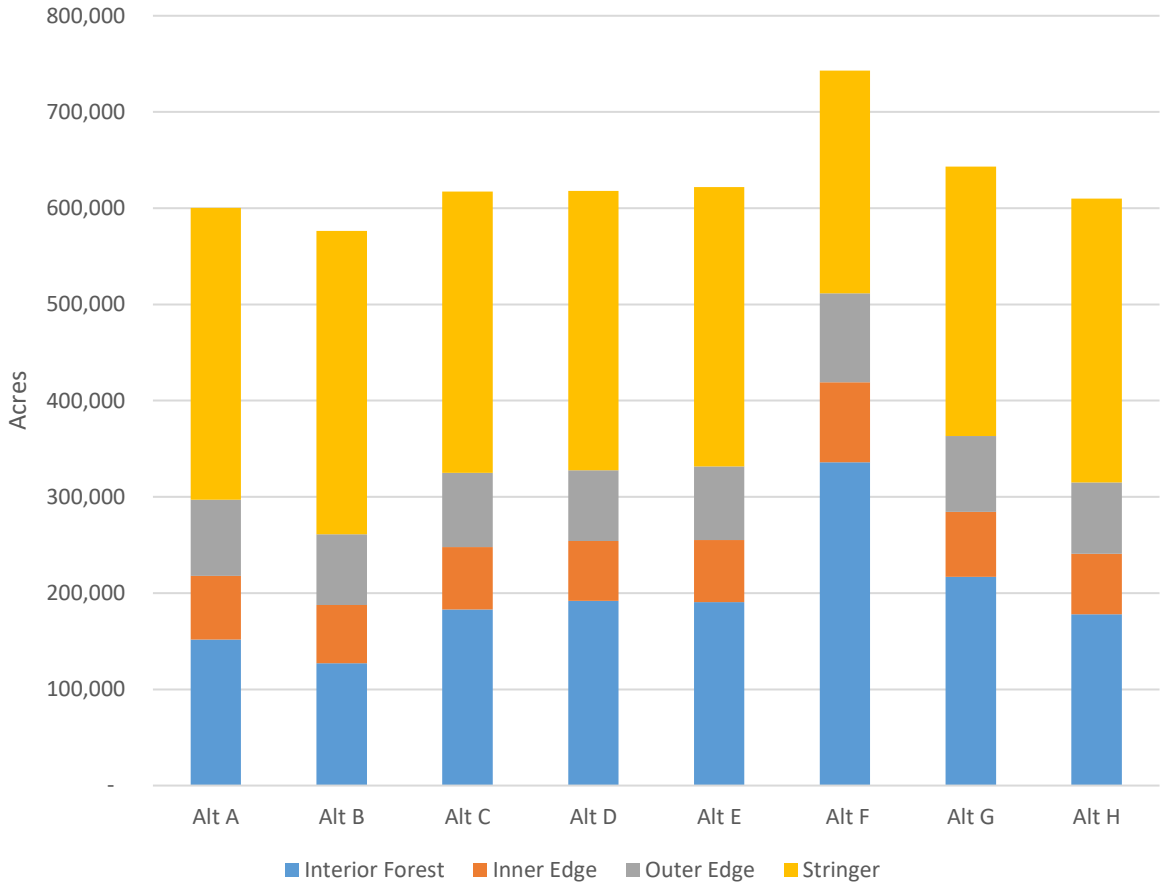
An edge is an abrupt transition or boundary between two habitat types. Forest edges are created by roads, harvests, changes in species composition, and physical changes in the landscape. Studies (for example, Burger and others 2004, Malt and Lank 2009) have shown that predation risk at marbled murrelet nests is likely higher near forest edges and in fragmented landscapes. Refer to Chapter 4 and Appendix H for more information about edges and their potential impacts.

Figure 2.4.3. Illustration of Long-term Forest Cover and Categories of Edge on a Block of DNR-Managed Land



The configuration of long-term forest cover under different alternatives is used in the analysis of potential environmental consequences (Chapter 4) for elements of the environment sensitive to habitat configuration. Comparisons can be made of species diversity found in interior forests compared to edge environments. The type and amount of edge are also major factors in assigning mitigation values to the different alternatives (refer to Chapter 4 and Appendix H for a more detailed explanation of the mitigation "discounts" given for edges and stringers). As illustrated in Figure 2.4.4, long-term forest cover under each alternative has different amounts of interior forest and different proportions of interior forest to edge or stringer forest.

Figure 2.4.4. Comparison of Long-Term Forest Cover Interior, Edge, and Stringer Acres, by Alternative



Alternatives Considered But Not Analyzed in Detail

The Joint Agencies received several comment letters proposing new alternatives for consideration in this NEPA/SEPA process. An alternative proposed by WDFW and one of two alternatives proposed by USEPA were within the range of alternatives analyzed in the 2016 DEIS and were incorporated into Alternative G in the RDEIS.

However, the Joint Agencies eliminated from further review the alternatives proposed by the American Bird Conservancy, Pacific Seabird Group, Marbled Murrelet Coalition, and the second alternative from USEPA. These four alternatives proposed by commenters would modify Alternative F. Each of these alternatives would create marbled murrelet conservation areas of varying sizes and configurations, and prohibit timber harvest of current and future habitat for the remaining initial term of the incidental take permit. All of these four alternatives contain significantly more marbled murrelet-specific conservation than Alternative F, which was found to have significant adverse impacts to trust beneficiaries when compared to all other alternatives analyzed in detail (refer to Section 4.11, "Socioeconomics"). Refer to "Impacts and Mitigation of Proposed Alternatives" at the end of this section and Figure 2.4.5 for more information. USFWS determined, based on DNR's analysis of impacts to trust beneficiaries, that these four alternatives are not economically feasible and thus are not reasonable alternatives pursuant to 43 CFR 46.420(b).

American Bird Conservancy

The alternative provided by the American Bird Conservancy combines Alternatives E and F from the 2016 DEIS. It also prohibits all harvest of existing and future marbled murrelet habitat for 50 years and provides 492-foot (150-meter) buffers around all occupied sites and old forest mapped by the 2008 Science Team (Raphael and other 2008). To avoid disturbance, the alternative prohibits salvage in MMMAs and special habitat areas during the nesting season. This alternative would include approximately 267,000 acres of marbled murrelet-specific conservation and 834,000 acres of long-term forest cover (60 percent of the analysis area).

USEPA

The second USEPA alternative that would modify Alternative F would include all of the conservation areas identified in Alternative F and would conserve all current and future habitat, any special habitat areas not included in Alternative F, and any emphasis areas not included in Alternative F. Current habitat is defined as having a P-stage value of at least 0.25. Future habitat is defined as "all lands that will reach a P-stage value by the final decade of the Habitat Conservation Plan." This alternative would include 261,000 acres of marbled murrelet specific conservation and 832,000 acres in long-term forest cover (60 percent of the analysis area).

Pacific Seabird Group

The alternative recommended by the Pacific Seabird Group is a modification of Alternative F from the 2016 DEIS. Alternative F would be modified by prohibiting harvest of any occupied, suitable, or "near suitable" habitat for 50 years; providing 492-foot (150-meter) or larger buffers around all occupied, current and future suitable, and older-forest habitat; and adding buffered special habitat areas and emphasis areas from Alternative E. This alternative would include 445,000 acres of marbled murrelet-specific conservation and over one million acres in long-term forest cover (73 percent of the analysis area).

Marbled Murrelet Coalition

The alternative proposed by the marbled murrelet coalition is a modification of Alternative F. This alternative would add to Alternative F all current and future habitat within the next 50 years, all emphasis areas and special habitat areas from Alternative E, and 492-foot (150-meter) buffers around all occupied sites and in the OESF old forest northern spotted owl habitat as mapped by the Science Team (Raphael and others 2008). Current and future habitat is defined as having a P-stage of at least 0.25. The Coalition suggests combining special habitat areas, emphasis areas and MMMAs into one category referred to as "Conservation Areas." This alternative would include 265,000 acres of marbled murrelet specific conservation and 832,000 acres in long-term forest cover (60 percent of the analysis area).

This alternative also includes conservation measures for forest management activities, recreation, leases and contracts, land disposition, research, fire suppression, and wind energy development.

Impacts and Mitigation of Proposed Alternatives

The analytical framework used in the 2016 DEIS and RDEIS includes an assumption that the loss of habitat from harvest in the managed forest over time (impacts) will be offset by habitat gains that occur in areas protected by the conservations strategy (mitigation). However, each habitat acre harvested and each acre grown have different values, depending on their P-stage value, their location relative to forest edges, distance from other habitat areas, and in which decade they are harvested, develop into habitat, or increase in P-stage value. Figure 2.4.5 shows acres of impact and mitigation based on these factors (refer to Appendix H for a more detailed description).

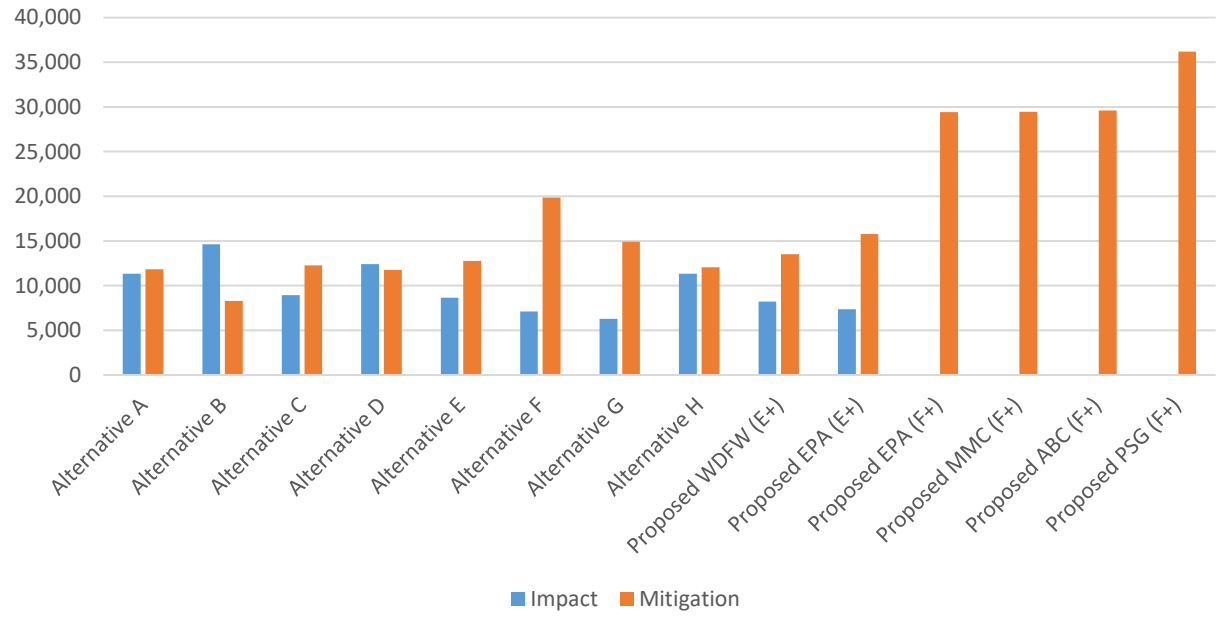
The impacts from habitat removal for each of the proposed alternatives considered but not analyzed in detail in Figure 2.4.5 is zero because these alternatives severely restrict harvest activities in all areas that may impact murrelets (60 to 73 percent of the analysis area). In addition, the mitigation imposed in adjusted acres is as follows:

- USEPA alternative (EPA F+): 29,426 acres
- Marbled Murrelet Coalition (MMC) alternative: 29,471 acres
- American Bird Conservancy (ABC) alternative: 29,600 acres
- Pacific Seabird Group (PSB) alternative: 36,181 acres

This mitigation is approximately 50 percent more than Alternative F. Socioeconomic impacts are closely related to the change in acres available for harvest (known as "operable acres") because of additional conservation (refer to the evaluation criteria discussion in Section 4.11 and Table 4.11.6). As shown in Table 4.11.6, Alternative F has approximately three times as much marbled murrelet-specific conservation as Alternative D and approximately 3 times as much impact on operable acres. Alternative F has 176,000 acres of marbled murrelet-specific conservation. The proposed alternatives considered but not analyzed in detail have between 261,000 and 445,000 acres of marbled murrelet-specific conservation. The socioeconomic impacts of the proposed alternatives considered but not analyzed in detail are expected to be proportionally higher, or between 50 percent more and 250 percent more impact on operable acres than Alternative F.

The proposed alternatives are not reasonably related to, and do not accomplish, DNR's project purpose and need, which includes obtaining long-term certainty for timber harvest and other management activities on forested state trust lands consistent with DNR's fiduciary responsibility to the trust beneficiaries as defined by law. The proposed alternatives are not consistent with DNR's project objectives because of impacts to trust beneficiaries from the harvest restrictions and because the mitigation imposed greatly exceeds impacts from DNR activities. Based on its analysis of impacts to trust beneficiaries, DNR concludes that these alternatives are not economically feasible in view of its trust obligations, and thus are not reasonable alternatives. Consequently, the Joint Agencies decided not to analyze the four proposed alternatives in detail.

Figure 2.4.5. Impacts and Mitigation Summary for all Alternatives, Including Those Considered but Not Analyzed in Detail



How Do the Alternatives Address DNR's Project Objectives?

The need, purpose, and objectives statements in Chapter 1 includes five objectives that guided the development of alternatives. This section provides a brief summary of DNR's evaluation of how the alternatives address each of DNR's project objectives.

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.

All alternatives allow continued generation of revenue for trust beneficiaries. Revenue streams may be impacted differently depending on the alternative. The alternatives would generate revenue in the following order, from the most revenue to the least revenue: Alternative B, A, H, D, C, E, G, F. Alternatives that generate the least revenue, such as Alternatives F and G, may not achieve DNR's Trust Mandate objective. Revenue estimates are discussed in more detail in Section 4.11, "Socioeconomics." Specific impacts to trusts and counties are also discussed in Section 4.11.

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.

Marbled murrelet-specific conservation areas, in combination with existing 1997 HCP conservation strategies, maintain areas in long-term forested condition. These forested areas are designed to minimize and mitigate incidental take. The proposed conservation measures are designed to avoid, minimize, and mitigate the impacts of certain forest management activities.

Alternatives C through H modify the current interim approach to murrelet conservation (approximated by Alternative A) by designating strategically important locations for conservation of marbled murrelet habitat. Alternatives C through H identify strategic locations for marbled murrelet conservation on DNR-managed lands as areas with documented occupied sites and concentrations of murrelet habitat in context of the existing conservation network provided by federal lands. For example, certain DNR-managed lands in southwest Washington were considered strategically important because of their concentrations of documented occupied habitat, and because the absence of habitat on federal lands in this area could result in a gap in the otherwise continuous coastal distribution of marbled murrelets in Washington. Some specific areas in the North Puget HCP Planning Unit were considered strategic locations because they provide forested landscapes within commuting distance to nest sites from marine foraging areas around the San Juan Islands, which were identified by Raphael and others (2015) as "hot spots" due to heavy murrelet use and prey availability. And the OESF and Straits west of the Elwha River strategic location

contains an abundance of high quality habitat, is in close proximity to marine waters, and also is close to areas identified by Raphael and others (2015) as "marine hot spots."

Although Alternative B protects known occupied sites, no additional marbled murrelet-specific conservation areas are identified.

Refer to Section 4.6, "Marbled Murrelets," for an evaluation of how these alternatives may affect marbled murrelet populations. Figure 2.4.5 provides a summary of impacts and mitigation by alternative. An alternatives may not achieve DNR's marbled murrelet habitat objective if mitigation greatly exceeds impacts, such as Alternatives F and G, or if impacts greatly exceeds the mitigation, such as Alternative B.

3) **Active Management:** Promote active, innovative, and sustainable management on the forested trust land base.

Each alternative allows continued, sustainable harvest of timber, consistent with existing laws, policies, and the 1997 HCP. Harvest of some marbled murrelet habitat also is permitted. Underlying regulations and policies promoting innovation remain in place unless otherwise constrained by specific conservation measures. For example, riparian restoration treatments may be prohibited in special habitat areas but are allowed elsewhere in the analysis area.

The proposed conservation measures also allow innovative thinning treatments that could be used to accelerate the development of marbled murrelet habitat in some areas of long-term forest cover. Impacts to active, innovative, and sustainable management is discussed primarily in Sections 4.6 through 4.9.

4) **Operational Flexibility:** Provide flexibility to respond to new information and site specific conditions.

All alternatives would allow DNR to continue to respond to emergency situations and would not change the existing practice of consultation with USFWS. Site-specific consultation with USFWS is expected under the proposed conservation measures for some forest management activities. For four types of operations within long-term forest cover (thinning, roads, blasting, and recreation), the conservation measures differ among alternatives, with some limiting DNR's operational flexibility more than others. Alternatives B, E, and F generally allow more flexibility and site-specific assessments (with consultation where necessary) to avoid, minimize, and mitigate potential habitat impacts. However, Alternative F would restrict harvest operations on the greatest number of acres and would subject the greatest number of acres to site-specific consultation. Alternatives C, D, and H would prohibit new road and new recreation facility development in marbled murrelet conservation areas and propose more restrictions on where thinning and blasting activities can occur.

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 1997 HCP.

The action alternatives all share a feasible, practical, and cost-effective, basic approach to conservation by increasing certainty about where and how much marbled murrelet habitat will be conserved over time and

by building a strategy around areas that are already deferred from harvest by existing DNR policies and regulations. Lands already assumed to be unavailable for harvest make up the majority of the proposed marbled murrelet conservation areas, which will control DNR's costs for implementing a long-term strategy. The conservation measures largely acknowledge the need for most DNR routine operations to continue to occur within long-term forest cover and limit restrictions or prohibitions to within specific marbled murrelet habitat areas. Thus active management of forest resources could largely continue, following clear parameters for seasonal timing restrictions, disturbance buffers, and need for consultation. Thinning to accelerate habitat development under the alternatives would increase implementation costs for those alternatives. Alternative F allows the most thinning within MMMAs. While the conservation measures common to the action alternatives add some implementation cost and/or time delay for projects compared with the no action alternative, these impacts are not expected to be significant.