

Chapter 2

THE ALTERNATIVES

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The Alternatives

In this chapter, DNR and USFWS (Joint Agencies) describe six 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 the alternatives are described, and the features of the alternatives are compared to one another.

2.1 Developing and Screening the Alternatives

The Joint Agencies worked together to develop six alternatives within the range of the marbled murrelet to analyze in this DEIS, including the no action alternative. These alternatives cover a range of acres and configurations of DNR forestland that is managed for marbled murrelet conservation. The alternatives differ in the amount of land that is designated for marbled murrelet conservation, where conservation is located, and how conservation areas will be managed. Development of these alternatives was informed by the scoping process described in Chapter 1; Appendix A provides a summary of this process and the comments received. The alternatives were screened by the Joint Agencies for their ability to potentially meet the project’s adopted need, purpose, and objectives and basic criteria under the Endangered Species Act. A discussion of how the alternatives address project objectives is included at the end of this chapter.

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.

■ 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 (refer to Chapter 1) were not considered feasible and were not developed into alternatives. These included:

- 1) ***Removing HCP coverage*** for the marbled murrelet and managing instead under the forest practices rules (WAC 222) and existing DNR policies. This approach could not achieve the need, purpose, and objectives and 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 murrelet presence (a one- to two-year process with up to 18 site visits (Evans Mack and others 2003)) and consultation with USFWS each time potential habitat impacts 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 would also be unlikely to provide a significant contribution to protecting the murrelet population, 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. This could foreclose future options for nesting habitat development in areas strategically important to the population.
- 2) ***Ceasing timber harvest activities*** on DNR-managed state trust lands. This approach was not considered feasible as it 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, the Joint Agencies did conduct some additional analyses to explore a variety of the following scenarios that were not included as action alternatives:

- Analyzing no harvest of DNR-managed land through the planning period or immediate removal of all DNR-managed habitat. These scenarios were requested to be explored by the Board of Natural Resources. The purpose of analyzing these two scenarios was to understand the outermost boundaries of the model's outputs for the marbled murrelet population (refer to Appendix C: Population Viability Analyses (Peery and Jones 2016))
- Including "stringer" habitat (defined in Section 2.4, Habitat Configuration) in order to understand the effect this habitat might have on the population.

- Metering of the harvest of marbled murrelet habitat. The purpose of this scenario was to model how delaying initial harvest impacts may affect the population over time.¹
- Including a larger buffer (150 meters) on occupied sites, requested by the Board to test the sensitivity of Alternative F and how the balance of impacts and mitigation changes.²
- Excluding northern spotted owl habitat from long-term forest cover, requested by the Board, to minimize overlap of the marbled murrelet strategy and the owl 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 described in Section 4.6, Marbled Murrelet.

These supplementary analyses, although not incorporated into an action alternative, informed deliberations about the alternatives.

■ Why do we need a long-term strategy 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 strategy will also help ensure sustainable management of state trust lands. Further delay in the development of a long-term strategy would mean the data used to identify potential nesting habitat and model habitat growth under the proposed alternatives would become out of date, and delay could also 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 nesting 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 on mature trees, adequate canopy cover, and sufficient interior forest to provide security to nesting murrelets from predation and other forest edge effects. 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.

¹ Analysis of including stringers and metering was presented to the Board of Natural Resources on June 7, 2016.

² Analysis of a larger buffer and excluding owl habitat were discussed with the Board of Natural Resources on August 11, 2016.

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 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), the report provides a landscape-level examination of proposed conservation areas on DNR-managed lands on the Olympic Peninsula and Southwest Washington (not North or South Puget). 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 of Natural Resources.

However, the report made considerable contributions toward the development of alternatives for this DEIS. The Science Team examined the relationship of the structure and composition of forest stands with their potential contribution to carrying capacity for marbled murrelets. This analysis provides a critical foundation for the habitat model referred to as "P-stage," which DNR and USFWS use to estimate the area of current and future murrelet habitat in all of the alternatives described in this chapter. The Science Team also evaluated occupied sites resulting from surveys on DNR 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). 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 in Appendix E for detailed description.) DNR and USFWS used these delineations and recommendations for occupied sites in Alternatives B through F, with an exception regarding buffer width for two alternatives. Finally, the conservation areas recommended by the Science Team on the Olympic Peninsula and in southwest Washington are incorporated into Alternative F. For this alternative, conservation areas in North and South Puget planning units, which were designed using Science Team principles, are also included.

Occupied marbled murrelet sites

Previous survey work and habitat relationship studies done by DNR under the interim strategy resulted in the identification of 44,722 acres of occupied sites on DNR-managed forestlands in the analysis area. Occupied sites are habitat patches of varying size where murrelets are assumed to nest based on field observations. Occupied sites identified through HCP survey work are maintained as habitat and are not currently subject to harvest. Work by the Science Team identified an additional 16,000 acres of occupied sites, and these sites are used 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 have identified where other potential nesting habitat may currently exist on DNR-managed lands, or where it is likely to develop during the life of the HCP. To find these areas, DNR applied the Science Team’s landscape-scale habitat classification model called “P-stage.” The P-stage model, developed for the 2008 Science Team report (Raphael and others 2008), uses forest inventory data (including forest type, stand origin, and stand age) to estimate the location and quality of murrelet habitat. (Refer to Appendix E for a detailed description of the P-stage model, including a comparison of this model with other available habitat models.) Habitat is assigned a P-stage value based on its quality, ranging from relatively low-quality habitat on up to higher-quality 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 2.2.1).

P-stage was used to inform the Joint Agencies on development of alternatives. 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 was also 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.)

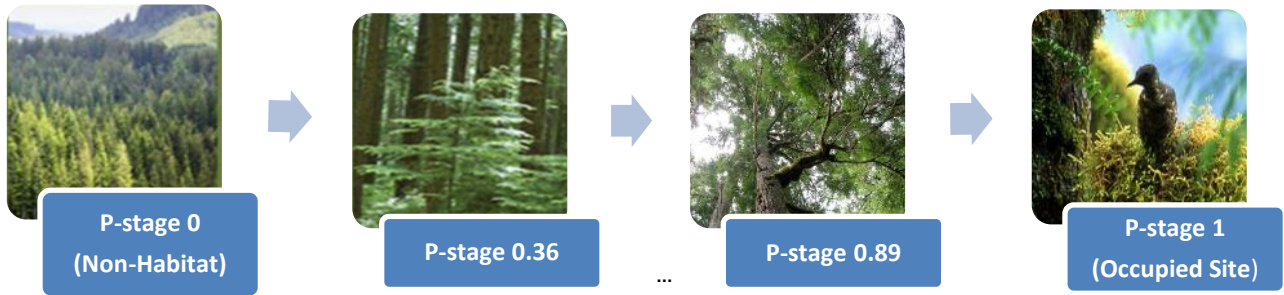
In general throughout this DEIS, when the term “marbled murrelet habitat” is used, this means land that has a P-stage value greater than zero (0). However, not every acre of DNR-managed land with a P-stage value is proposed for murrelet habitat conservation under the alternatives. Depending upon the alternative, certain forestlands with a P-stage value will be harvested over the life of the HCP. 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, from the 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 potential habitat on DNR-managed lands.

Figure 2.2.1. Ascending P-stage Classes and Associated Habitat Development



2.2 Elements Common to all Alternatives

The six alternatives (a no action alternative and five action alternatives) described in this chapter represent a range of different conservation approaches for the marbled murrelet. They do, however, share a common framework. All alternatives 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 a different amount of land for conservation for the marbled murrelet, representing a range of options that are analyzed in this DEIS.

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 |
|---|-----------------------|---------|---------|---------|---------|---------|
| Acres of existing conservation that may provide benefits to marbled murrelets, depending on forest condition | 583,000 | 583,000 | 583,000 | 583,000 | 583,000 | 583,000 |
| Acres of additional, marbled murrelet-specific conservation³ | 37,000 | 10,000 | 53,000 | 51,000 | 57,000 | 151,000 |
| Total approximate acres | 620,000 | 593,000 | 636,000 | 634,000 | 640,000 | 734,000 |

These categories are explained in the next section.

³ Acres reported here are those which do not overlap other existing conservation lands.

Lands providing existing conservation benefit to the marbled murrelet

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.⁴ These lands are managed under specific strategies that also provide long-term habitat benefits to the marbled murrelet. The following management strategies and programs implemented by DNR provide existing conservation benefits to the marbled murrelet.

RIPARIAN CONSERVATION STRATEGIES

The 1997 HCP includes riparian conservation strategies to maintain or restore freshwater habitat for salmon on DNR-managed lands and aid in the conservation of other riparian and aquatic species. There are two strategies, one for the five west-side HCP planning units—the Riparian Forest Restoration Strategy (RFRS)—and another for the OESF. Both strategies establish riparian management zones on all salmonid-bearing streams and other streams of a certain size.⁵ 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 RFRS and OESF strategies is in how the riparian management zone is designed (in the RFRS, there is a set width by stream type, while the OESF uses a watershed analysis approach) and what the specific management objective is to be achieved (the RFRS has a desired future condition for all stands, while the OESF’s objective is restoration of riparian function at the watershed scale). The other minor difference is that in the OESF, a small amount of area in the riparian management zone is allowed to be variable retention harvested. (For more information, refer to the OESF forest land plan.⁶)

Riparian management zones in OESF and the other west-side HCP planning units are included as conservation lands in the alternatives analyzed in this DEIS because they are managed to maintain forest cover on a long-term basis. Forest stands in these zones can provide nesting habitat for marbled murrelets as well as insulate the habitat from other forest management activities.

OLD-GROWTH STRATEGY

The Board of Natural Resources’ policy is to protect and defer timber harvests in all existing old growth on forested state trust lands in western Washington as part of implementing the HCP and meeting other regulatory requirements and policy goals.⁷ Old-growth stands of 5 acres and larger that originated

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.

⁴ The sustainable harvest calculation establishes the volume of timber to be scheduled for sale during a planning decade (RCW 79.10.300). Available at: www.dnr.wa.gov/shc

⁵ *DNR Proprietary HCP Substitution Agreement for Aquatic Resources*, 2008, Appendix 1.

⁶ Refer to www.dnr.wa.gov/oesf-forest-land-plan.

⁷ *Policy for Sustainable Forest* (DNR 2006, p. 34).

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.⁸ Old-growth stands 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 also includes a landscape-scale strategy to protect and restore habitat for the northern spotted owl in strategic locations near the Cascades and on the west side of the Olympic Peninsula in the OESF. 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 strategy in the five west-side planning units is to create habitat that significantly contributes to the species' demography, distribution, and habitat contiguity by providing provide nesting, roosting, and foraging (NRF) 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 potential northern spotted owl habitat.

PROTECTION OF HABITAT FOR MULTIPLE SPECIES

The 1997 HCP is a multispecies document, and it employs additional strategies to ensure that uncommon habitats (such as large, structurally unique trees) are protected throughout the HCP planning units and to leave trees that are designated as part of harvest activities to maintain habitat and biodiversity.

NATURAL AREAS

These 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 are generally 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 and special ecological features throughout the analysis area. These lands often contain marbled murrelet habitat or provide security forest functions or buffers to that habitat.

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 among all the alternatives. Some of these lands may not be forested or contain marbled murrelet nesting habitat. But generally, when they are forested, they may contribute to murrelet conservation by providing security forest, or ideally, potential or future nesting habitat. These baseline acreage numbers are the same for each alternative, with the exception that Alternative F also includes low-quality northern spotted owl habitat. All acreage numbers are approximate based on current data from a variety of DNR databases.

⁸ DNR Procedure 14-004-045.

Table 2.2.2. Acres of Currently Conserved Land Providing Benefit to the Marbled Murrelet (rounded to nearest 1,000; only non-overlapping acres are reported)

| Type of conservation | Source | Approximate acres in long-term forest cover |
|--|--|---|
| Forested natural areas (Natural Area Preserves and Natural Resources Conservation Areas) | RCW 79.70, 79.71 | 85,000 |
| Long-term conservation commitments for multiple species ⁹ | HCP, <i>Policy for Sustainable Forests</i> | 479,000 |
| Existing northern spotted owl habitat—high-quality ¹⁰ | HCP | 19,000 |
| Total | | 583,000 |

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 are generally referred to in the DEIS as “marbled murrelet conservation areas.” These areas include occupied sites, buffers, special habitat areas, 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 types of conservation areas, which are defined in the following sections.

OCCUPIED SITES

Occupied sites are areas previously identified through surveys as showing signs of occupancy by nesting 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 survey effort from 1997 to 2002 as DNR implemented the interim strategy. Alternatives B through F use occupied sites that were expanded from this original set by the Science Team Report.

OCCUPIED SITE BUFFERS

Alternatives A and Alternatives C through F apply a 100-meter buffer to the outer extent of a mapped occupied site. Under Alternatives C through E, buffers are reduced to 50 meters for sites 200 acres or greater in size in the OESF planning unit. Alternative B does not apply any buffers to occupied sites.

⁹ 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.

¹⁰ Existing northern spotted owl high-quality habitat refers to the following DNR mapped habitat classes as of 2015: old forest, high-quality nesting habitat, and A and B habitat per the definitions in the 1997 HCP (DNR 1997, p. 12).

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. 40). 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 is also 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.

SPECIAL HABITAT AREAS

The goal of special habitat areas is to increase marbled murrelet productivity by reducing edge and fragmentation around occupied sites in specific geographic areas to benefit the species. All special habitat areas have at least one marbled murrelet-occupied site within their borders, and some have multiple occupied sites. Special habitat areas include not only the occupied site(s), but also surrounding habitat (P-stage) and non-habitat that may function as security forests. Security forest provides additional protection to nesting habitat from wind, predators, and other types of disturbances. Over the long term, additional marbled murrelet habitat is expected to develop in special habitat areas due to forest maturation.

Special habitat areas rely on the exclusion of active forest management to achieve the goal of reducing edge and fragmentation and growing new habitat over the long-term. Alternatives C, D, and E all designate special habitat areas, although the size and location of these areas varies by alternative (refer to Appendix F). 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. All emphasis areas provide a 0.5-mile buffer next to occupied sites where 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 includes both variable density thinning to facilitate the development of future habitat and variable retention harvest where it does not delay achieving future habitat goals for the emphasis area. Alternatives C and E designate emphasis areas.

MARBLED MURRELET MANAGEMENT AREAS

Marbled murrelet management area (MMMA) goals are to protect occupied sites and to increase future marbled murrelet nesting habitat within their borders. MMMAs are larger in size than either special habitat areas or emphasis areas. MMMAs are in geographic areas that will increase support for the species. MMMAs were originally designated in the Science Team Report, where maps of these areas for

four of the six HCP planning units can be found. For this DEIS, MMMAs were added for North and South Puget planning units; refer to Appendix F. MMMAs allow thinning that facilitates recruitment of future marbled murrelet habitat. Only Alternative F designates MMMAs. Some management activities are allowed in these areas, consistent with habitat development and protection.

HIGH-QUALITY HABITAT STANDS

These are existing stands of P-stage habitat in class 0.47 or above that are protected. These stands are not otherwise identified as occupied sites or as part of the other conservation areas described in the preceding sections. Alternatives C and E designate these habitat stands for conservation in addition to special habitat areas and emphasis areas. Table 2.2.3 shows a comparison of acres by type of conservation area applied under the different alternatives. This table reports only those acres that are *additional* to the existing conservation provided by DNR.

Table 2.2.3. Approximate Acres of Marbled Murrelet-Specific Conservation, by Alternative (rounded to nearest 1,000)

| Murrelet-specific conservation acres (2016) | Alternative A | Alt. B | Alt. C | Alt. D | Alt. E | Alt. F |
|---|---------------|---------------|---------------|---------------|---------------|----------------|
| Occupied sites | 8,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| Occupied site buffers | 12,000 | n/a | 13,000 | 13,000 | 13,000 | 16,000 |
| Habitat identified under interim strategy | 17,000 | n/a | n/a | n/a | n/a | n/a |
| Marbled murrelet management areas | n/a | n/a | n/a | n/a | n/a | 78,000 |
| Emphasis areas | n/a | n/a | 14,000 | n/a | 14,000 | n/a |
| Special habitat areas | n/a | n/a | 9,000 | 28,000 | 13,000 | n/a |
| High-quality P-stage habitat (≥0.47) patches | n/a | n/a | 7,000 | n/a | 7,000 | n/a |
| Existing northern spotted owl habitat—low-quality ¹¹ | n/a | n/a | n/a | n/a | n/a | 47,000 |
| Total | 37,000 | 10,000 | 53,000 | 51,000 | 57,000 | 151,000 |

Acres reported are only those which do not overlap the existing conservation commitments reported in Table 2.2.2.

¹¹ Existing northern spotted owl high-quality habitat refers to the following DNR-mapped habitat classes as of 2015: old forest, high-quality nesting habitat, and A and B habitat per the definitions in the 1997 HCP (DNR 1997, p. 12).

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 (LTFC) for the murrelet on DNR-managed lands. By long-term forest cover, we mean lands where variable retention harvest is not allowed and that will remain forested through the life of the HCP, providing murrelets with nesting habitat or security for that habitat. (Refer to Figure 2.2.2 and Appendix G for a more detailed description of LTFC.) The conservation lands included in LTFC often overlap (refer to Figure 2.2.2). For example, some acres of high-quality owl habitat may also be within a special habitat area. Summary data provided throughout the DEIS does not double-count these overlapping acres for purposes of assigning take or mitigation or analyzing impacts. It is important to note that the amount of LTFC 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. Illustration of Different Components of LTFC on a Block of DNR-Managed Land

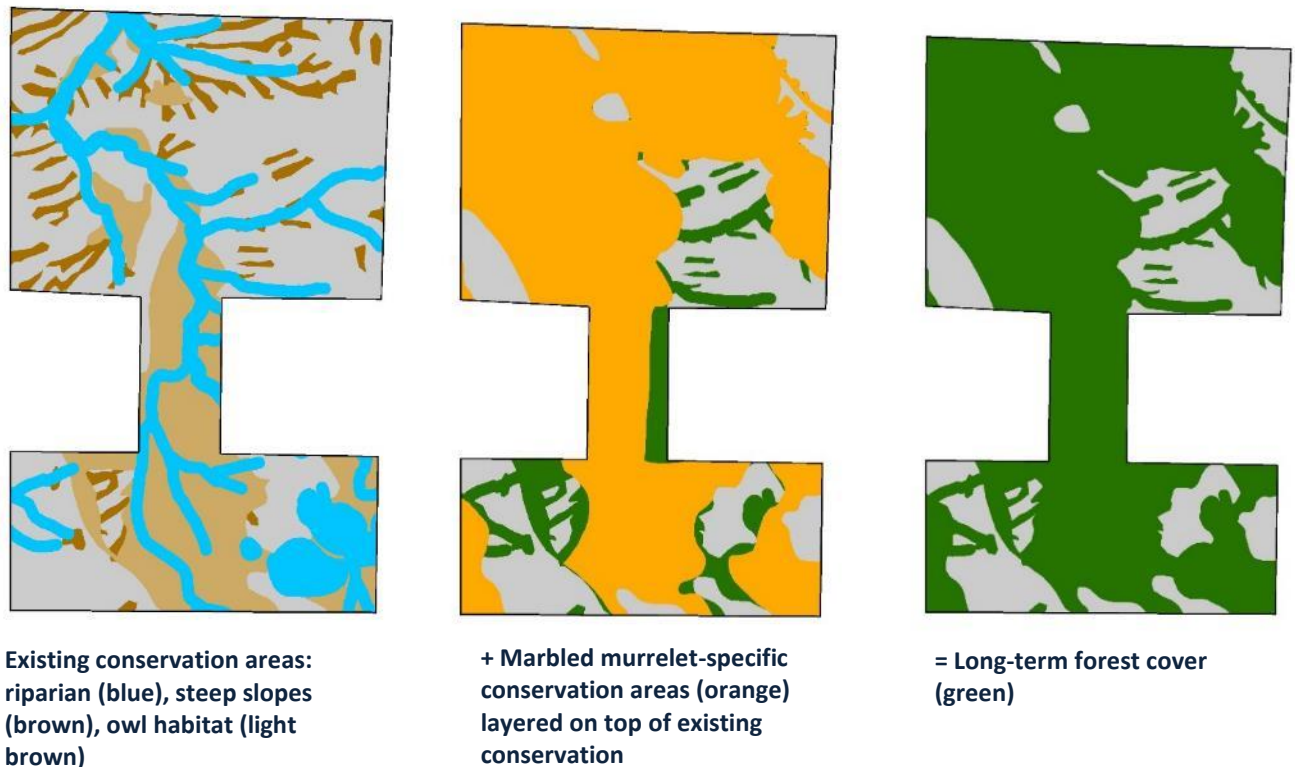


Figure 2.2.2 illustrates this important LTFC concept. For example, assume that the total DNR-managed acreage within the left map is 1,000 acres. The left map further identifies 200 acres in riparian areas, 100 acres in steep slopes, and 100 acres in owl habitat. The map in the center then adds 300 acres of marbled murrelet-specific conservation, much of which overlaps these other areas. The map on the right combines all the different LTFC designations, for a total of 700 acres of LTFC within the 1,000-acre block of DNR-managed land.

■ 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 LTFC. Some of these activities have the potential to negatively impact the marbled murrelet or its nesting habitat.

Certain impacts to marbled murrelets can be classified as incidental take. Under the ESA, the definition of take includes harm to a listed species.¹² The ESA'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 ESA 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 LTFC, 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: Potential Impacts and Mitigation focus paper).

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 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 strategies, DNR requirements or policies, or state law also apply to LTFC, the most restrictive requirement will be followed (refer to Figure 2.2.3 in the following section).

¹² 16 U.S.C. §1532(19).

Text Box 2.2.2

What activities occur on DNR-managed lands?

A variety of activities and land uses occur on the 1.377 million acres of DNR-managed forestlands in the analysis area. These include but are not limited to:

- 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.

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.

Proposed conservation measures (action alternatives)

The following conservation measures are common to all the action alternatives, with some variation where noted in the sections that follow. 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.

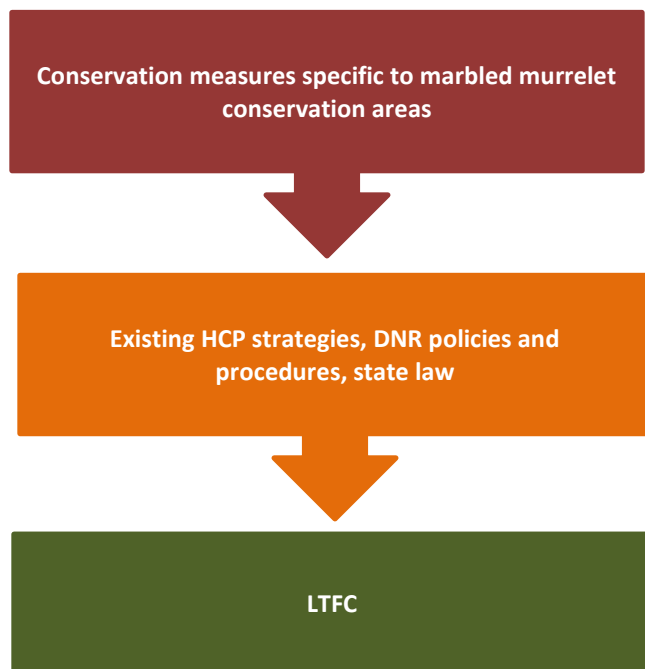
For purposes of these conservation measures, **the nesting season is defined as April 1 through September 23**. Daily timing restrictions are used to minimize potential impacts of an activity during daily peak activity periods for the murrelet during this nesting season. The daily timing restrictions 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 in areas identified as long-term forest cover will be consistent with the specific management objectives of those lands. Those objectives are defined by the conservation strategy applicable to the land (for example, the Riparian Forest Restoration Strategy or old-growth strategy). Variable retention harvest will be prohibited in occupied sites and their buffers, within special habitat areas, within 0.5 mile of occupied sites in emphasis areas, MMMAs (consistent with the Science Team recommendations for the OESF), and within other blocks of high-quality habitat identified by an alternative. Where different strategies overlap, the most restrictive requirement will apply, as illustrated in Figure 2.2.3.

Thinning and related silviculture. Thinning and silviculture prescribed by an underlying plan or policy, such as the HCP riparian strategies, OESF 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 silviculture may be allowed in marbled murrelet conservation areas where those activities are consistent with maintaining murrelet nesting habitat and providing security forest.¹³ Specific measures

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



¹³ For the purposes of this DEIS, security forest is defined as closed-canopy stands over 80 feet tall.

for thinning and silviculture are summarized in Table 2.2.4 and are described under each alternative profile in the next section.

Table 2.2.4. Thinning Requirements in Long-Term Forest Cover (LTFC)

| 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: Riparian Forest Restoration Strategy (RFRS) – Type III or OESF variable density thinning or pre-commercial thinning allowed as needed to enhance or maintain security forest with windfirm canopy | Allowed if needed to enhance or maintain security forest with windfirm canopy | Not allowed | Allowed: Commercial thinning or habitat enhancement thinning with objective to enhance habitat or maintain canopy cover |
| 0.5-mile buffer around occupied sites | n/a | RFRS-Type III or OESF variable density thinning allowed to enhance habitat development or maintain canopy cover | n/a | n/a |
| Current P-stage habitat | Not allowed | Not allowed | Not allowed | Not allowed |
| Future P-stage habitat and non-habitat | Allowed | Allowed | Not allowed | Allowed |
| Unstable slopes | Allowed consistent with geologic assessment | Allowed consistent with geologic assessment | Not allowed | Allowed consistent with geologic assessment |
| Riparian areas | Allowed consistent with riparian strategies | Allowed consistent with riparian strategies | Not allowed | Allowed consistent with riparian strategies |

| Element of LTFC | LTFC outside of emphasis areas, special habitat areas, and MMMAs | Emphasis areas | Special habitat areas | MMMAs |
|---|--|---|-----------------------|---|
| Northern spotted owl (NSO) habitat | Allowed only in low-quality habitat consistent with NSO objectives; in high-quality habitat, not allowed consistent with 1997 HCP (refer to Table 2.4.1 for definitions) ¹⁴ | Allowed only in low-quality habitat consistent with NSO objectives; in high-quality habitat, not allowed consistent with 1997 HCP | Not allowed | Allowed only in low-quality habitat consistent with NSO objectives; in high-quality habitat, not allowed consistent with 1997 HCP |
| NAPs | Allowed consistent with NAP management plan | Allowed consistent with NAP management plan | Not allowed | Allowed consistent with NAP management plan |
| NRCAs | Allowed consistent with NRCA management plan | Allowed consistent with NRCA management plan | Not allowed | Allowed consistent with NRCA management plan |

Forest health treatments. Forest health treatments to deal with root rot, pests, and fire damage will be allowed throughout LTFC in accordance with site-specific management plans and state law. Daily timing restrictions during the nesting season will be followed, and prescribed burning will be kept greater than 0.25 miles from occupied sites.

Forest roads. DNR builds and maintains a network of forest roads throughout LTFC, providing access to harvestable timber stands. These roads are also used by recreation users for hiking, motorized and non-motorized use, and access to fishing, hunting, and camping sites. Forest roads create forest edges, which can attract common predators of murrelet eggs and young, including Steller’s jays and other corvids. Use of forest roads by motorized vehicles may also cause noise disturbance to nesting murrelets. Use of existing forest roads is covered by the 1997 HCP. Construction of new forest roads in marbled murrelet conservation areas would be subject to one of two conservation measures as shown in Table 2.2.5.

¹⁴ Thinning is allowed within high-quality spotted owl habitat in the OESF.

Table 2.2.5. Forest Road Conservation Measures

| Activity/Use | Alternatives B, E, and F | Alternatives C and D |
|---|--|---|
| New road construction and reconstruction | Avoiding impacts to murrelet habitat resulting from road construction or reconstruction through special habitat areas, MMMAs, occupied sites and their buffers, including the 0.5-mile buffer around occupied sites within emphasis areas is the first priority. If potential impacts from road construction or reconstruction are identified in these areas, and DNR decides to pursue the road construction or reconstruction project, USFWS and DNR will consult and condition the project to avoid, minimize, or mitigate as necessary, subject to state and federal laws governing the activity or emergency (e.g., culvert or bridge replacement). This consultation ¹⁵ may result in some road construction through murrelet conservation areas, including occupied sites. | No new road construction or reconstruction through special habitat areas, occupied sites and their buffers, including the 0.5-mile buffer around occupied sites within emphasis areas unless otherwise required by state or federal laws or emergency (for example, a culvert or bridge replacement). |

Maintenance, decommissioning, and abandonment of roads within 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 prohibited in special habitat areas and are limited in other marbled murrelet-specific conservation areas as follows:

- Tailholds and rigging must be installed outside the nesting season if they will be in occupied sites. Impacts to platform trees and trees adjacent to platform trees must be avoided.
- Guy lines and landings should be avoided; otherwise, these should be installed outside the nesting season or follow daily timing restrictions if during nesting season. This activity will minimize removal of large trees or platform trees and will require approval by the DNR regional manager. (Best management practices and mitigation may be required, as provided for in the Riparian Forest Restoration Strategy, for example.)
- Yarding corridors should be located outside occupied sites unless no other route is feasible. If a corridor through an occupied site is deemed necessary, DNR will consult with USFWS.

Salvage and recovery. Sometimes, natural disturbance events such as a wind event can result in forest stands being blown down. Salvage and restoration within marbled murrelet-specific conservation areas may occur under the proposed alternatives, if such action will contribute to the recovery of nesting habitat or security forest. Salvage or recovery will require a site-specific restoration plan approved by DNR

¹⁵ As used throughout these conservation measures, “consultation” refers to a joint agency agreement process, and not consultation under ESA Section 7.

region with wildlife biologist input. 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 with the goal of habitat restoration. 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 with resource extraction from leased pits. Two different conservation measures are proposed to address potential impacts from blasting in long-term forest cover:

Table 2.2.6. Conservation Measures to Address Blasting Impacts

| Activity/Use | Alternatives B, E, and F | Alternatives C and D |
|---|--|---|
| <p>Blasting (associated with forest road construction, maintenance, or extraction of valuable materials)</p> | <p>If blasting is needed during the nesting season within 0.25 mile of occupied sites, special habitat areas and within the 0.5-mile buffer of occupied sites within emphasis areas, DNR will consult with USFWS to avoid, minimize, and mitigate impacts to murrelet nests.</p> | <p>During the nesting season, blasting is prohibited within:</p> <ul style="list-style-type: none"> • special habitat areas, • the 0.5-mile buffer of occupied sites within emphasis areas, and • 0.25 mile of occupied sites. |

Crushing and pile-driving. For crushing or pile-driving within 110 meters (120 yards) of occupied sites, crushing activities shall 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 used 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 circumstance, aircraft overflights can disrupt the normal nesting behaviors of marbled murrelets. To reduce the likelihood of those potential impacts, the action alternatives 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:

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

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 two approaches to avoiding and minimizing the impacts from *new or expanded* recreation activities for the murrelet as follows:

Table 2.2.7. Conservation Measures to Address Recreation Impacts

| Activity/Use | Alternatives B, E, and F | Alternatives C and D |
|--|---|---|
| <p>Recreation facilities, trails and leases. Includes 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.</p> | <p>All proposed new or expanded recreation facilities, trails, and recreational leases in special habitat areas and MMMA 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, including potential removal of nesting 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.</p> <p>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 MMMA shall follow daily timing restrictions during the nesting season, or take place outside the nesting season when feasible.</p> | <p>No development of any new or expanded recreation facilities, trails, and recreational leases in special habitat areas, occupied sites, and their buffers, including the 0.5-mile occupied site buffer within emphasis areas.</p> <p>Prohibit conversion of any existing non-motorized trails to motorized use within those areas.</p> <p>DNR, in consultation with USFWS, may decommission or abandon illegal trails in these areas.</p> <p>Maintenance or improvements 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) would be allowed. These activities should take place outside the nesting season, or following daily timing restrictions during the nesting season.</p> |

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 these 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, private road access to inholdings). Existing easements are subject to the conditions of their contracts and the 1997 HCP and are not affected by the alternatives in this DEIS. The action alternatives propose language to the HCP clarifying that federal

projects must follow NEPA, including required consultation with USFWS and the National Marine Fisheries Service under the ESA, and may include avoidance, minimization, and mitigation by the proponent if necessary. For non-federal projects, DNR will avoid siting new powerlines and utilities in marbled murrelet habitat when feasible, subject to laws requiring DNR to grant interests in real property or use of state lands. New utilities will follow existing roads when feasible.

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, communications facilities, and other special uses. Existing contracts and leases are subject to the conditions of their contracts and the 1997 HCP and are not affected by the alternatives in this DEIS. Many leases are discretionary, and some are required by other federal or state laws. For all proposed new or renewed leases or contracts on lands located within special habitat areas, 0.5 mile of occupied sites in emphasis areas, and occupied sites, avoiding impacts resulting from these activities is the first priority. If potential impacts are identified in these areas, and DNR decides to pursue the proposal, USFWS and DNR will consult to design conditions of the lease or contract to consider strategies for avoidance, minimization, or mitigation as necessary, subject to state and federal laws governing the activity. Noise-generating activities will comply with disturbance distance thresholds and timing restrictions detailed in this section, where feasible.

Land dispositions. No voluntary disposition of land involving murrelet conservation areas (occupied sites, marbled murrelet management areas, special habitat areas, or emphasis areas) will be allowed without retaining HCP conservation commitments. Dispositions without retaining HCP conservation commitments will be avoided elsewhere in LTFC.

Research. Non-invasive research will be allowed in LTFC, following daily timing restrictions during nesting season. Invasive activities (those causing prolonged audiovisual disturbance or involving heavy equipment) must occur outside the nesting season within LTFC.

Emergency operations. All fire suppression activities, including aerial fire operations and aircraft, are allowed in LTFC, following “minimum impact suppression tactics” guidance.¹⁶

OTHER FOREST MANAGEMENT ACTIVITIES

For activities not listed in this section, DNR follows the existing language of the HCP and will consult with USFWS where necessary to avoid, minimize, and mitigate impacts of the activity.

¹⁶ Refer to *NWCG Guidance on Minimum Impact Suppression Tactics*, 2003.

■ 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 how the activity is covered by the HCP (1997 HCP, Ch. IV, Section H). Under Alternative A, the no action alternative, the current 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 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 zone in accordance with the Riparian Forest Restoration Strategy but there is a restriction on road building through an occupied site within that riparian zone (as in Alternatives C and D), then 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.

■ What happens outside LTFC?

Forestlands outside LTFC will continue to be managed per DNR policy and rule, including the 1997 HCP, Sustainable Harvest Calculation, Forest Practice Rules, HCP riparian strategies, and other state and federal laws (refer to Chapter 1). Once the Board of Natural Resources approves an HCP amendment that will include a long-term marbled murrelet conservation strategy, DNR will apply for an incidental take permit from USFWS. If approved, and all permit terms are accepted, 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 LTFC will be considered potential incidental take that is mitigated by P-stage habitat within LTFC (now and in the future) and other marbled murrelet-specific conservation approaches through the life of the HCP. Section 2.4 and Chapter 4 summarize potential impacts and mitigation expected under each alternative.

Text Box 2.2.2

Is all forestland outside LTFC 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 to harvest, including policies that protect old-growth forests, require hydrologic maturity, or protect habitat for other species. Operational costs also play a factor in where and when a harvest will occur.

2.3 Profiles of the Alternatives

The purpose of this section is to describe 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

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 analysis area scale in the following section and in Appendix F for each planning unit or at smaller scales where necessary. The maps provided in this sections are created using DNR geographic information system (GIS) data from 2015. 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 is then evaluated by USFWS for HCP amendment, will include more precisely refined polygons.

■ Composition, distribution, and quality

Opportunities for contributing to marbled murrelet conservation vary among HCP planning units. Each planning unit is a different size, has different amounts of DNR-managed forestland, and contains different amounts of marbled murrelet habitat. The OESF and North Puget planning units contain the most acres of land contributing to marbled murrelet conservation. However, land contributing to marbled murrelet conservation occurs in all planning units. The distribution of marbled murrelet conservation is described for each alternative in the following sections. Differences among the planning units can be attributed to differences in the amount of available habitat, importance of specific geographic areas for long-term marbled murrelet conservation, proximity to federal lands, existing occupied sites and off-shore marbled murrelet populations, and the location of state trust lands. 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 nesting habitat through the life of the HCP, but still provides security to nesting habitat by buffering interior forest stands from predation, wind, and other disturbances. Some areas of non-habitat in the first decade of the HCP will mature into habitat by the final decade of the HCP. The quality of habitat (measured by P-stage value) also improves over time within LTFC. Under every alternative, more nesting habitat becomes available through the life of the HCP.

Text Box 2.3.1

Does more habitat develop over time?

Under every alternative, more and higher-quality nesting habitat becomes available through the life of the HCP as forests grow and mature within LTFC.

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 **620,000** acres of LTFC, with specific murrelet conservation lands including:

- All HCP-surveyed occupied sites, with a 100-meter buffer
- All reclassified habitat in the Olympic Experimental State Forest (OESF)
- All reclassified habitat in the Straits, South Coast, and Columbia planning units that has not been identified as “released” for harvest under the interim strategy
- In the North Puget and South Puget 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 that has a P-stage value greater than 0 in Decade 0.¹⁷ Refer to the following section for further information on this habitat.

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 where 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.

In the North and South Puget planning units, the model did not accurately predict these areas. An alternative approach was developed by the Joint Agencies in 2007 and 2009 in “concurrence letters” that established a process to identify and manage potential and suitable habitat in North and South Puget planning units. The next section and Appendix D further describe the steps DNR follows to identify habitat among all the planning units under the interim strategy. Table 2.3.1 provides a summary of marbled murrelet conservation acres under Alternative A.

¹⁷ P-stage 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 the suitable habitat located in these planning units.

Table 2.3.1 Marbled Murrelet-Specific Conservation Acres—Alternative A¹⁸

| Type of conservation area | Acres (estimated) |
|---|-------------------|
| Occupied sites | 8,000 |
| Occupied site buffers | 12,000 |
| Habitat identified under the interim strategy | 17,000 |
| Total acres | 37,000 |

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:

- Harvest is deferred from all HCP-surveyed occupied sites.
- 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 are evaluated on a case-by-case basis.)
- Forests in OESF will be managed under the OESF forest land plan.

SOUTHWEST WASHINGTON, THE OLYMPIC EXPERIMENTAL STATE FOREST, AND THE STRAITS PLANNING UNIT

All reclassified habitat within the Olympic Experimental State Forest (OESF) and Southwest Washington, defined as those portions of the Columbia and South Coast 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 planning unit is available for harvest if 50 percent of the habitat will remain within the watershed administrative unit (WAU) and if the habitat is greater than 0.5 mile from an occupied site.

NORTH AND SOUTH PUGET PLANNING UNITS

The 2007 and 2009 concurrence letters between USFWS and DNR (Appendix I) establish a stepwise process for how murrelet habitat is managed in the North and South Puget planning units. Habitat meeting the definition of “suitable habitat,” but which 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.¹⁹ Once surveys are complete, buffers and timing restrictions on forest management activities are

¹⁸ Note that the acres reported here, and in similar tables for each alternative profiled in this section, are only those acres that do not overlap with existing

conservation under the 1997 HCP or other DNR conservation commitments.

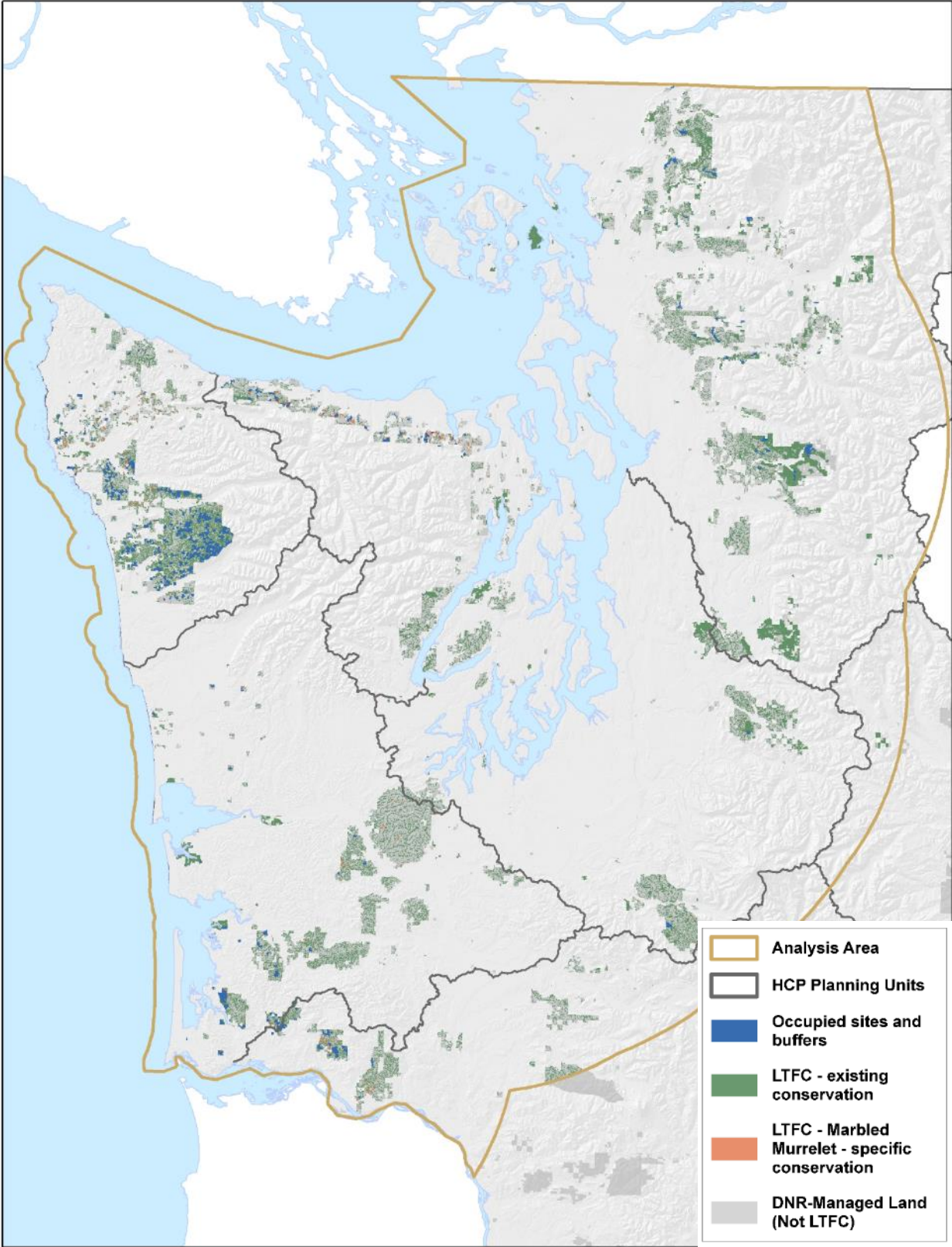
¹⁹ WAC 222-16-080(1)(j)(v).

not required for areas found to be unoccupied by murrelets. Surveyed suitable habitat within the North Puget planning unit can be released for harvest if 50 percent of the habitat will remain within the WAU, and if the habitat is greater than 0.5 mile from an occupied site.

All new forest management activities 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 strategy, any newly identified suitable habitat will not require buffers or harvest timing restrictions. Unique to the North Puget 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.

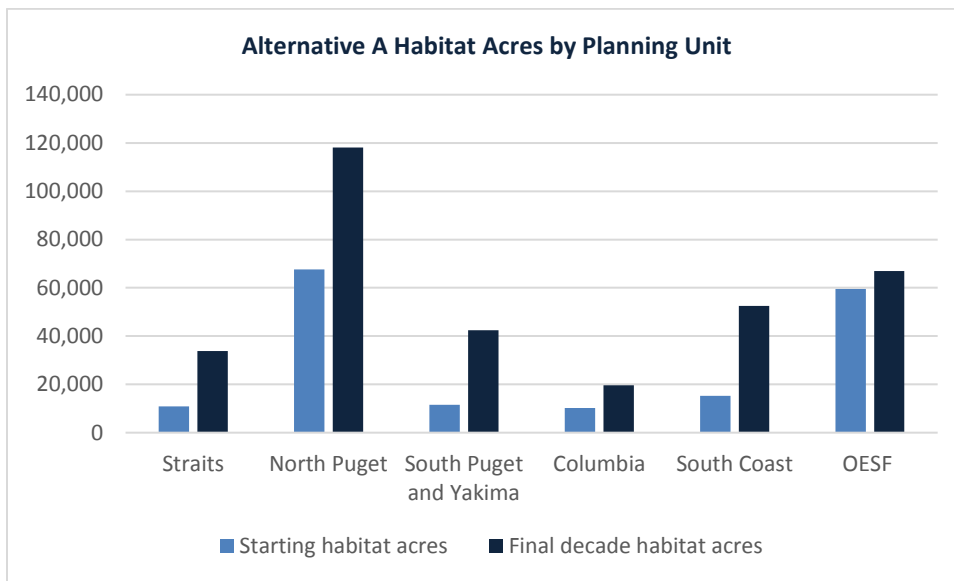
Figure 2.3.1. Habitat Location—Alternative A



Habitat composition and distribution

Figure 2.3.2 depicts the growth of habitat (acres of land with a P-stage value) within LTFC at the beginning of the planning period (2015) compared with the final decade of the planning period (beginning 2057). The figure also illustrates the distribution of habitat acres among the planning units.

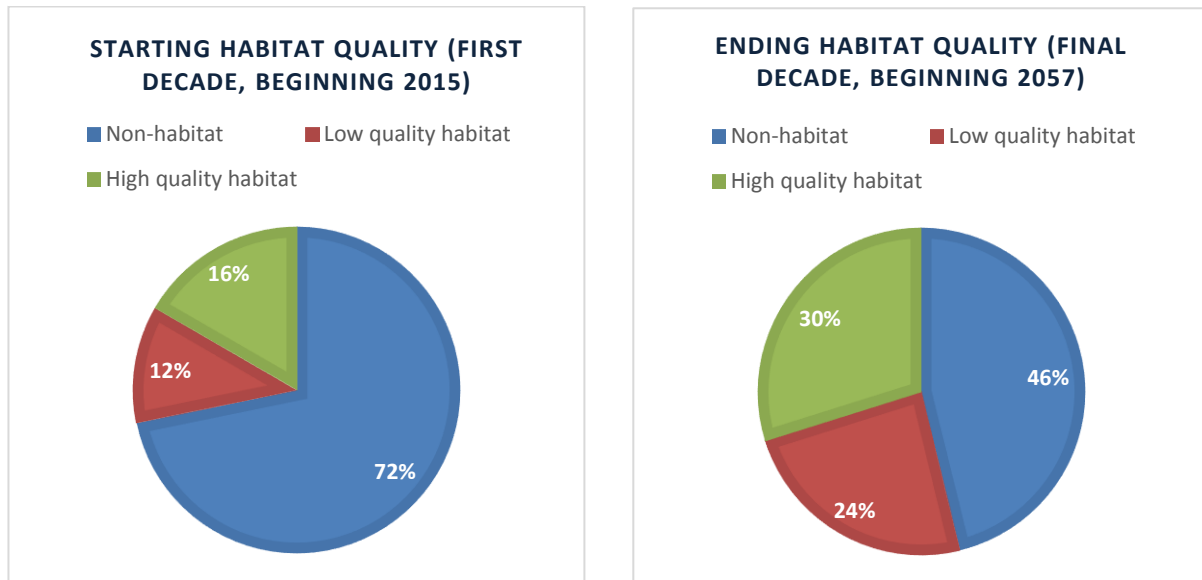
Figure 2.3.2. Habitat Growth by Planning Unit—Alternative A



Habitat quality in LTFC

Habitat quality increases among different P-stage categories throughout the planning period. Most of the increase in habitat quality comes from land starting with a P-stage value of zero (0, meaning non-habitat) in 2015 developing into low-quality habitat (P-stage values of 0.25 to 0.36) by the end of the planning period. High-quality habitat (P-stage value 0.47 to 1) also increases over time. Figure 2.3.4 shows habitat quality as a percentage of LTFC. Each alternative has a different amount of LTFC acres, so percentages are relative to those acres.

Figure 2.3.4. Starting and Ending Habitat Quality—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 **593,000** 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 planning units. This alternative is the only one that does not provide buffers on occupied sites. Harvest and thinning would be prohibited in occupied sites.

Table 2.3.2. Marbled Murrelet-Specific Conservation Acres—Alternative B

| Type of conservation area | Acres (estimated) |
|---------------------------|----------------------|
| Occupied sites | 10,000 ²⁰ |

Habitat composition and distribution

Figure 2.3.5. Habitat Growth by Planning Unit—Alternative B

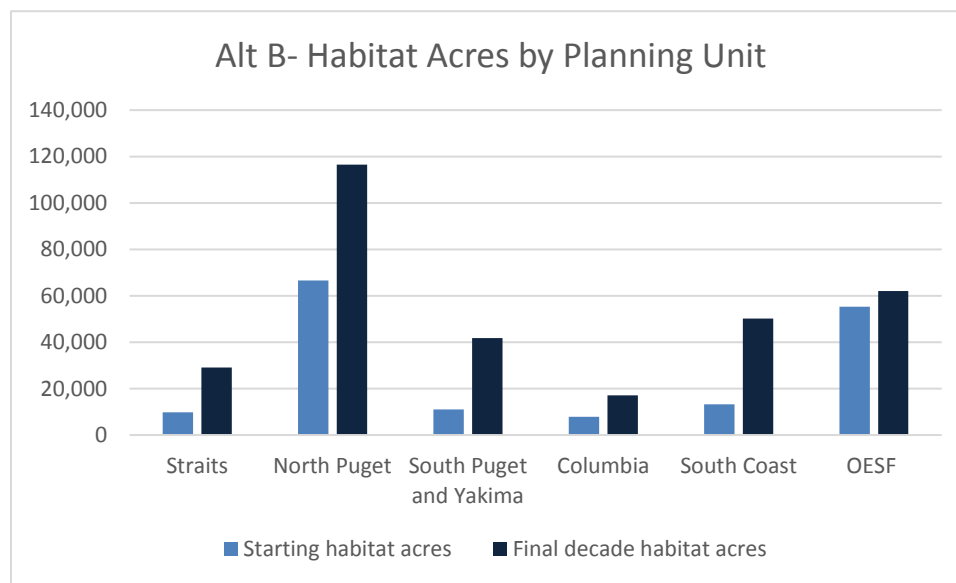


Figure 2.3.5 depicts the growth of habitat (acres of land with a P-stage value) within LTFC at the beginning of the planning period (2015) compared with the final decade of the planning period (beginning 2057). The figure also illustrates the distribution of habitat acres among the planning units. Although Alternative B contains the lowest total number of acres in LTFC among the alternatives, the amount of habitat conserved still increases over time, particularly in North Puget and South Coast planning units.

²⁰ Note: Alternative B and all action alternatives add approximately 16,000 acres of occupied sites compared with the no action alternative. However, only the portion of these acres are not already conserved by other conservation commitments of the 1997 HCP, *Policy for Sustainable Forests*, or other DNR policies or regulations is reported here.

Habitat quality in LTFC

As with the other alternatives, habitat quality increases through the life of the HCP under Alternative B. The largest increases are in a shift of acres from the non-habitat category into lower-quality habitat. The following figures show the change in LTFC habitat quality as a percentage of LTFC.

Figure 2.3.6. Starting and Ending Habitat Quality—Alternative B

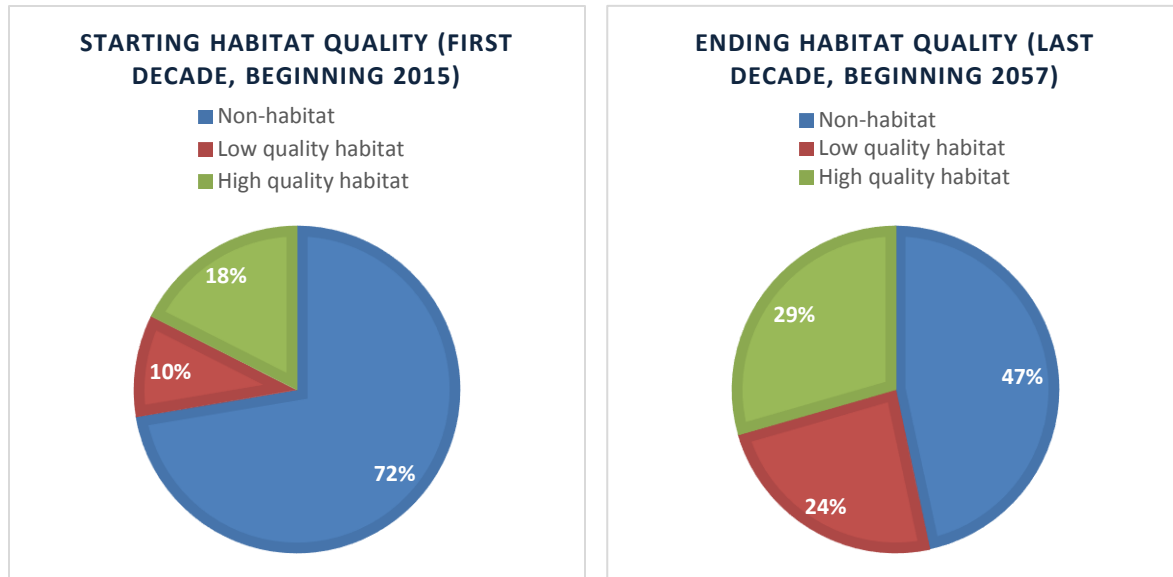
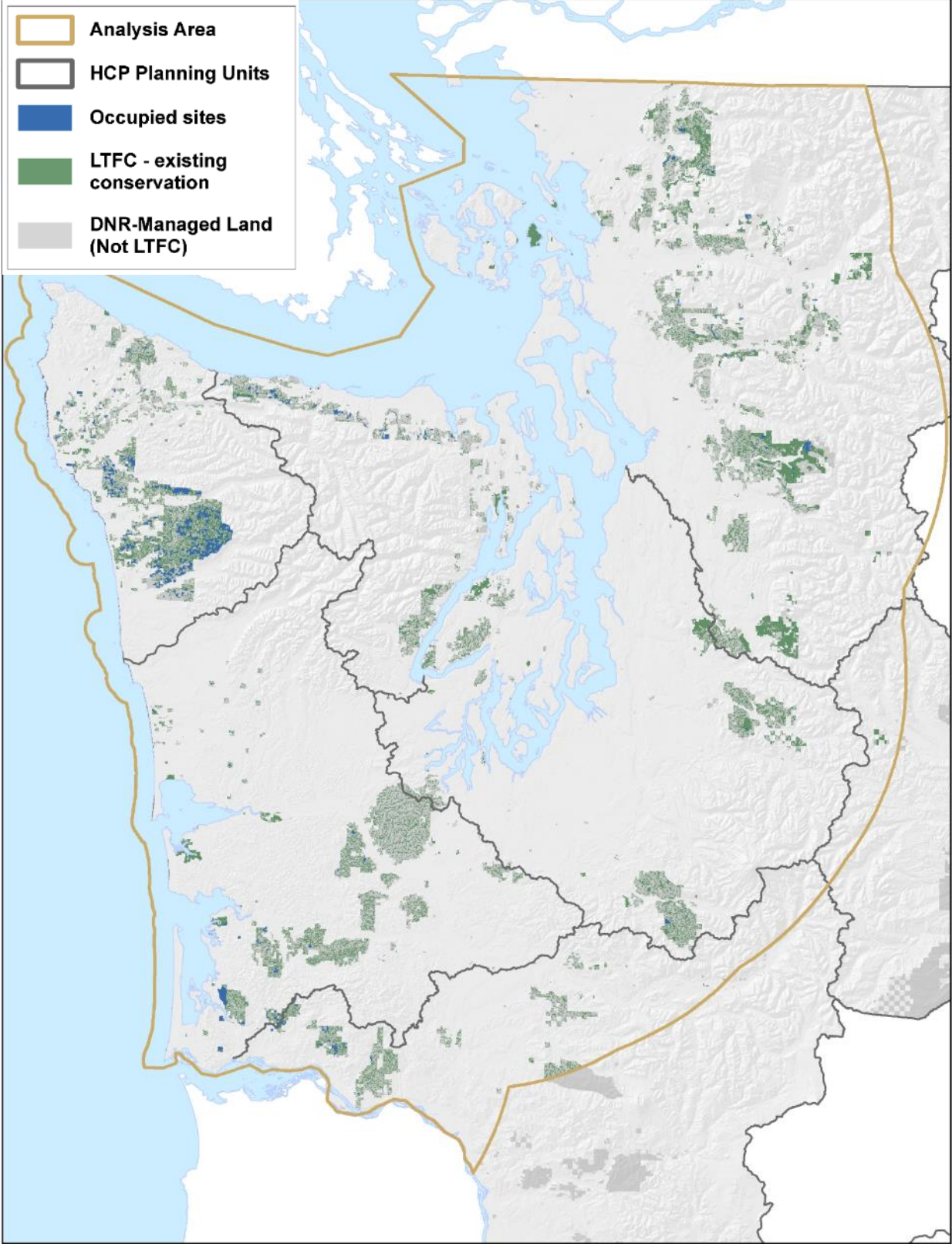


Figure 2.3.7. Habitat Location—Alternative B



Alternative C

Alternative C includes approximately **636,000** acres of LTFC. 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 100-meter buffer to all occupied sites except in the OESF planning unit, where this buffer is 50 meters for occupied sites greater than 200 acres. Within each of the nine 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 0.25 or greater) 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 nesting 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 LTFC.

Table 2.3.3. Marbled Murrelet-Specific Conservation Acres—Alternative C

| Type of conservation area | Acres (estimated) |
|---------------------------|-------------------|
| Occupied sites | 10,000 |
| Occupied site buffers | 13,000 |
| Emphasis areas | 14,000 |
| Special habitat areas | 9,000 |
| 0.47 P-stage habitat | 7,000 |
| Total | 53,000 |

Special habitat areas are smaller than emphasis areas and are designed to increase murrelet productivity by reducing 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 quality in LTFC

The portion of habitat in each quality category is shown as a percentage of total long-term forest cover.

Figure 2.3.8. Starting and Ending Habitat Quality—Alternative C

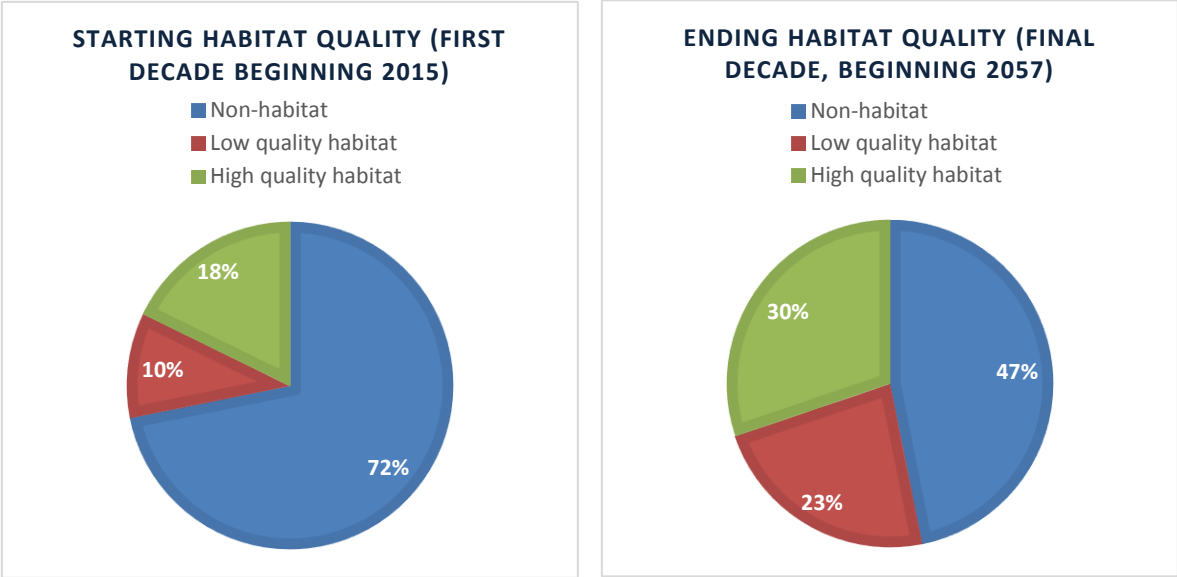
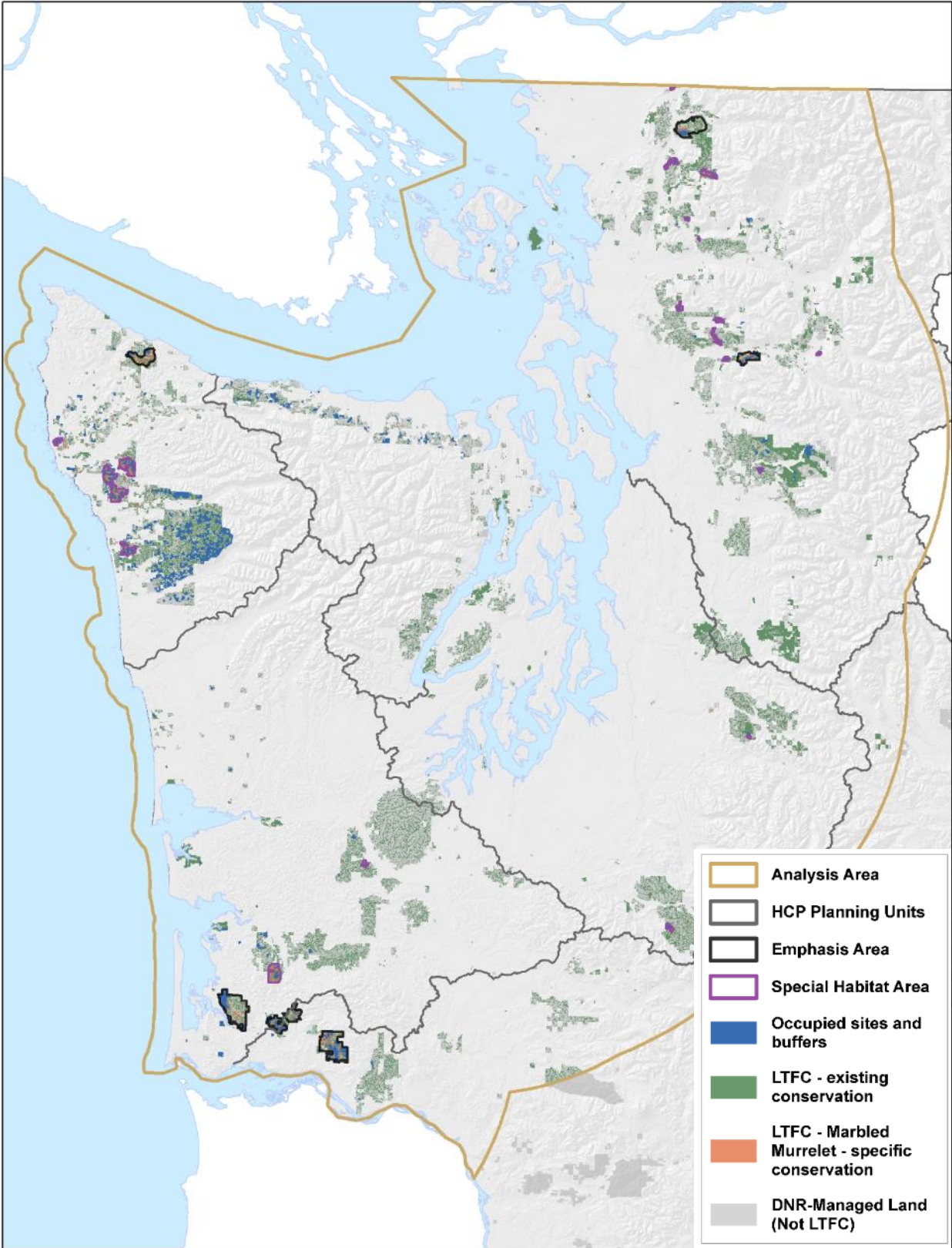


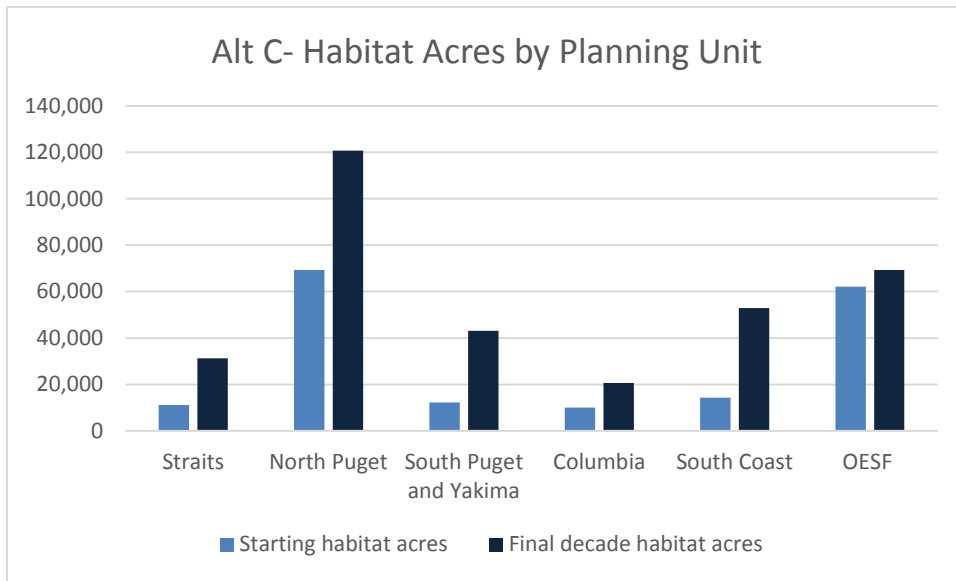
Figure 2.3.9. Habitat Location—Alternative C



Habitat composition and distribution

Figure 2.3.10 depicts the growth of habitat (acres of land with a P-stage value) within LTFC at the beginning of the planning period (2015) compared with the final decade of the planning period (beginning 2057). The figure also illustrates the distribution of habitat acres among the planning units.

Figure 2.3.10. Habitat Growth by Planning Unit—Alternative C



Alternative D

Alternative D concentrates marbled murrelet conservation into 34 special habitat areas. LTFC totals approximately **634,000 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 are designed to increase the productivity of existing occupied sites by reducing 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. They include:

- Strategically located occupied sites with 100-meter buffers, except in OESF where sites greater than or equal to 200 acres have 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 potential habitat (habitat that has or will develop a P-stage value) to be harvested outside LTFC than Alternative C.

Table 2.3.4. Marbled Murrelet-Specific Conservation Acres—Alternative D

| Type of conservation area | Acres (estimated) |
|---------------------------|-------------------|
| Occupied sites | 10,000 |
| Occupied site buffers | 13,000 |
| Special habitat areas | 28,000 |
| Total | 51,000 |

Habitat quality in LTFC

Habitat quality is expressed in the following figures as a percentage of total LTFC in each habitat category.

Figure 2.3.11. Starting and Ending Habitat Quality—Alternative D

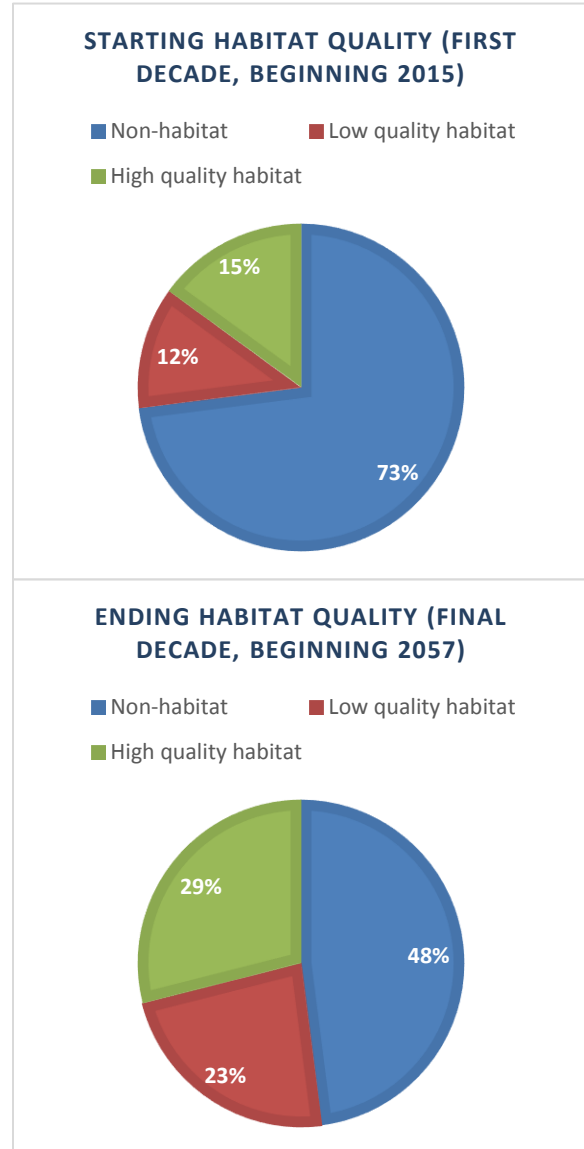
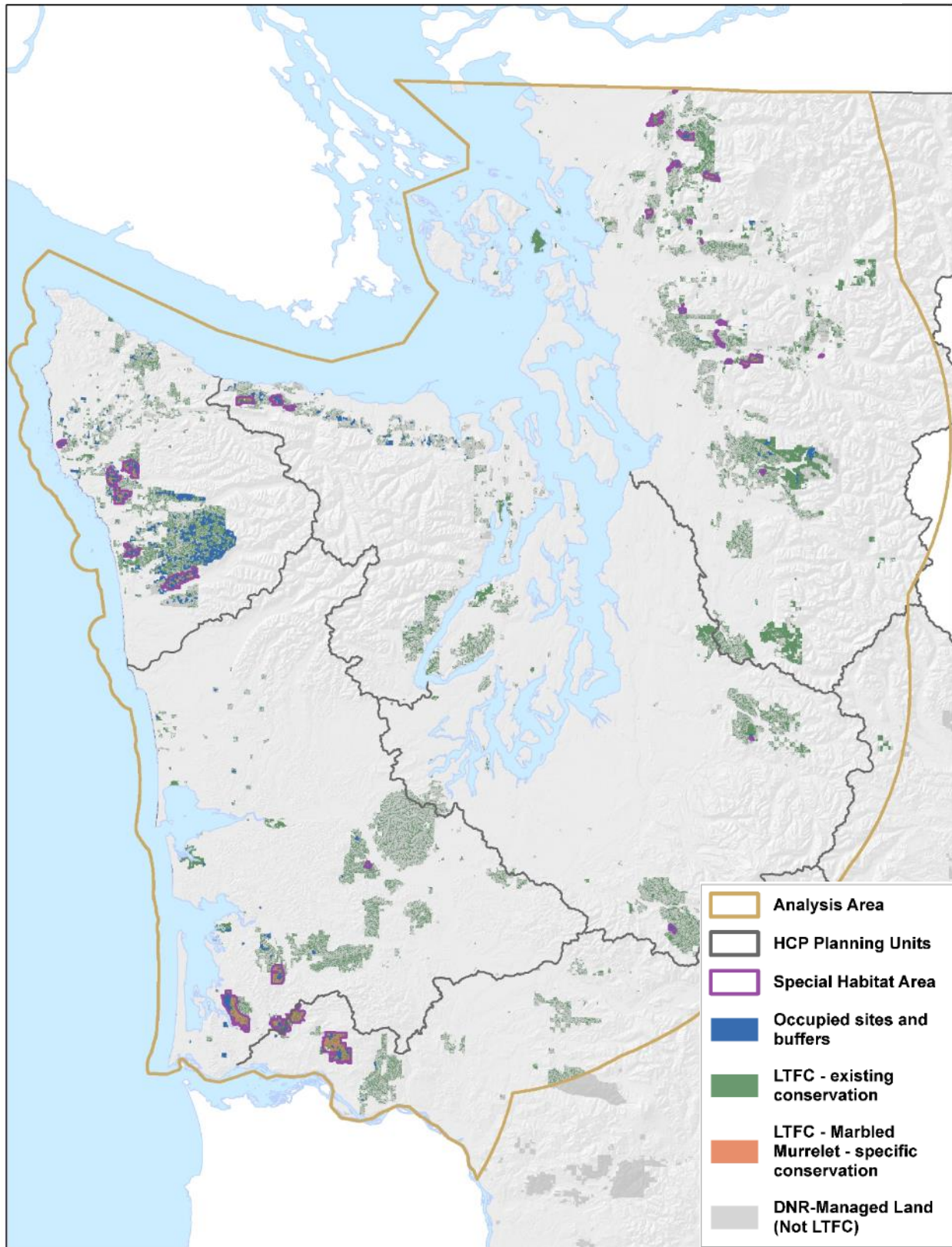


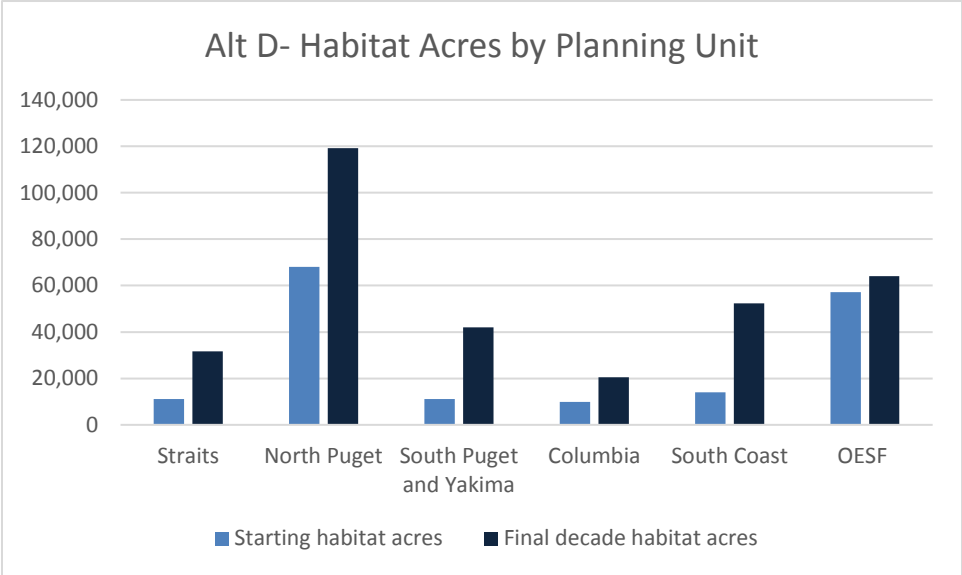
Figure 2.3.12. Habitat Location—Alternative D



Habitat composition and distribution

Figure 2.3.12 depicts the growth of habitat (acres of land with a P-stage value) within LTFC at the beginning of the planning period (2015) compared with the final decade of the planning period (beginning 2057). The figure also illustrates the distribution of habitat acres among the planning units.

Figure 2.3.13. Habitat Growth by Planning Unit—Alternative D



Alternative E

Alternative E combines the conservation approaches of Alternatives C and D (including conservation measures) for a total of approximately **640,000 acres** of long-term forest cover. This alternative includes the following murrelet-specific conservation lands:

- Occupied sites with 100-meter buffers, except in OESF where sites greater than or equal to 200 acres have 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.

Table 2.3.5. Marbled Murrelet-Specific Conservation Acres—Alternative E

| Type of conservation area | Acres (estimated) |
|---------------------------|-------------------|
| Occupied sites | 10,000 |
| Occupied site buffers | 13,000 |
| Emphasis areas | 14,000 |
| Special habitat areas | 13,000 |
| 0.47 P-stage | 7,000 |
| Total | 57,000 |

Habitat quality in LTFC

Habitat quality is expressed in the following figures as a percentage of total LTFC in each habitat category.

Figure 2.3.14. Starting and Ending Habitat Quality—Alternative E

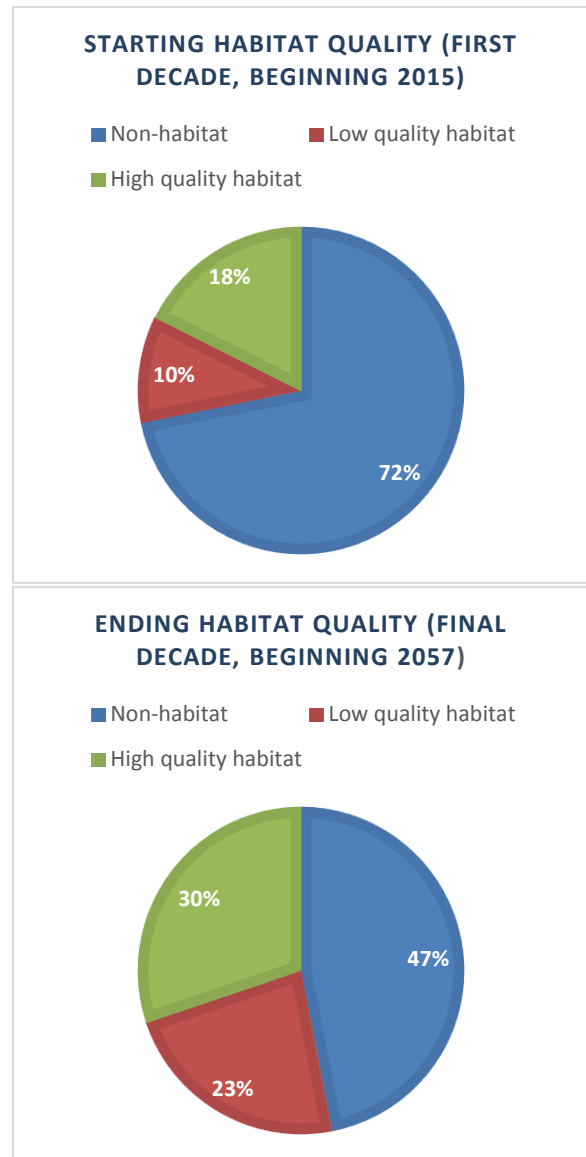
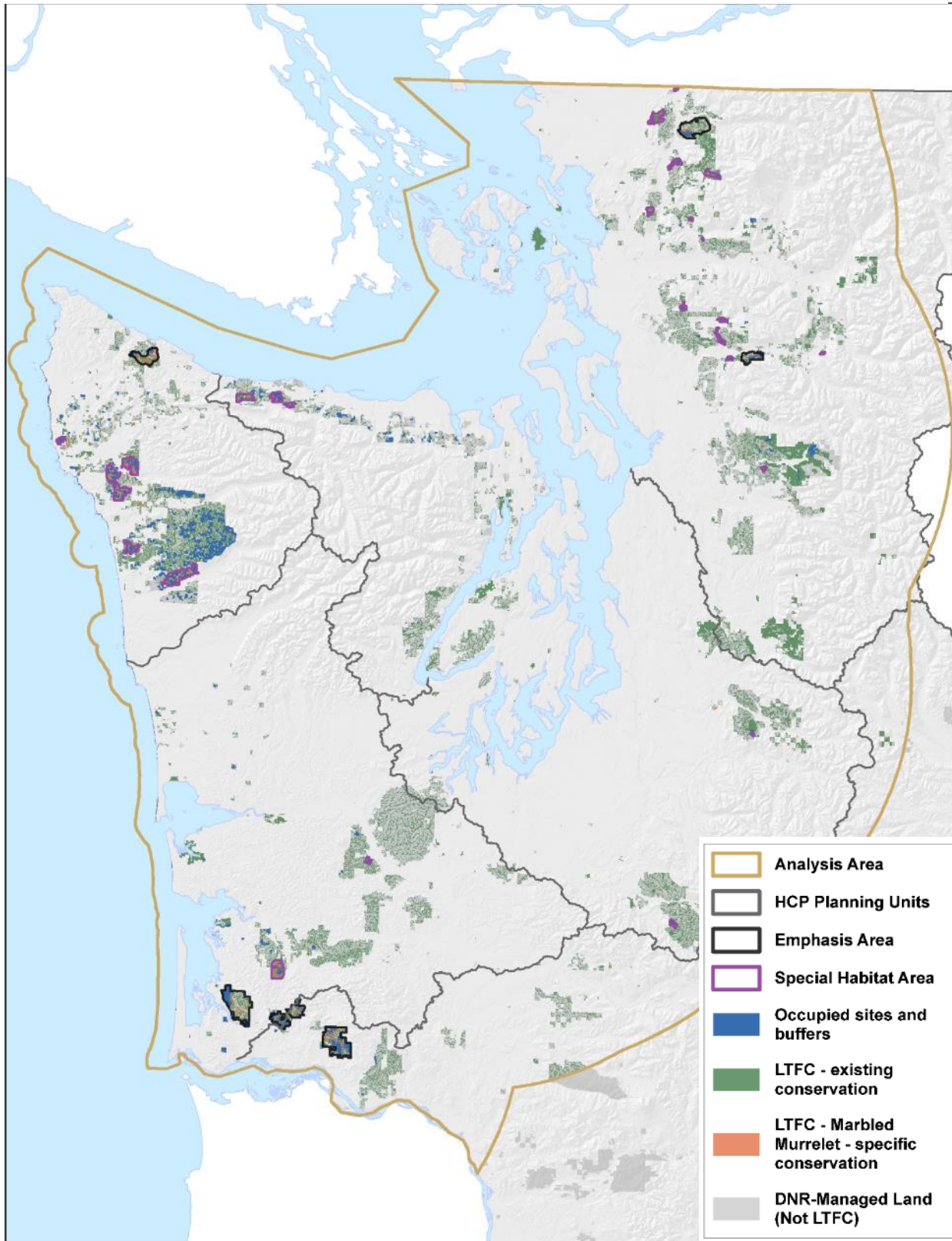


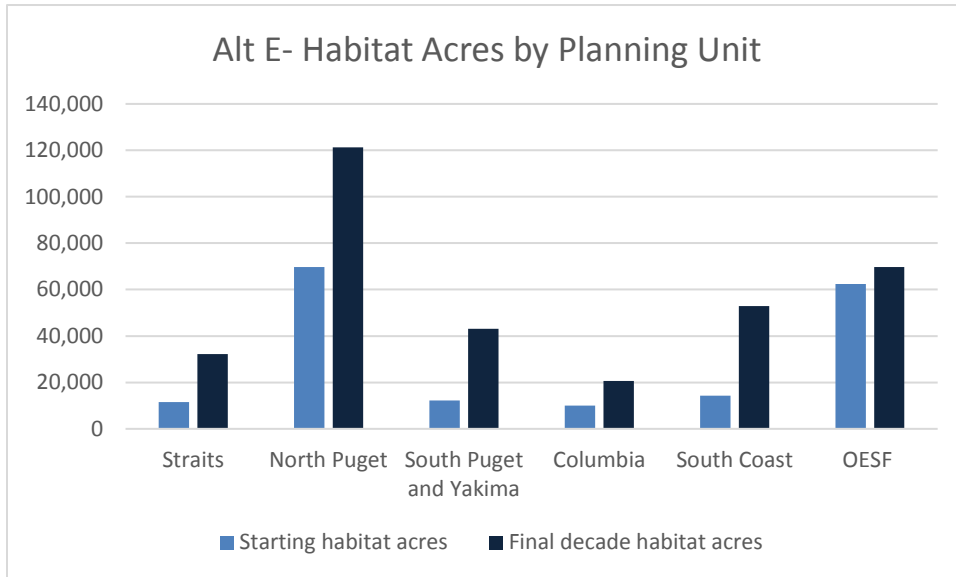
Figure 2.3.15. Habitat Location—Alternative E



Habitat composition and distribution

Figure 2.3.16 depicts the growth of habitat (acres of land with a P-stage value) within LTFC at the beginning of the planning period (2015) compared with the final decade of the planning period (beginning 2057). The figure also illustrates the distribution of habitat acres among the planning units.

Figure 2.3.16. Habitat Growth by Planning Unit—Alternative E



Alternative F

Alternative F proposes to protect approximately **734,000** acres of marbled murrelet habitat by designating the marbled murrelet management areas recommended in the Science Team Report and establishing marbled murrelet management areas 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 100-meter buffer. Additionally, all old forest habitat (as defined the 1997 HCP) in OESF would receive a 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 LTFC. (Alternatives A through E only include high-quality owl habitat as LTFC.)²¹ 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.

Table 2.3.6. Alternative F - Marbled Murrelet-Specific Conservation Acres—Alternative F

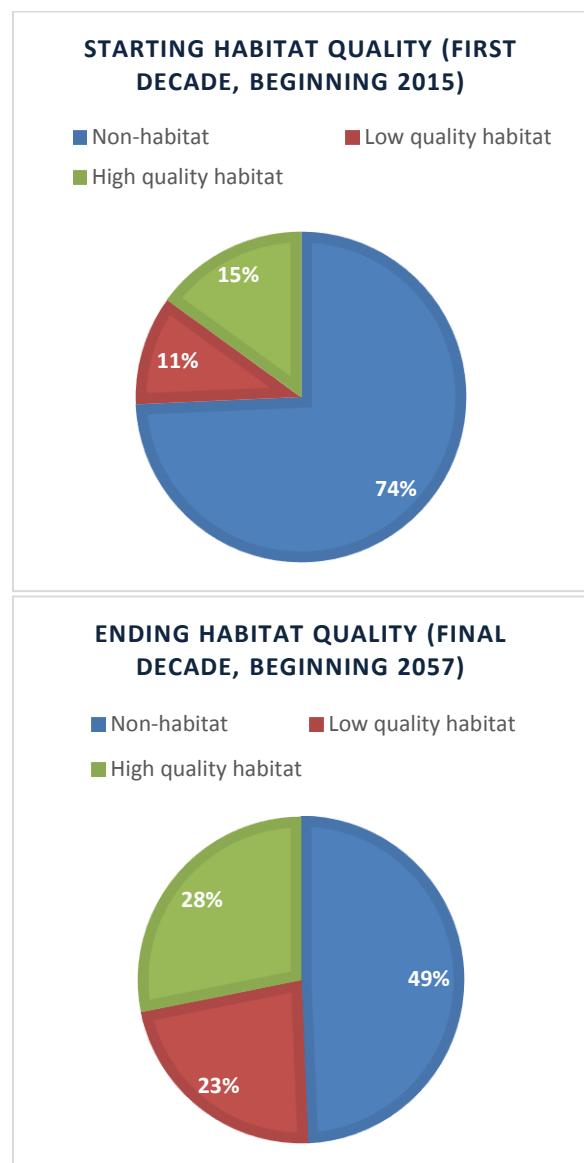
| Type of conservation area | Acres (estimated) |
|---------------------------------|-------------------|
| Occupied sites | 10,000 |
| Occupied site buffers | 16,000 |
| MMMA's | 78,000 |
| Spotted owl low-quality habitat | 47,000 |
| Total | 151,000 |

²¹ Note that “settlement” northern spotted owl habitat would not be included as LTFC.

Habitat quality in LTFC

The quality of habitat under Alternative F at the beginning of the conservation strategy and in the final decade of the strategy is depicted in the following figures. The percentage of high-quality habitat in the first decade is lower than most of the other alternatives. This is largely due to the inclusion of low-quality spotted owl habitat in Alternative F.

Figure 2.3.17. Starting and Ending Habitat Quality—Alternative F



Habitat composition and distribution

Figure 2.3.18 shows starting habitat acres (acres with a P-stage) value in 2015. Final decade habitat acres include all LTFC acres with a P-stage value by the final decade of the planning period, beginning in 2057.

Figure 2.3.18. Habitat Growth by Planning Unit—Alternative F

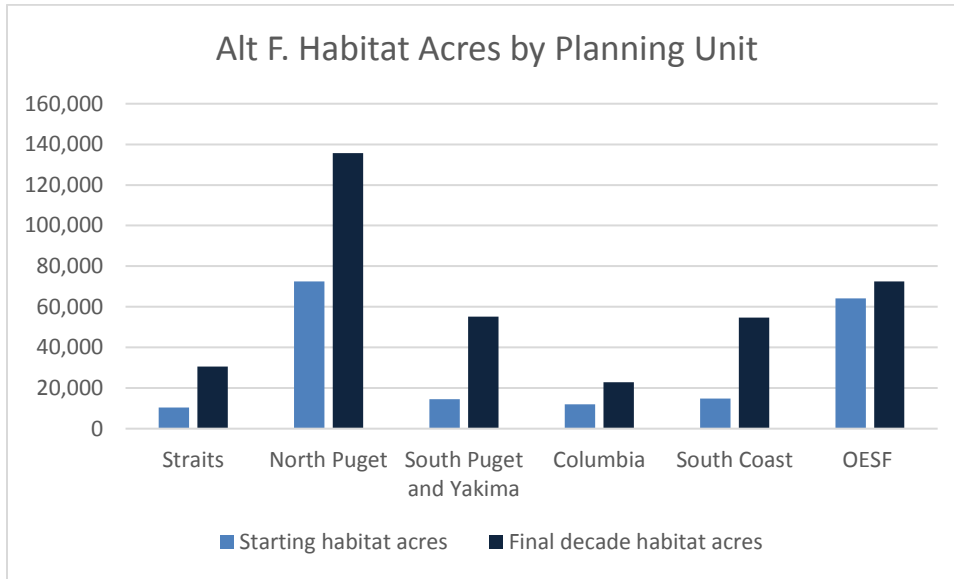
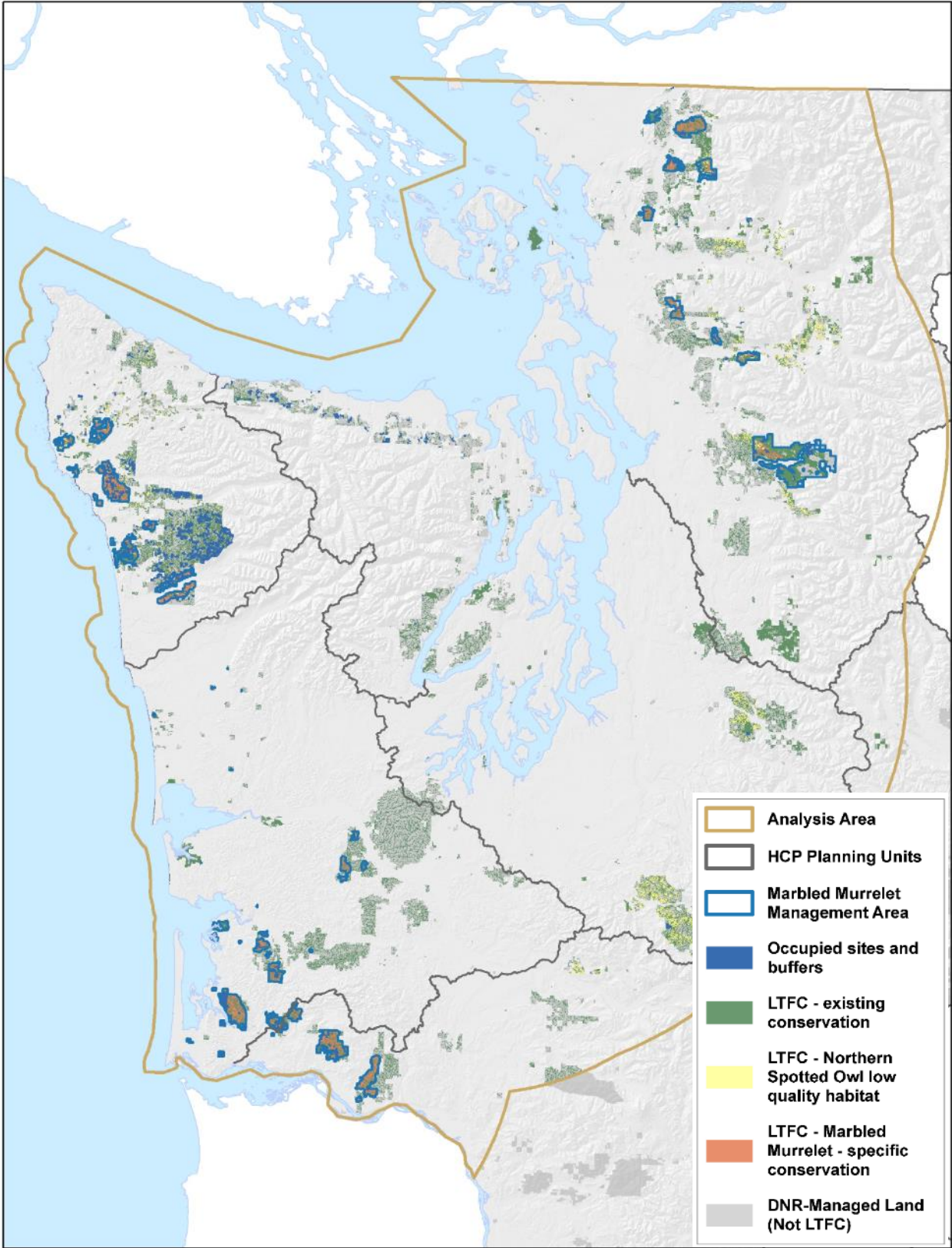


Figure 2.3.19. Habitat Location—Alternative F



2.4 Comparing the Alternatives

This section provides a summary of how LTFC 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

| Contributing components of the marbled murrelet habitat conservation strategy | | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative F |
|--|--|----------------|---------------|---|---------------|---------------|---------------|
| Approximate acres of long-term forest cover | | 620,000 | 593,000 | 636,000 | 634,000 | 640,000 | 734,000 |
| Existing habitat conservation that provides marbled murrelet conservation benefits | Natural areas ^a | ✓ ^b | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Riparian management zones ^c | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Conservation commitments made in the <i>Policy for Sustainable Forests</i> | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 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 | 100 meters | 0 | 100 meters on all, except in OESF where sites greater than or equal to 200 acres have 50 meters | | | 100 meters |
| | Habitat types identified under interim strategy ^h | ✓ | | | | | |
| | Marbled murrelet management areas | | | | | | ✓ |

| Contributing components of the marbled murrelet habitat conservation strategy | | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative F |
|---|---|--|---|---|---------------|---------------|---------------|
| | High-quality murrelet habitat (P-stage ≥ 0.47) | | | ✓ | | ✓ | |
| | Emphasis areas ⁱ | | | ✓ | | ✓ | |
| | Special habitat areas ^j | | | ✓ | ✓ | ✓ | |
| Forest management within LTFC | Harvests that create large openings, such as clear cuts and variable retention harvests. | | No planned harvests allowed. | | | | |
| | Limited management (includes silvicultural treatments such as thinnings, salvage reforestation) | | Treatments are generally allowed in operable, non-marbled murrelet habitat (outside of special habitat areas) consistent with other land management objectives. | | | | |
| | 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 LTFC identified and mitigated. New or expanded non-timber land uses are subject to conservation measures (described in Section 2.2). | | | | |
| Forest management outside LTFC | Harvest, thinning, silviculture, and non-timber land uses | Forest stands managed consistent with the Sustainable Harvest Calculation, <i>Riparian Forest Restoration Strategy</i> , HCP, <i>Policy for Sustainable Forests</i> , Forest Practices rules, forest land plans, and the Multiple Use Act. | | | | | |

- a. Natural areas include Natural Areas Preserves (NAP) and Natural Resource Conservation Areas (NRCA).
- 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 1997 HCP Riparian Forest Restoration Strategy for the five west-side HCP planning units and per the OESF HCP riparian conservation strategy.
- d. Existing northern spotted owl high-quality habitat refers to the following DNR mapped habitat classes as of 2015: old forest, high-quality nesting 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. LTFC 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.
- i. 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 LTFC around certain occupied sites and create blocks of cohesive habitat with reduced fragmentation.

■ How much land is available for harvest?

Under each alternative, a full range of management options (harvest, thinning, and related silviculture) is expected to be available on DNR-managed forestland *outside* LTFC.

Within LTFC, 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 LTFC under each alternative by planning unit 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. This is due to a shifting emphasis in conservation to areas with potentially higher habitat value to the murrelet.

Figure 2.4.1. Estimated Change in LTFC Acres from Alternative A (No Action), by HCP Planning Unit



Compared with the no action alternative, Alternative B would increase the land available for active forest management by approximately 27,000 acres. Alternatives C through E reduce the land available for harvest by approximately 14,000 to 20,000 acres, and Alternative F reduces available land by approximately 114,000 acres. Appendix F contains maps for each planning unit showing where these changes 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. This is 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 are explored in detail as they relate to the marbled murrelet. This section provides a more general comparison of habitat quality among the alternatives.

Habitat composition and quality

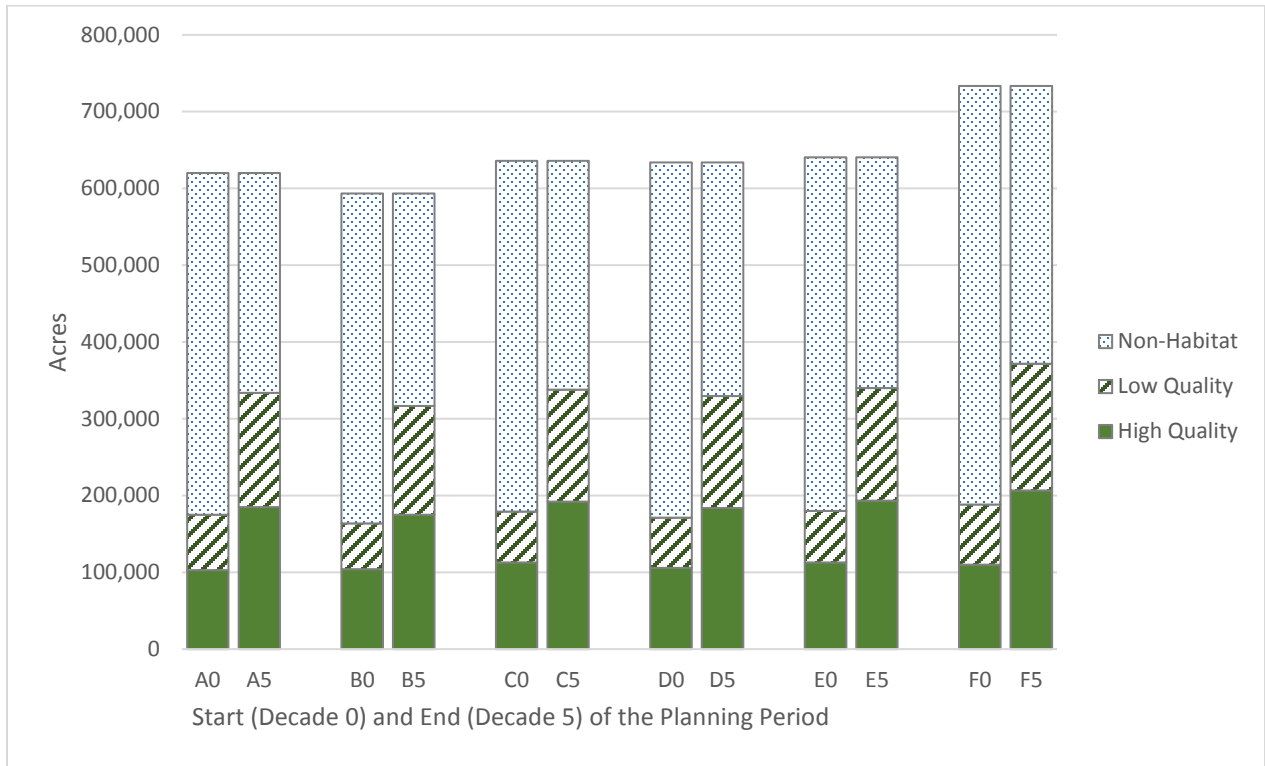
As illustrated in the previous sections, long-term forest cover contains both habitat (forestlands with a P-stage value) and non-habitat (forestlands with no P-stage value, but that contribute to conservation as security forest or buffers). As forests mature and develop into habitat through time, how much habitat is “captured” by LTFC increases, and the quality of that habitat changes. Figure 2.4.2 compares the habitat quality (high or low) versus non-habitat (non) composition of LTFC among alternatives between the start of the planning period (2015) and the end decade of the planning period (2057–2067).

Text Box 2.4.2

Does more habitat develop through time?

Yes. Under all of the alternatives, the acres of marbled murrelet habitat are greater in the final decade of the HCP than at the beginning of the long-term conservation strategy.

Figure 2.4.2. Increases in Habitat Quality of LTFC Over Time, by Alternative



Under all of the alternatives, habitat grows significantly over time by the end of the planning period. Habitat exceeds non-habitat as a proportion of LTFC in every alternative by the end of the planning period. Alternative F is closer to a 50:50 split of habitat to non-habitat, while Alternatives A through E are closer to a 53:47 habitat to non-habitat ratio.

Habitat quality also increases over time under every alternative. Most of the growth of new habitat occurs as low-quality habitat develops out of existing forest stands that begin the planning period with a P-stage value of zero (0). This is reflected in the pie charts shown under the alternative profiles and is summarized in Table 2.4.2. On average, all alternatives show between 23 and 26 percent conversion of non-habitat to habitat through the planning period.

Habitat configuration

The configuration of habitat conserved in LTFC also varies among alternatives. A measure of configuration is the size of interior forest patches relative to edge habitat. For purposes of this DEIS, we categorize LTFC into one of the following configurations:

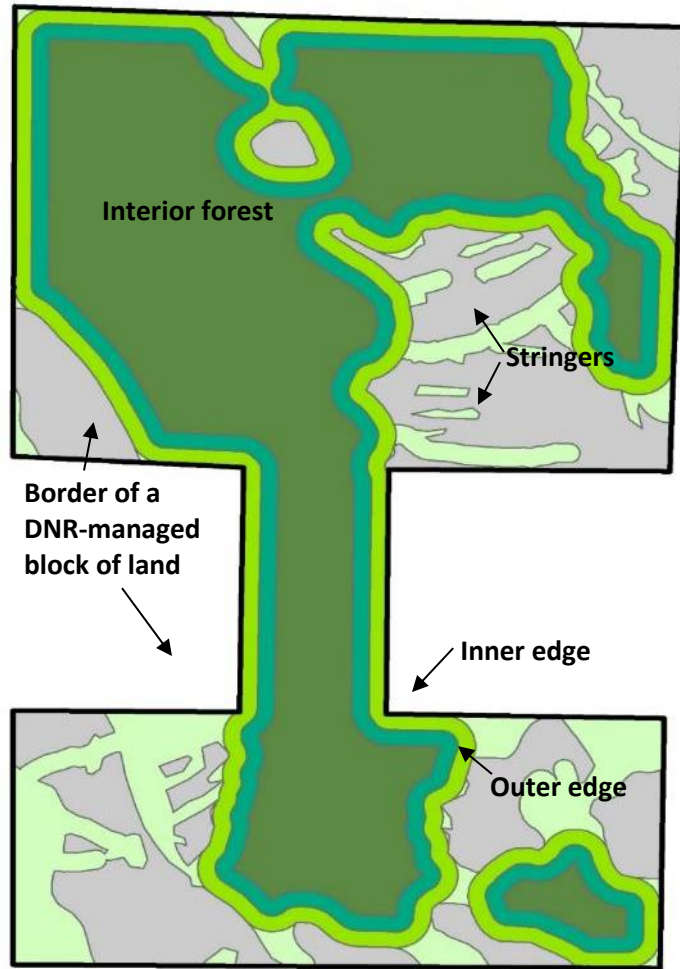
- **Interior forest:** The interior forest is comprised of forested area (patch) that is at least 100 meters from any type of edge. These interior areas are protected from effects associated with harvest edges.
- **Inner edge:** The inner edge is a forested area 51 to 100 meters from the edge of the 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 to 50 meters from the edge of the managed forest. The literature indicates that the edge effects from the actively managed forest extend further than 50 meters into the stand but diminish until there is minimal effect after 100 meters from the managed area (Burger and others 2004).
- **Stringer:** This term refers to long, relatively narrow (less than 200 meters wide) corridors of LTFC, 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 the following section and Appendix H).

Text Box 2.4.3

What is “edge,” and how does it affect the murrelet?

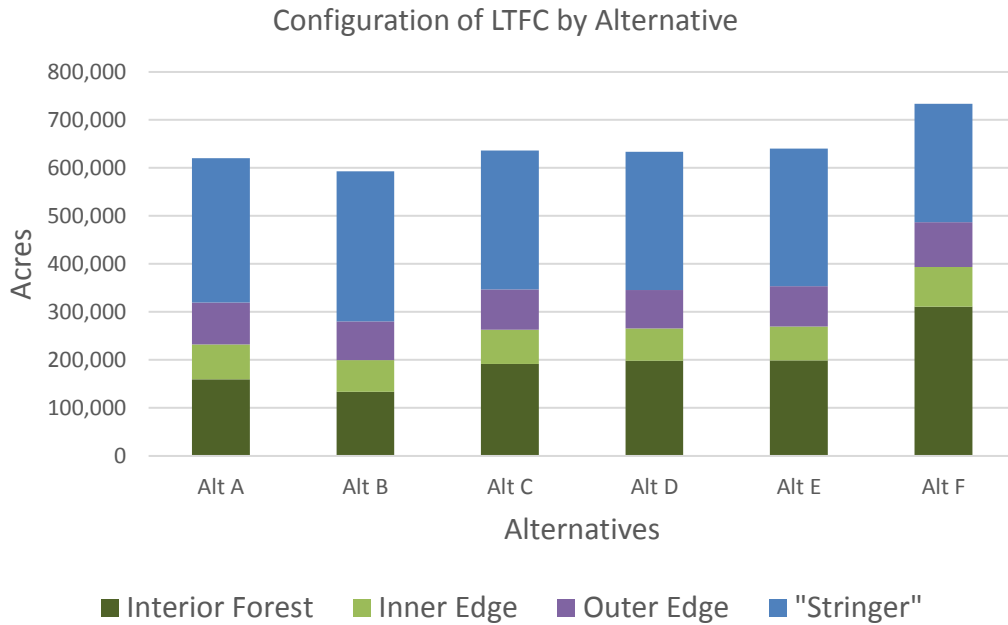
An edge is a transition or boundary between two habitat types. Forest edges are created by roads, harvests, changes in species composition, and physical changes in the landscape. Studies (e.g., Burger and others 2004, Malt and Lank 2009) have shown that predation risk at marbled murrelet nests is likely higher near forest edges and 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 (LTFC) and Categories of Edge on a Block of DNR-Managed Land



The configuration of LTFC 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).

Figure 2.4.4. Comparison of Interior, Edge, and Stringer Acres, by Alternative



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.

■ Summary of potential impacts to the environment

Chapter 4 includes an analysis of the alternatives for potential impacts to twelve different elements of the environment. A summary is provided in this section. Specific impacts are described in detail in Chapter 4, and Chapter 5 describes potential cumulative effects beyond those described for each element of the environment.

Natural environment: Earth, climate, aquatic resources, vegetation, wildlife, and marbled murrelets

Forests within long-term forest cover are expected to become more structurally complex through time and experience less active management. Elements of the natural environment are not expected to be adversely impacted by these changes. Soil resources and areas subject to landslide hazards would continue to be protected by existing DNR regulations, policies, and procedures. The alternatives are not expected to exacerbate climate change impacts on any element of the environment, and carbon sequestration is expected to be greater than emissions under all alternatives.

Existing riparian protection strategies remain in place under all the alternatives and aquatic functions are expected to be maintained or enhanced under all alternatives. Minor localized impacts to microclimate are possible under Alternative B.

Some limitations on thinning (Alternatives C, D, and E) could delay some riparian or natural areas from meeting their restoration objectives within a shorter time frame. However, overall HCP, OESF, and natural areas management objectives are not impacted.

Many wildlife and plant species would benefit from an increase in structurally complex forest that will occur in long-term forest cover over the planning period. Wildlife diversity is likely to increase over time with all alternatives. Some local changes in habitat conditions may temporarily affect some species, but overall abundance and distribution of species, including listed and sensitive species, would remain stable or increase on DNR-managed lands.

In areas where land would be “released” from its current conservation status (including 27,000 acres under Alternative B and between 2,000 and 3,000 acres in the Straits HCP planning unit under Alternatives C through F), the existing framework of regulations, policies, and procedures designed to minimize the environmental impacts from active management would remain in place.

IMPACTS TO MARBLED MURRELET HABITAT AND POPULATIONS

The marbled murrelet population has declined at an average annual rate of 4.4 percent in Washington since monitoring began in 2001. Given this declining trend, it is uncertain whether the murrelet population will respond to increased habitat on federal or state lands in the future under any alternative. However, the distribution and trends in marbled murrelet populations are linked to the amount and configuration of nesting habitat. The alternatives recognize the importance of protecting existing occupied marbled murrelet habitat and recruiting additional habitat in specific areas. The alternatives vary by providing differing levels of habitat protection and recruitment, coupled with some short-term habitat loss. The intent is to improve current population trends through conservation and recruitment of additional nesting habitat on DNR-managed lands.

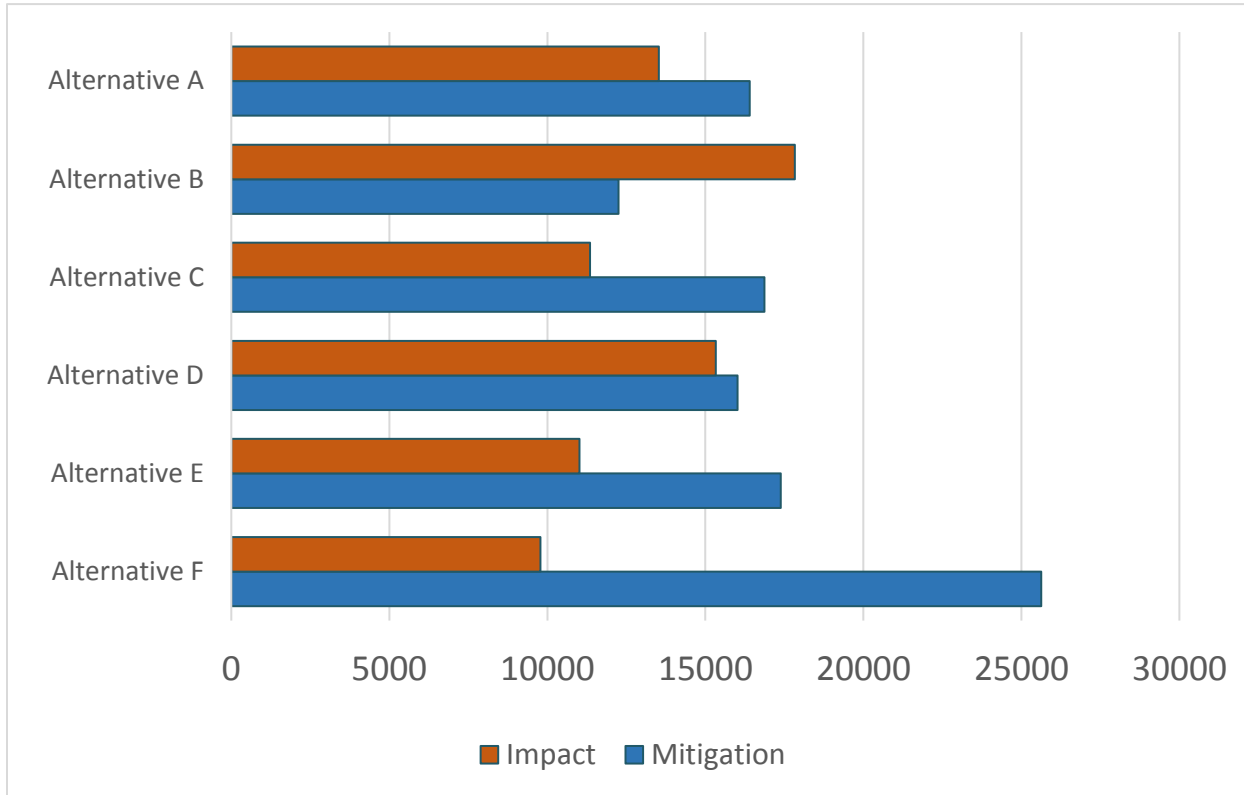
Two analytical approaches were used to estimate alternative-specific impacts to marbled murrelet habitat and populations. The acreage, quality (as influenced by stand condition and edge effects), and timing of habitat harvested and developed under each alternative provide a relatively direct measure of impacts. Potential impacts to the Washington murrelet population were evaluated with a mathematical population viability analysis model based on two different assumptions about the relationship of the murrelet population with forest habitat and other environmental factors: 1) insufficient forest habitat compounds negative effects of other factors, and 2) insufficient forest habitat is the principal negative influence on the murrelet population.

For all alternatives, habitat loss in the short term (the first decade of the planning period, due to harvest of habitat outside of long-term forest cover) is expected to be mitigated over time by the recruitment of more and higher-quality habitat and an increase in interior habitat in strategic locations within long-term forest cover. When the acres of this habitat are adjusted for quality and timing, the cumulative adverse impacts expected to marbled murrelet habitat are exceeded by the mitigation expected under every proposed alternative except Alternative B. Figure 2.4.5 compares impacts to mitigated acres by the end of the 50-year planning period.

Population viability analysis suggests that regardless of alternative, habitat conservation on DNR-managed land can do little at the statewide scale to influence either the risk of local declines or likelihood of population increases if other environmental factors such as marine conditions are limiting. Assuming that nesting habitat is the primary limitation on murrelet population trends allows the analysis to evaluate the influence of habitat on DNR-managed land on local murrelet populations. The statewide population is projected to stabilize under all alternatives, while focusing just on DNR-managed lands suggested local population increases that vary in timing and magnitude were possible under all alternatives.

In summary, the population viability analyses suggest that Alternative B results in the highest risk of local declines and the lowest likelihood of local population increases during the modeled planning period. Alternative F is projected to result in the lowest risk of local declines and the highest likelihood of local population increases, with intermediate results projected under Alternative A and Alternatives C through E.

Figure 2.4.5. Acres of Habitat Loss (Impact) and Gain (Mitigation) by the End of the Planning Period, by Alternative and Adjusted for Quality



Human environment: Recreation, forest roads, public services and utilities, environmental justice, cultural resources, and socioeconomics

Some localized impacts to these elements of the human environment are expected as a result of increasing the acres of marbled murrelet conservation and implementing proposed conservation measures. Cumulatively, these impacts are expected to be minor for all elements of the human environment except socioeconomics (refer to the following section), considering the scale of the analysis area and the availability of other DNR-managed lands for these land uses. Impacts are similar across all action alternatives.

Compared with the no action alternative, adding acres of marbled murrelet conservation would result in local reductions in the land available for new or expanded recreation facilities or non-timber leases/easements, shifting demand to lands elsewhere within the analysis area. Existing facilities, easements, leases, and land uses would remain largely unaffected, although the timing of some maintenance activities could be impacted.

Where conservation measures limit road development, compensatory increases in road miles may occur nearby, but overall road density in the analysis area is unlikely to increase as a result of the alternatives.

Increased road abandonment in conservation areas would likely occur, which in turn could affect recreational use and access within these areas. Continued access to and use of cultural resources is unlikely to be significantly affected, however, and existing DNR policies and procedures for tribal consultation and cultural resource protection remain in place.

No environmental justice impacts under any alternative are anticipated from this conservation strategy, although local economic impacts in two counties could be adverse (as discussed in the next section).

SOCIOECONOMIC IMPACTS

NEPA requires an examination of socioeconomic impacts of the proposed action. Socioeconomic impacts in this analysis concern the relationship of DNR-managed land to local economies, including county revenues, state trust revenues, employment, and local tax generation. These impacts were measured both qualitatively, by considering how activities on DNR-managed land contribute broadly to the local economy, and quantitatively, by attributing assumed values to the acres that would be available for harvest under each alternative.

The change in the value of operable acres was found to be relatively small at the scale of the analysis area. The overall change in operable acres ranges from a 4 percent increase under Alternative B to a decrease of between 1 and 4 percent for Alternatives C through F.

The federally granted trusts would experience minor gains in operable acres under Alternative B (increases between 1 and 6 percent) and minor reductions under Alternatives C through F (decreases between 1 and 6 percent). Exceptions would be the University Grant (original and transferred) trust, which would see a larger reduction (between 11 and 18 percent) under Alternatives C through F, and the Scientific School Grant, which would see a 16 percent reduction under Alternative F. Counties benefiting from State Forest Trust lands would experience either no change or an increase in operable acres under Alternative B (increases up to 20 percent). Several counties would experience small changes in operable acres under Alternatives C through F (from decreases of 5 percent to increases up to 6 percent). Exceptions include Pacific County (decreases from 13 to 23 percent), Wahkiakum County (decreases from 9 to 25 percent) under Alternatives C through F. Under Alternative F, Whatcom and Pierce counties experience reductions of operable acres of 22 percent and 11 percent, respectively.

Alternative B, by increasing the number of operable acres available for harvest as compared with Alternative A, is expected to result in stable or increased harvests levels on all trusts and in all counties in the analysis area, stable or increased revenue or all trust beneficiaries with lands within the analysis area, and stable or increased tax revenue and employment in counties within the analysis area.

Alternatives C through F, by decreasing the number of operable acres available for harvest, are expected to result in stable or decreased harvest levels on most trusts and in all counties in the analysis area, stable or decreased revenue for most trust beneficiaries with lands within the analysis area, and stable or decreased tax revenue and employment in counties within the analysis area.

Pacific and Wahkiakum counties are most likely to be adversely impacted by Alternatives C through F. These counties are more heavily dependent on timber harvest for local government revenue and have below average economic diversity compared with other counties in the analysis area. The economies of Pacific and Wahkiakum counties are therefore less able to tolerate the reduction in harvest volume

anticipated under Alternatives C through F because of their low socioeconomic resiliency.

Some of the adverse economic effects due to reduced timber supply in the near term could be offset over time by the cumulative benefits of improved efficiencies and effectiveness in forest management, additional opportunities for thinning (which is more labor intensive), more regulatory certainty under the Endangered Species Act, and potential use of the State Forest Trust Land Replacement Program in Pacific and Wahkiakum counties.

■ How do the alternatives address DNR's project objectives?

The need, purpose, and objectives statement described in Chapter 1 includes five objectives that guided the development of alternatives. This section provides a brief summary of how the alternatives address 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, D, C, E, F. 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 HCP conservation strategies, maintain areas in long-term forested condition. These areas are designed to minimize and mitigate incidental take. The proposed conservation measures are designed to avoid and minimize the impacts of certain forest management activities.

Alternatives C through F 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 F identified strategic locations for marbled murrelet conservation on DNR 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 lands in southwest Washington were considered strategically important because of their concentrations of documented occupied habitat and because the absence of federal habitat lands in

this area could otherwise result in a gap in the otherwise continuous coastal distribution of marbled murrelets in Washington. Likewise, some specific areas in the North Puget, Straits, and OESF landscapes were identified as strategic locations due to presence of important habitat, occupied sites, and proximity to important marine foraging areas. 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.

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 HCP. Harvest of some marbled murrelet habitat is also 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 LTFC. 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 LTFC (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 habitat impacts. However, 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 and D 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 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 LTFC and limit restrictions or prohibitions to within specific marbled murrelet habitat areas. This means that active management of forest resources could largely continue, following clear parameters for seasonal timing restrictions, disturbance buffers, and need for consultation. Thinning designed to accelerate habitat development under the alternatives would increase implementation costs for those alternatives. Alternative F allows the most thinning within marbled murrelet conservation areas (MMMAs). While the conservation measures common to the action alternatives all add some implementation cost and/or time delay for projects compared with the no action alternative, these impacts are not expected to be significant.

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