



Public Meeting Posters

The following posters were presented at the public meetings for the Long-Term Conservation Strategy for the Marbled Murrelet Revised Draft Environmental Impact Statement.

Public meetings were held at four locations:

- Forks – October 9, 2018
- Cathlamet – October 11, 2018
- Seattle – October 15, 2018
- Burlington – October 17, 2018



Ecology

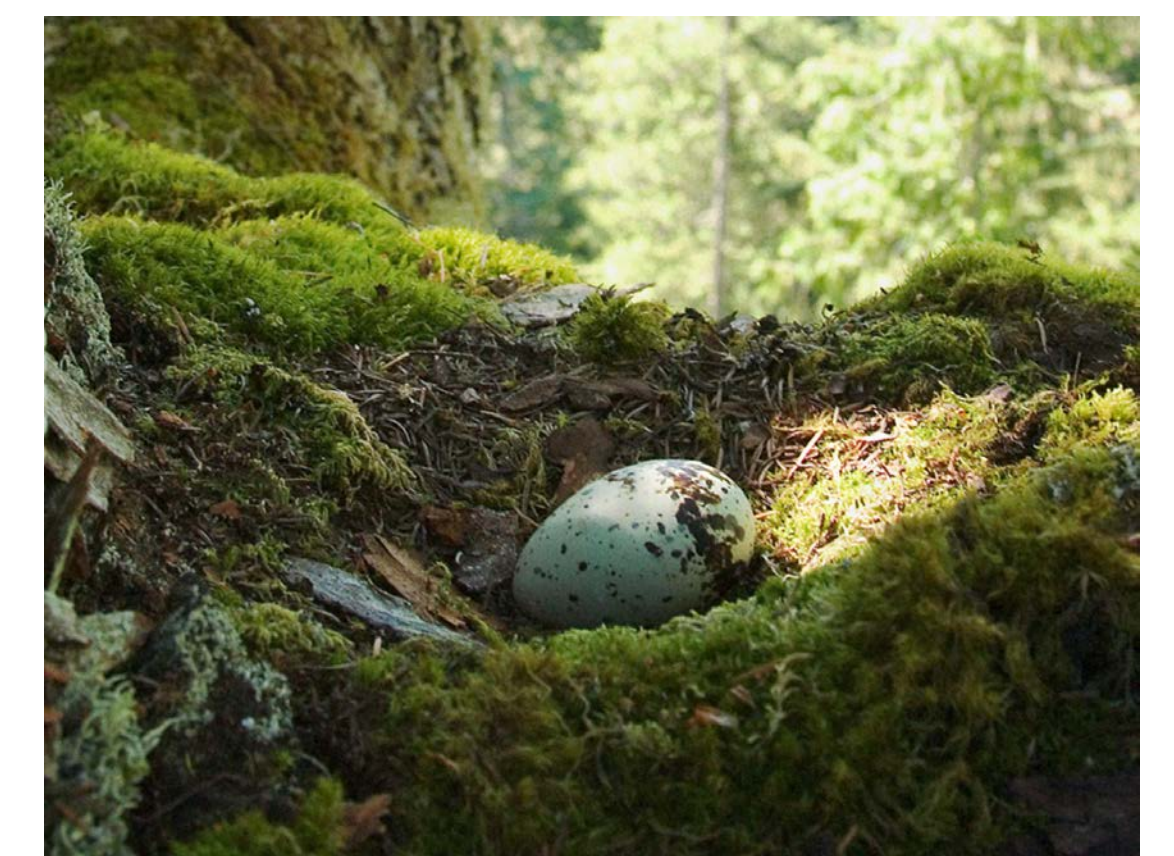
Range of the Marbled Murrelet

Marbled murrelets spend most of their lives on coastal marine waters from southern Alaska to central California and nest up to 55 miles inland from these waters in mature forests.

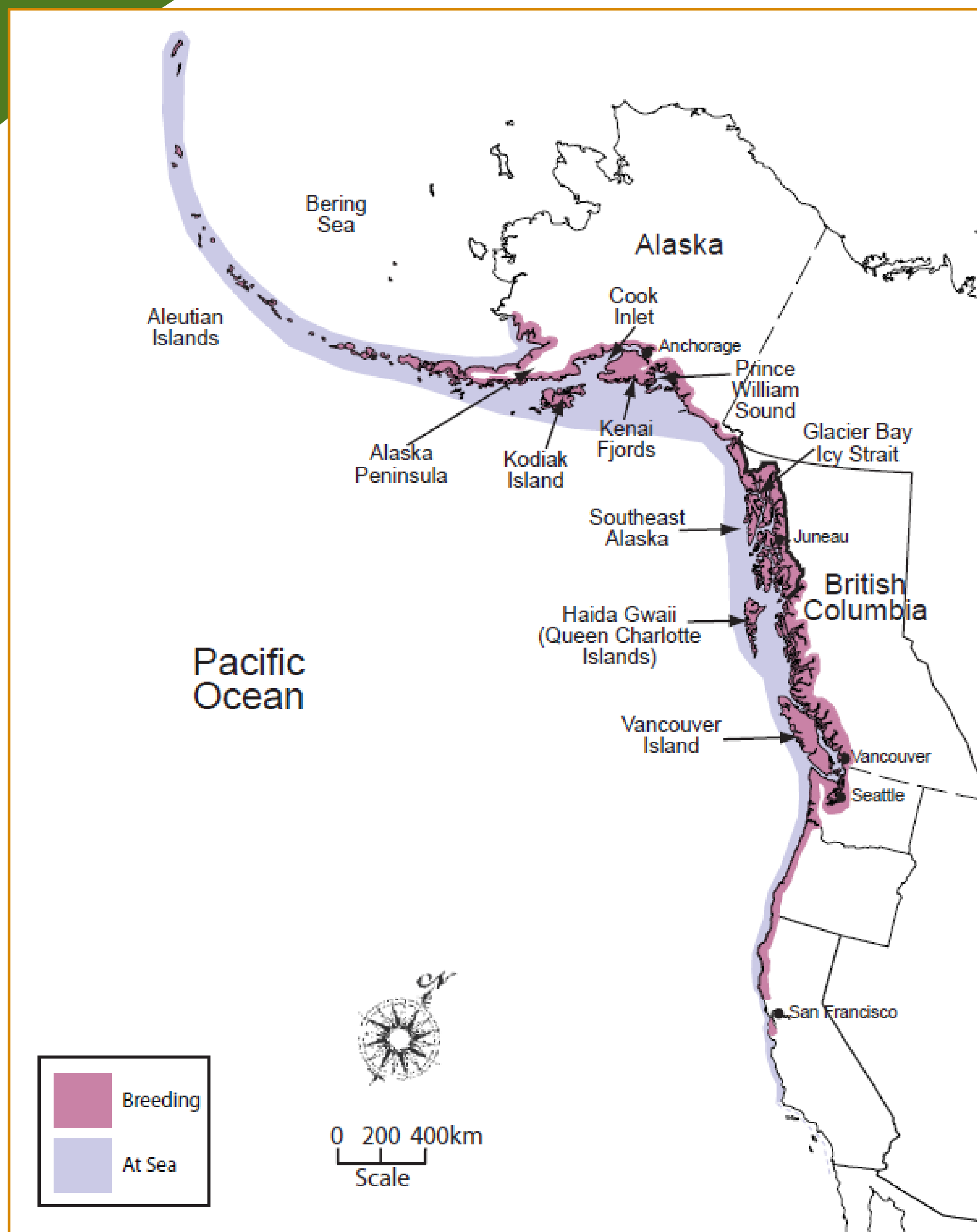


Marbled Murrelets at Sea and on Land

Marbled murrelets eat primarily forage fish (for example, sand lance and herring), and may dive up to 30 meters below the surface for their prey. Birds are largely solitary or found in pairs or small groups. Although they are generally found within 2 to 5 kilometers offshore, they may be found up to approximately 90 kilometers offshore.



Marbled murrelets do not build a typical nest; rather, they lay a single egg on a branch in the live crowns of coniferous trees. They use a variety of tree species, but in Washington, Douglas fir and western hemlock are the primary species. Marbled murrelets have a tendency to return to the same nesting areas. Nesting season is April through September.



Population in Decline

The marbled murrelet was listed as a threatened species under the Endangered Species Act in Washington, Oregon, and California in 1992. The marbled murrelet population is declining in Washington at 3.9* percent per year. Habitat loss has occurred throughout the listed range of the marbled murrelet, with the greatest habitat losses and steepest population declines in Washington. While the direct causes for marbled murrelet population declines are unknown. Potential factors include:

- Loss of nesting habitat
- Changes in the marine environment reducing the availability and quality of prey
- Increased densities of nest predators

*4.4 percent was used in the population viability analysis





Habitat

What is P-stage?

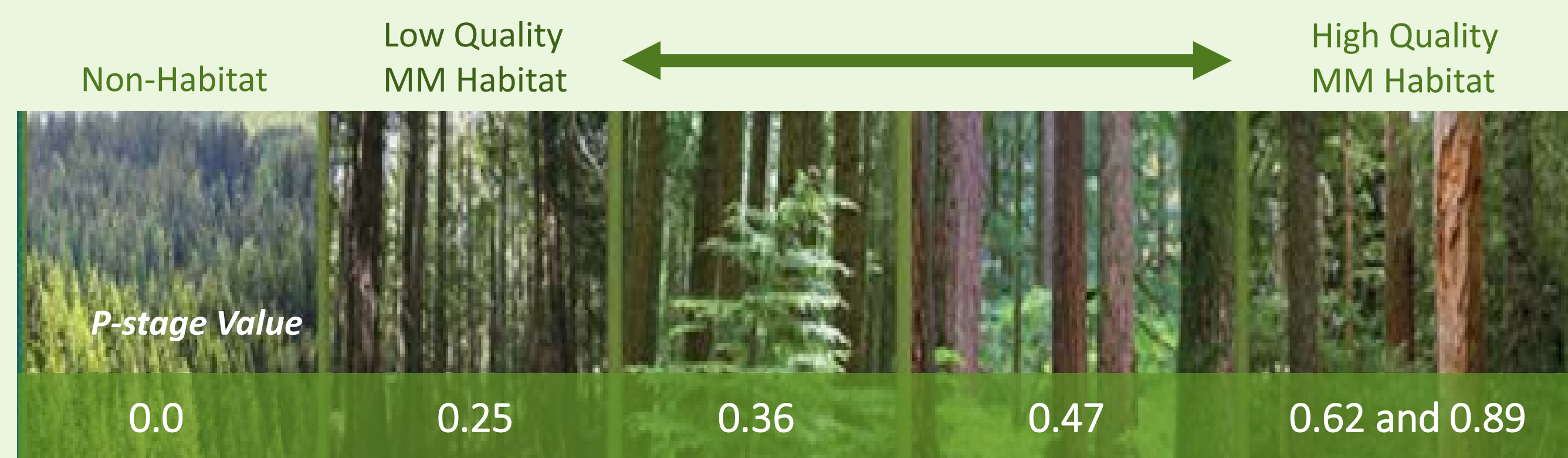
“P-stage” refers to a habitat model that classifies DNR-managed forestlands based on their **relative value** as nesting habitat, using DNR’s forest inventory data. Forestland is classified based on the probability it will be used for nesting by marbled murrelets.

A higher P-stage value means there is a higher probability for nesting. P-stage values are modified by a variety of habitat quality factors, including edge condition (is the habitat next to a recent timber harvest or a road that could bring predators to the nest sites?), location (is it close to marine waters or adjacent to other known habitat?), and timing (is this habitat now or is it expected to develop in the future?).

Using the P-stage habitat classification model, the Joint Agencies (DNR and US Fish and Wildlife Service) were able to identify key marbled murrelet habitat throughout DNR-managed lands in the analysis area.

P-stage was also used to inform the development of the alternatives, for example, to help identify areas that currently contain marbled murrelet habitat or could develop into habitat. In addition, P-stage was used to estimate the potential impacts of habitat removal and potential mitigation of habitat retention and recruitment for each alternative.

“Marbled murrelet habitat” means forest stands (acres) that have a P-stage value of at least 0.25.



What is the Distribution of Current Marbled Murrelet Habitat on DNR-Managed Land?

Landscape	P-Stage Class (acres)							Total Habitat	Total Land
	0	0.25	0.36	0.47	0.62	0.89	1		
Southwest Washington	140,219	13,449	3,853	400	159	2	8,905	26,768	166,987
OESF and Straits west of the Elwha River	229,563	13,801	9,359	5,594	3,790	814	42,171	75,529	305,091
North Puget	302,945	27,958	4,715	2,615	3,572	19,137	3,834	61,831	364,775
Other high value landscape	278,842	26,543	4,589	2,722	2,332	2,486	4,420	43,092	321,934
Marginal landscape	219,960	3,498	482	223	227	0	0	4,430	224,390
Total	1,171,529	85,249	22,998	11,554	10,080	22,439	59,330	211,650	1,383,177

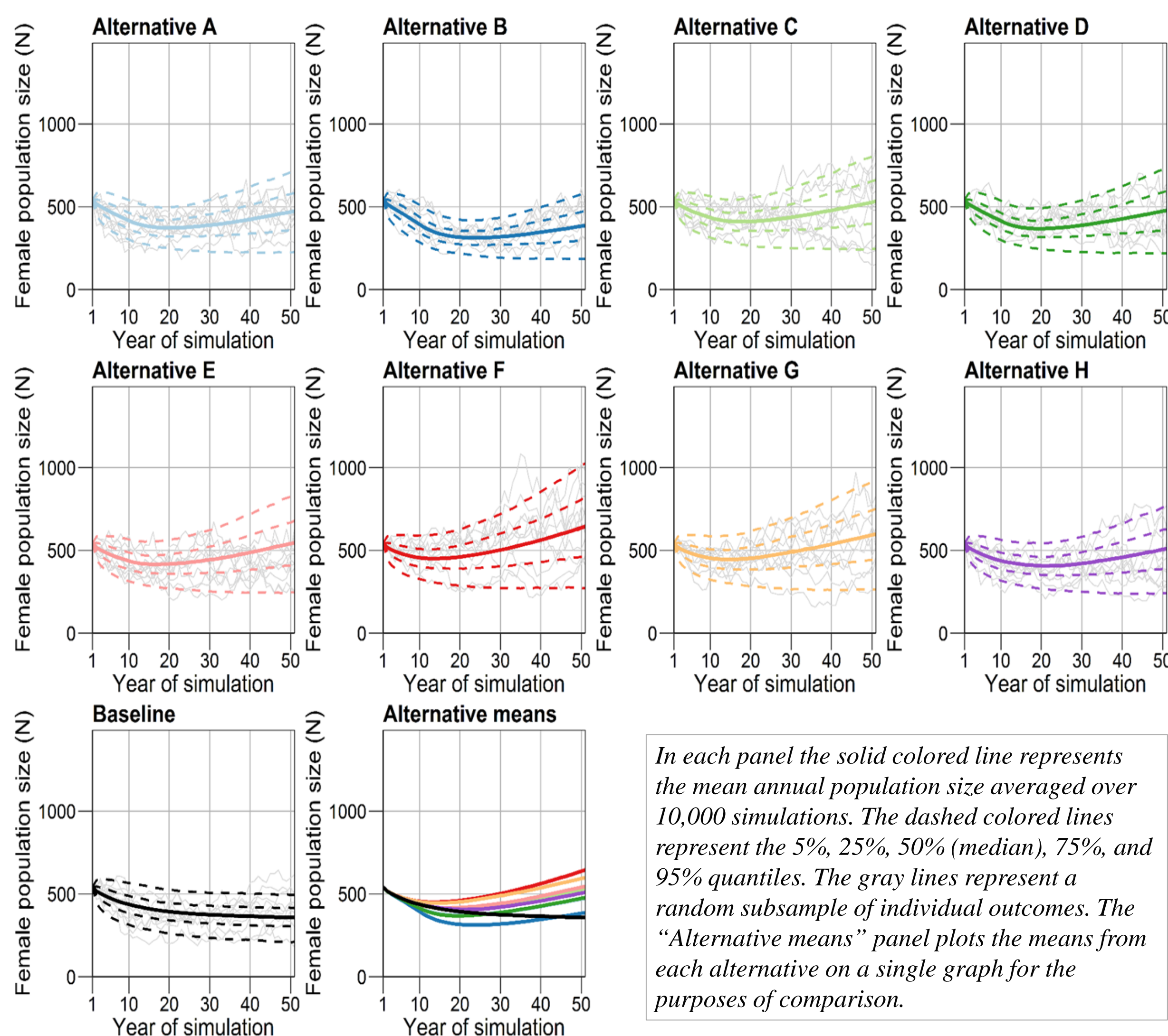
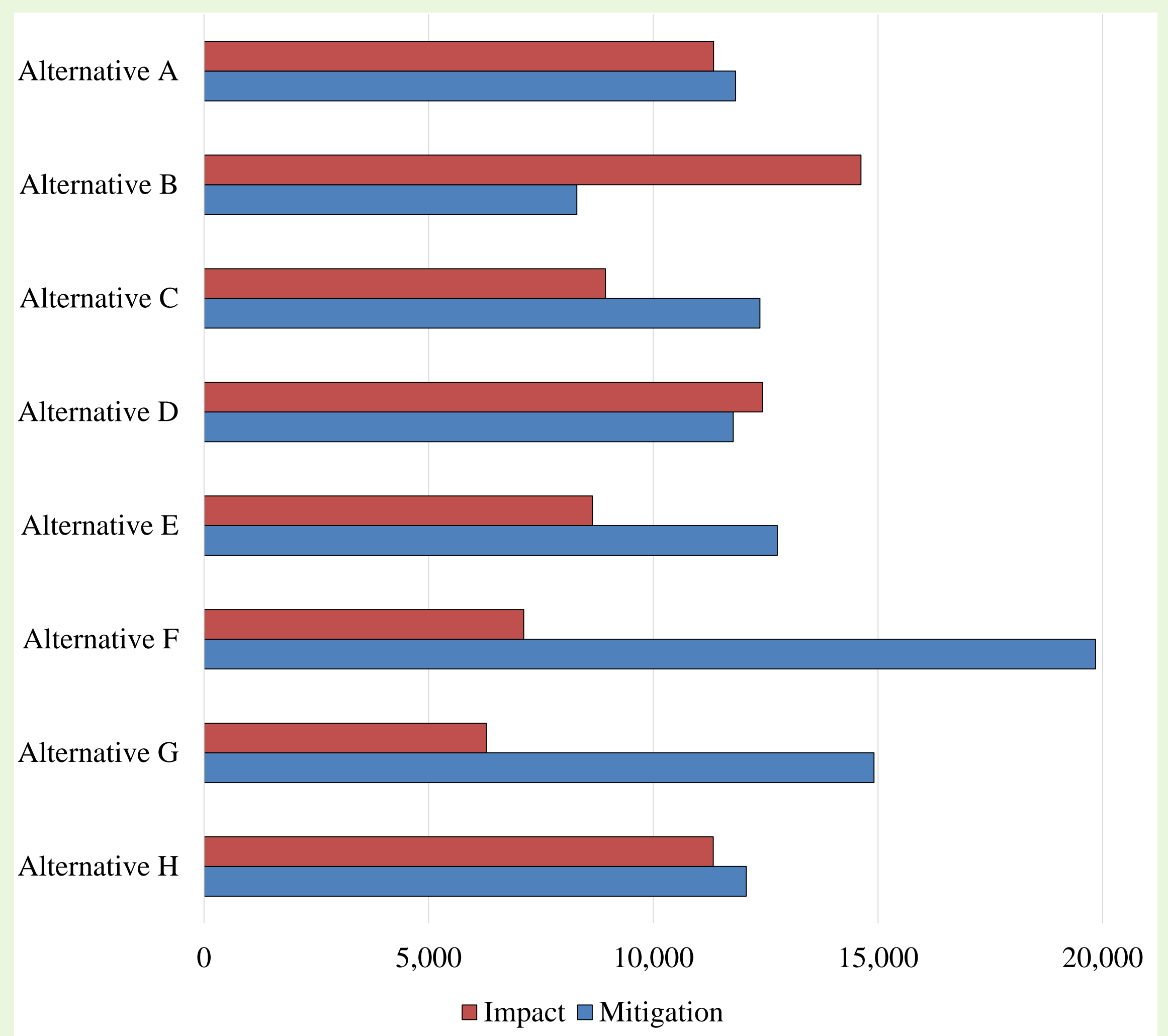


Habitat

How do Expected Habitat Impacts Stack up Against Proposed Conservation?

Each alternative assumes different levels of harvest that result in the removal of marbled murrelet habitat (acres with P-stage values) as well as growth that increase the quality and quantity of P-stage. Each acre harvested (Impacts) and each acre grown (mitigation) have different habitat values, depending on their P-stage value, their location relative to forest edges, distance from other habitat, and in which decade they are harvested or develop into habitat. Because not every acre has equal value to the marbled murrelet, the P-stage value of an acre is modified by the habitat quality factors listed above. The resulting acres, referred to as “adjusted habitat acres”, quantify the total impacts and mitigation for each alternative. This approach ensures that the same metrics to calculate impacts and mitigation were used to evaluate every alternative in the RDEIS.

Adjusted Habitat Acres by end of Planning Period



How Is the Marbled Murrelet Population Potentially Affected?

The Joint Agencies commissioned population modeling experts to conduct a **population viability analysis**. For the RDEIS, the P-stage value of all acres within occupied sites as well as the growth of forest in occupied sites over the analysis period was modeled, reflecting a more accurate representation.

The model compares how each alternative might perform compared to the others as a long-term conservation strategy with respect to the marbled murrelet population in Washington.

In the scenario presented here, a modeled female population of marbled murrelets on DNR-lands responds differently depending on assumed levels of habitat conservation and harvest over time.



Landscapes and Strategic Locations

High Value and Marginal Landscapes

For Alternatives C through H, DNR-managed lands can be segregated into two types of landscapes:

- **High value landscapes**
- **Marginal landscapes**

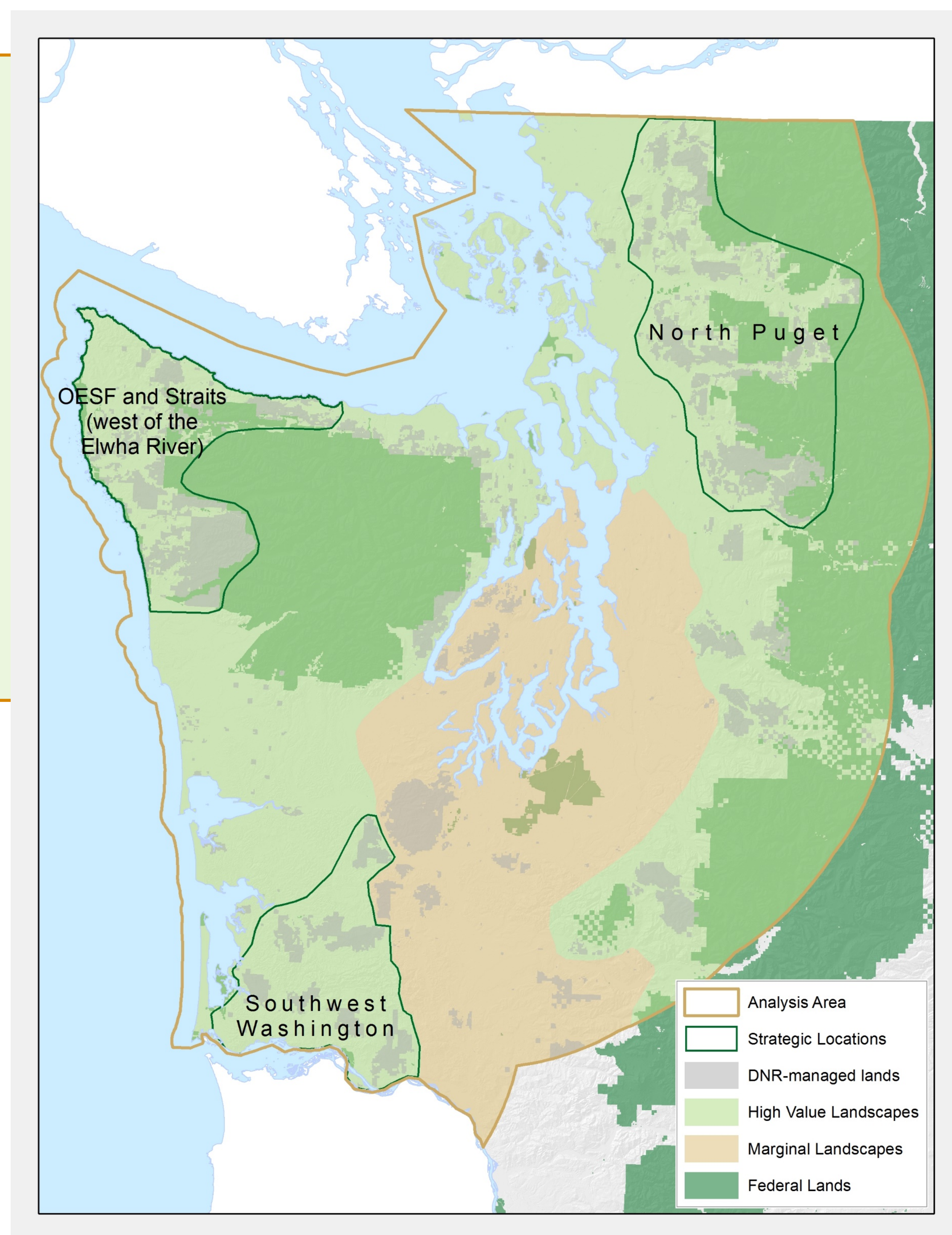
High value landscapes can be further separated into strategic locations and other high value landscapes.

Marginal landscapes are less valuable for long-term marbled murrelet conservation due to low amounts of marbled murrelet habitat, being located further than 3 miles from known occupied sites, and having a relatively low capacity for developing into future habitat.

What Are Strategic Locations?

Strategic locations are geographic areas that the Joint Agencies identified as having disproportionately high importance for murrelet conservation due to one or more of the following:

- Proximity to marine waters (within 40 miles)
- Proximity to known occupied sites
- Abundance of habitat
- Abundance and distribution of occupied sites
- Capacity for development of future habitat
- Protection from disturbance
- Proximity to federal lands



Why Were Each of the Strategic Locations Chosen?

The **Southwest Washington** strategic location captures areas that are in close proximity to marine waters, but where federal ownership is lacking.

The **OESF and Straits west of the Elwha River** strategic location contains an abundance of high quality habitat, is in close proximity to marine waters, and is also close to areas identified as “marine hot spots”*.

The **North Puget** strategic location provides forested landscapes within commuting distance to nest sites from marine foraging areas around the San Juan Islands, and areas identified as “hot spots”* due to heavy marbled murrelet use and prey availability.

*Raphael and others (2016)



Conservation Areas

Existing Conservation:

In the range of the marbled murrelet, DNR already has conserved approximately 567,000 acres of DNR-managed forests that contain murrelet habitat or may otherwise support the development and protection of that habitat (“long-term forest cover”).

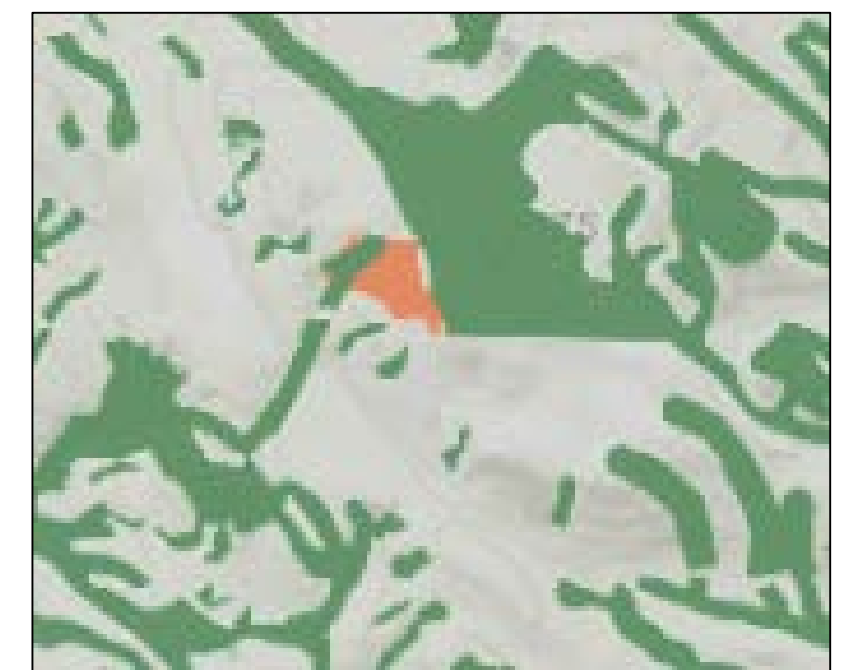
Marbled Murrelet-Specific Conservation:

Each alternative builds on existing conservation by adding one or more types of strategic conservation areas designed and managed for the marbled murrelet.

Habitat Identified Under the Interim Strategy

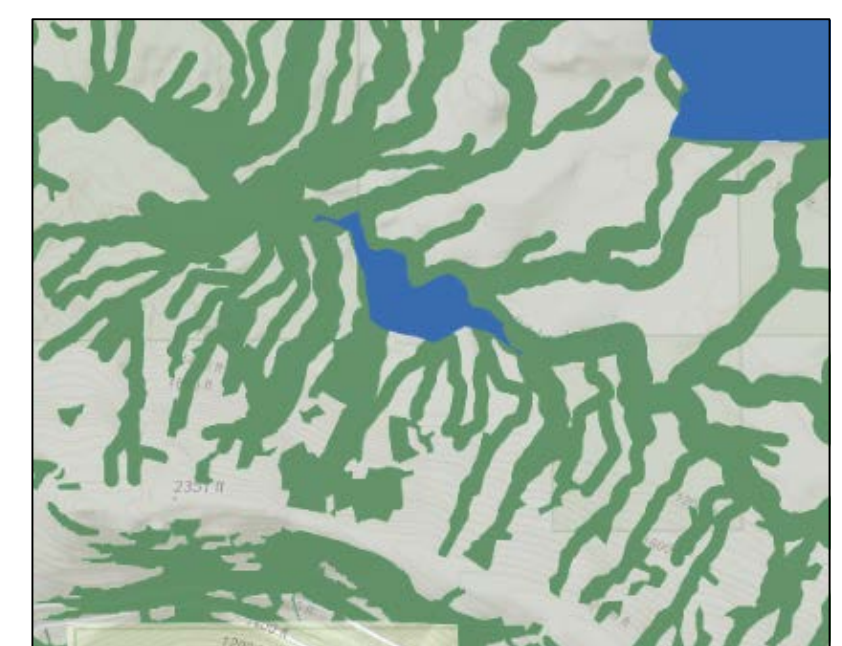
The interim marbled murrelet strategy in the HCP required DNR to identify higher-quality habitat (called “reclassified habitat”) for marbled murrelet habitat surveys to determine occupancy. Habitat surveys were conducted from 1997 to 2002. All reclassified habitat found to be occupied is protected under the interim strategy, as is the majority of unoccupied, reclassified habitat.

Alternative A is the only alternative that specifically protects reclassified habitat.



Occupied Sites

Occupied sites are areas that were surveyed and showed signs of occupancy by nesting marbled murrelets. **Alternative A** uses occupied sites delineated under the interim strategy. **Alternatives B through H** use an adjusted set of occupied sites delineated in the 2008 Science Team Report.



Occupied Site Buffers

Alternatives A and C through H apply a 328-foot (100-meter) buffer to mapped, occupied sites. Under **Alternatives C through E**, buffers are reduced to 164 feet (50 meters) for sites ≥ 200 acres in the OESF HCP Planning Unit. **Alternative B** does not apply any buffers to occupied sites.



High-Quality Habitat Stands

These are existing stands of habitat with a P-stage value of at least 0.47 that are not otherwise identified as occupied sites or as part of the other conservation areas. **Alternatives C, E, and G** designate these habitat stands for conservation in addition to special habitat areas and emphasis areas.



Map Legend

 Occupied sites and buffers	 Long-term forest cover (LTFC)	 LTFC - Northern spotted owl low quality habitat	 LTFC – Marbled murrelet-specific conservation	 Non-LTFC
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Conservation Areas

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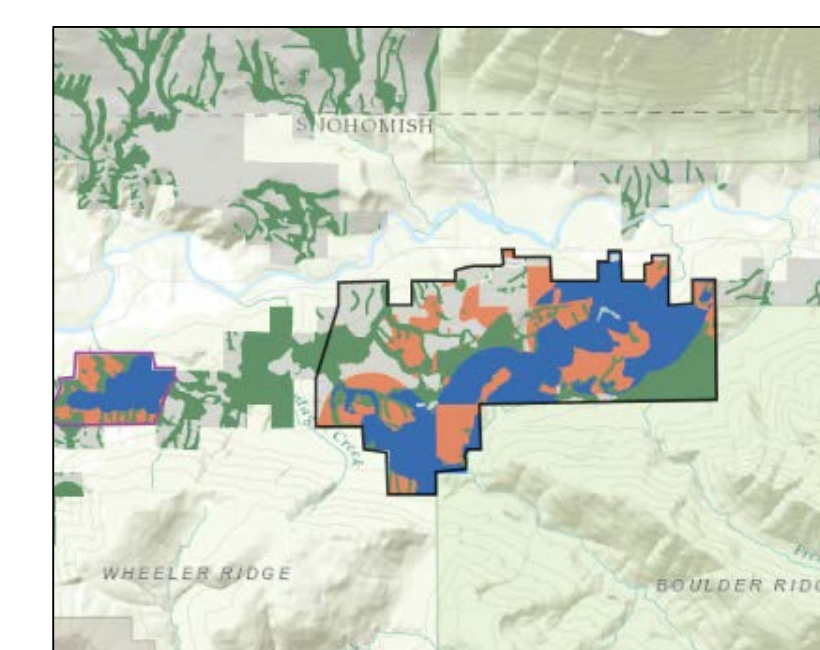
Special Habitat Areas

Most special habitat areas have at least one marbled murrelet occupied site within their borders. Special habitat areas also include surrounding habitat and non-habitat that may function as security forest. Security forest provides additional protection from disturbances. Special habitat areas rely on the exclusion of active forest management to achieve the goal of reducing edge and fragmentation and growing new habitat. **Alternatives C, D, E, G, and H** designate special habitat areas, although size and location of these areas varies. Individual special habitat areas are smaller in size than emphasis areas or marbled murrelet management areas.



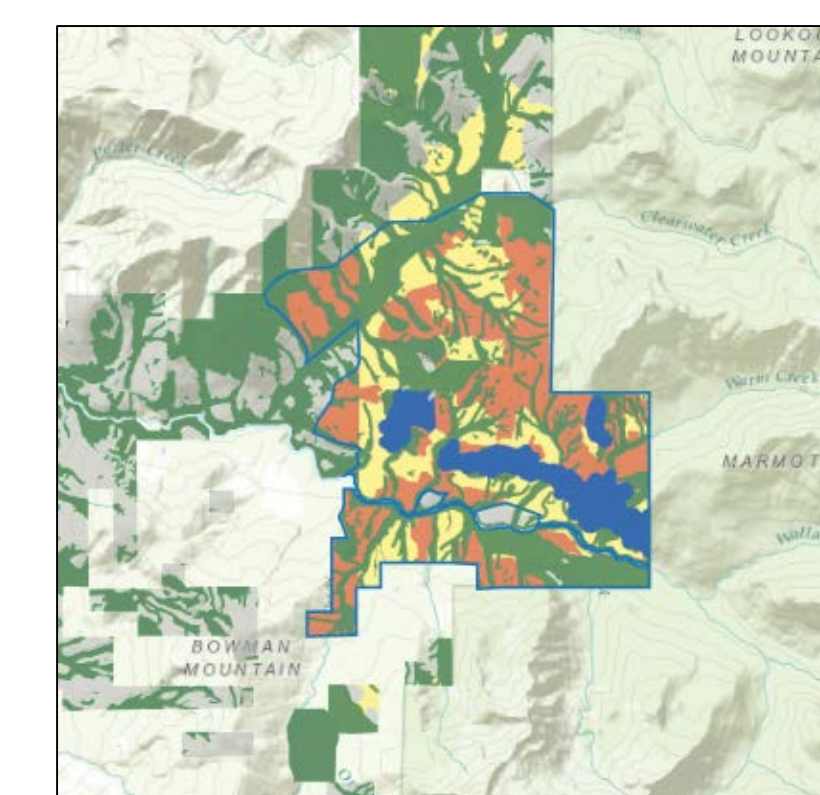
Emphasis Areas

Most emphasis areas are built around multiple occupied sites and include both managed and conserved lands. Emphasis areas are generally larger than special habitat areas, and apply expanded (0.5-mile) buffers to occupied sites. All existing P-stage habitat within their borders is protected. Emphasis areas allow some active forest management, including both variable density thinning to facilitate the development of future habitat and variable retention harvest when it does not delay achieving future habitat goals for the emphasis area. **Alternatives C, E, and G** designate emphasis areas.



Marbled Murrelet Management Areas (MMMA)

MMMAs are larger than either special habitat areas or emphasis areas. MMMAs were originally designated in the Science Team Report, in which maps of these areas for four of the six HCP planning units can be found. For the draft and revised draft environmental impact statements, MMMAs were added for the North Puget HCP Planning Unit. 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.



Map Legend

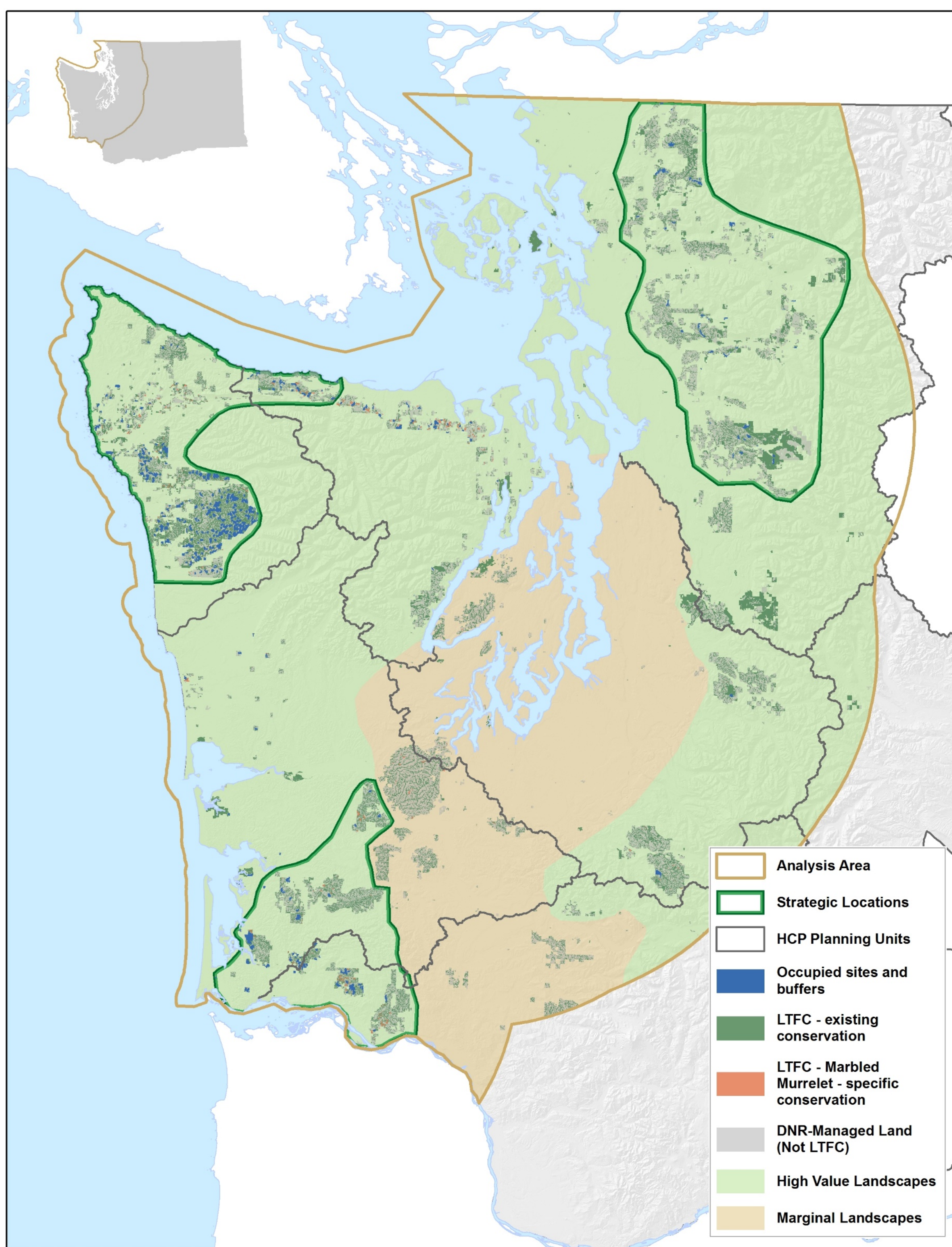
-  Occupied sites and buffers
-  Long-term forest cover (LTFC)
-  LTFC - Northern spotted owl low quality habitat
-  LTFC – Marbled murrelet-specific conservation
-  Non-LTFC



Alternative A

Acres of Marbled Murrelet-Specific Conservation

Types of conservation areas	Estimated acres
Occupied sites	7,000
Occupied site buffers	12,000
Habitat identified under the interim strategy	14,000
Total	33,000

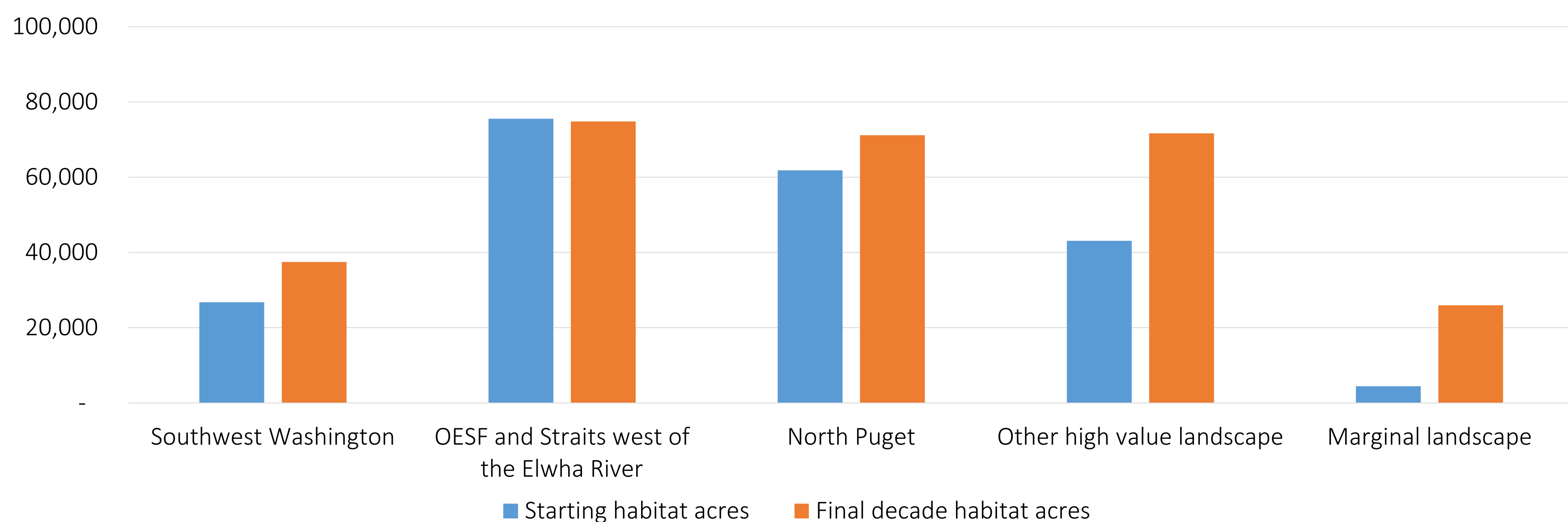


Alternative Summary

The “No Action Alternative” continues DNR operations as authorized under the 1997 HCP and incidental take permit.

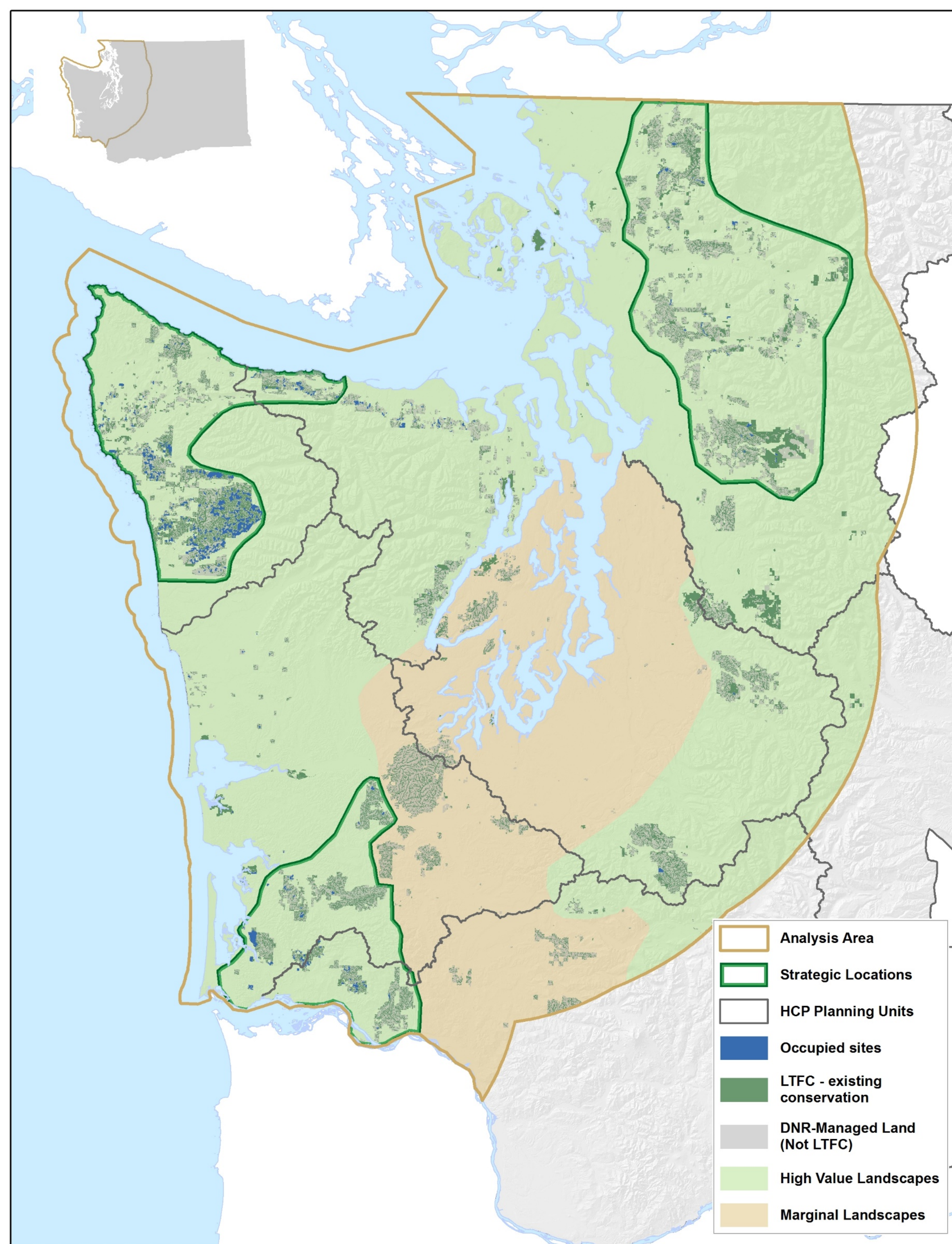
- HCP-surveyed occupied sites with 328-foot (100-meter) buffers
- All reclassified habitat in the OESF HCP Planning Unit
- Resumption of inventory surveys where not previously completed
- All reclassified habitat in the Straits, South Coast, and Columbia HCP Planning Units that has not been identified as “released” for harvest under the interim strategy
- In the North and South Puget HCP Planning Units, all habitat that has not been identified as released under the 2007 and 2009 concurrence letters, all newly identified habitat, and all potential habitat
- 600,000 (approx.) acres of long-term forest cover

Habitat Growth by Strategic Location and Landscape





Alternative B



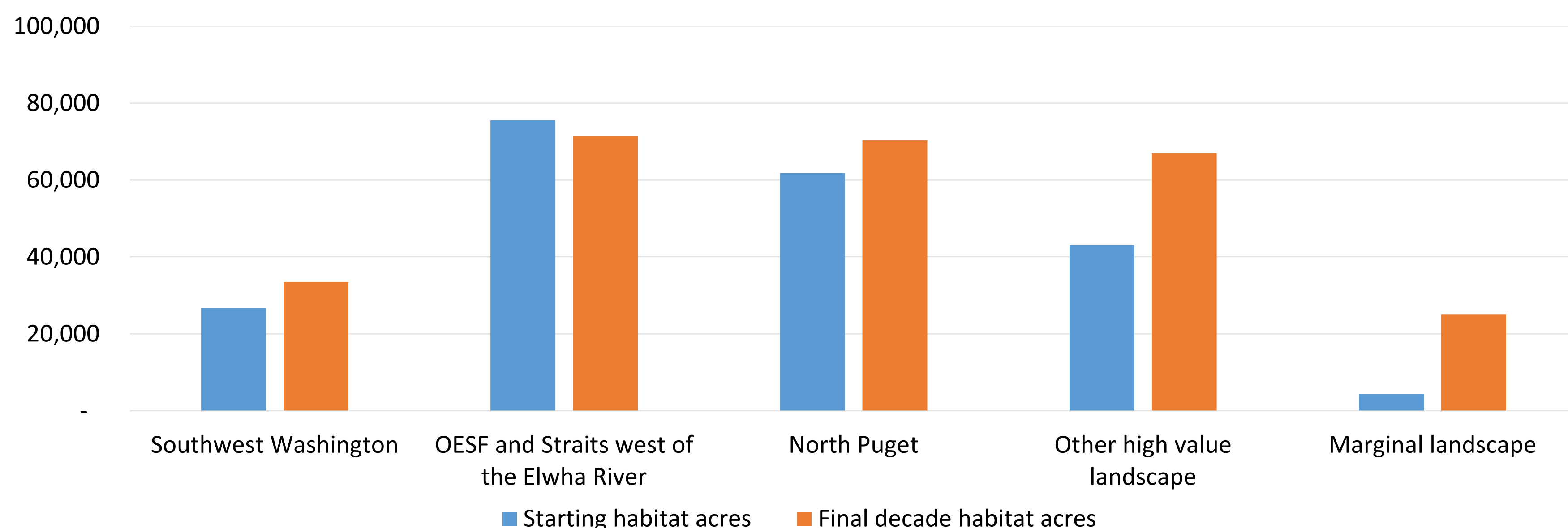
Acres of Marbled Murrelet-Specific Conservation

Type of conservation area	Estimated acres
Occupied sites	9,000
Total	9,000

Alternative Summary

- Includes occupied sites delineated by the Science Team recommendations as well as occupied sites identified by DNR staff in the North and South HCP Planning Units
- Focuses on protecting known occupied sites
- Does not provide buffers on occupied sites
- No harvest or thinning in occupied sites
- 576,000 (approx.) acres of long-term forest cover

Habitat Growth by Strategic Location and Landscape

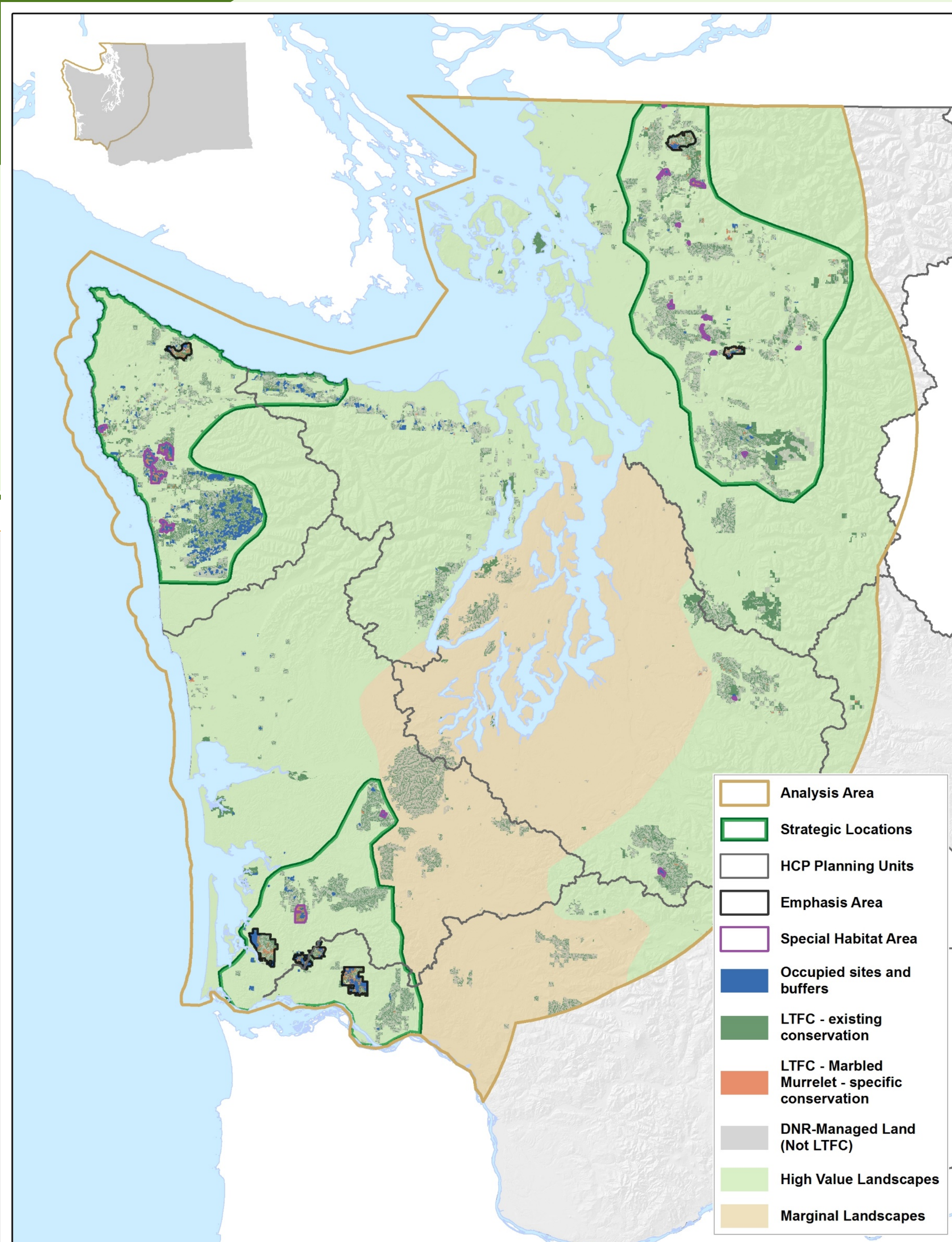




Alternative C

Acres of Marbled Murrelet-Specific Conservation

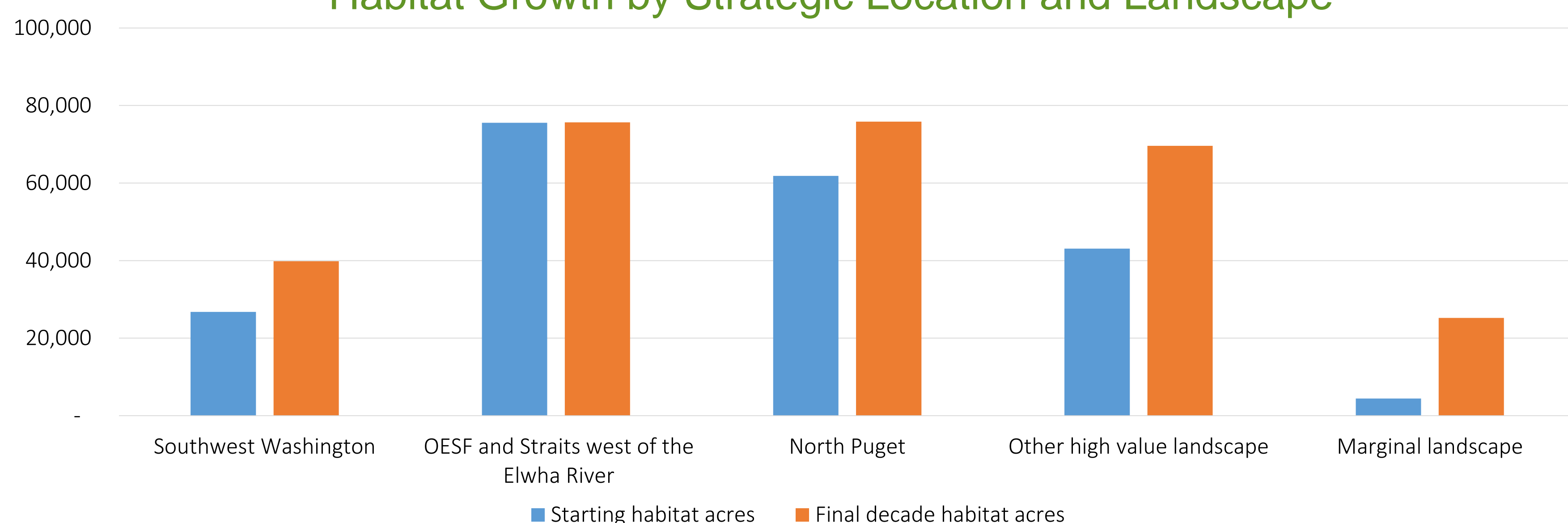
Type of conservation area	Estimated acres
Occupied sites	9,000
Occupied site buffers	13,000
Emphasis areas	14,000
Special habitat areas	9,000
High-quality marbled murrelet habitat	6,000
Total	50,000



Alternative Summary

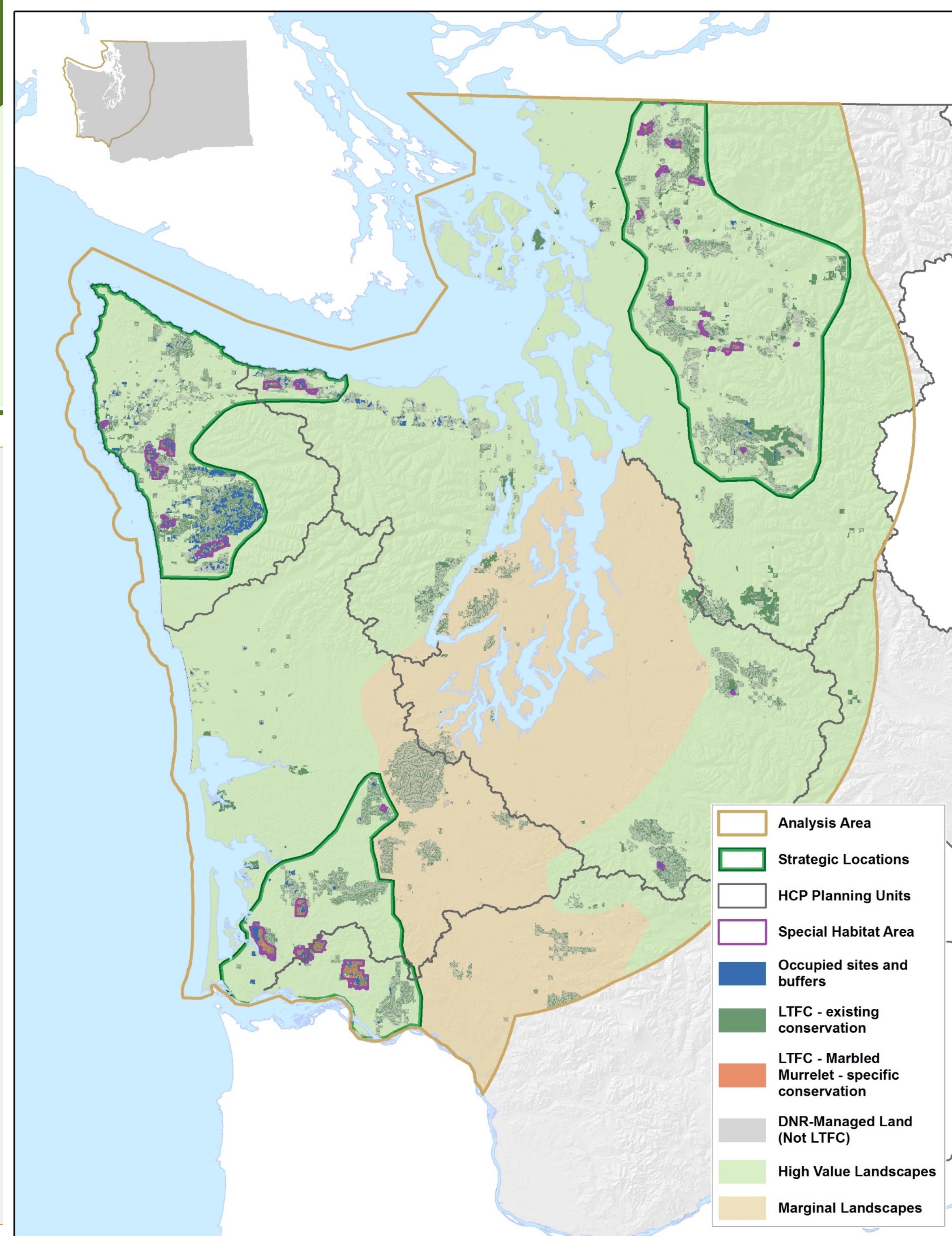
- Occupied sites as described in Alternative B
- Special habitat areas
- Emphasis areas
- High-quality marbled murrelet habitat (P-stage 0.47 to 0.89)
- In OESF HCP Planning Unit, 164-foot (50-meter) buffers on occupied sites that are 200 acres or more
- 328-foot (100-meter) buffers on remaining occupied sites
- Within each of the seven emphasis areas:
 - Lands within 0.5 mile of occupied sites conserved as security forest
 - All current habitat conserved
 - All future habitat conserved (lands that will reach P-stage value of at least 0.25 by 2067)
 - Thinning allowed in occupied site buffers to develop security forest or enhance habitat
 - Thinning allowed in expected future habitat
- 617,000 (approx.) acres of long-term forest cover

Habitat Growth by Strategic Location and Landscape





Alternative D



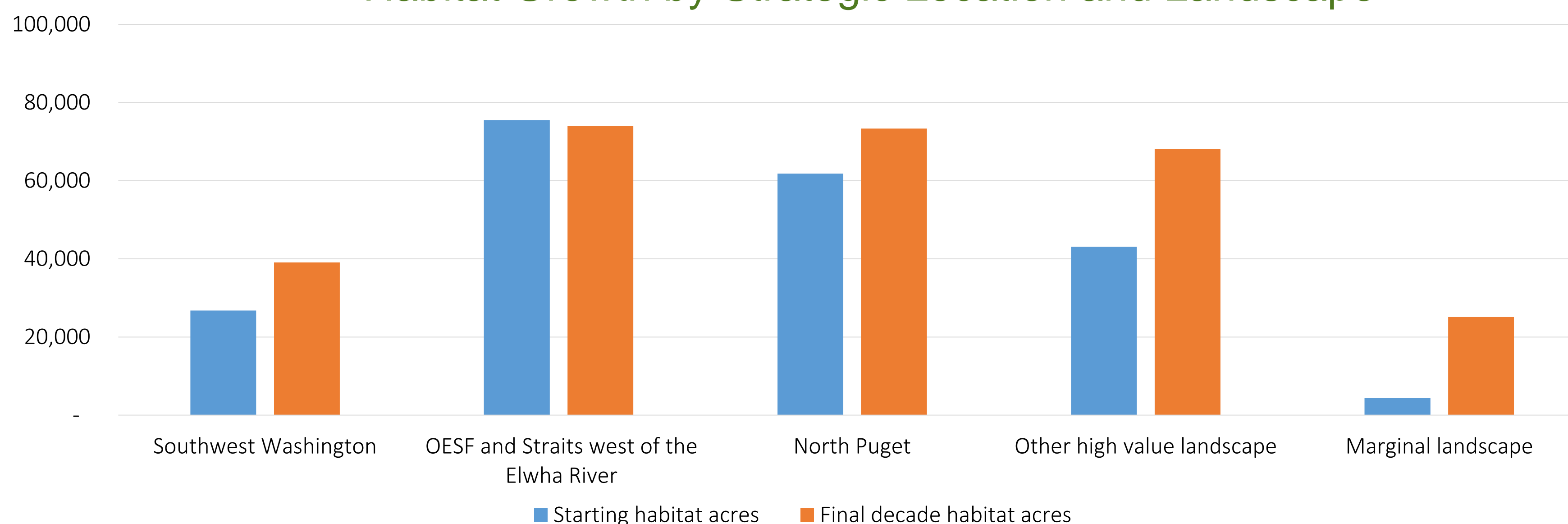
Acres of Marbled Murrelet-Specific Conservation

Type of conservation area	Estimated acres
Occupied sites	9,000
Occupied site buffers	13,000
Special habitat areas	29,000
Total	51,000

Alternative Summary

- Occupied sites as described in Alternative B
- 32 special habitat areas designed to reduce edge and fragmentation effects
- Special habitat areas prohibit thinning and harvest and include the following:
 - 328-foot (100-meter) buffers on remaining occupied sites
 - In OESF HCP Planning Unit, 164-foot (50-meter) buffers on occupied sites that are 200 acres or more
 - Adjacent P-stage habitat (existing and expected to develop through 2067)
 - Adjacent non-habitat areas intended to provide security forest to existing and future habitat
- 618,000 (approx.) acres of long-term forest cover

Habitat Growth by Strategic Location and Landscape

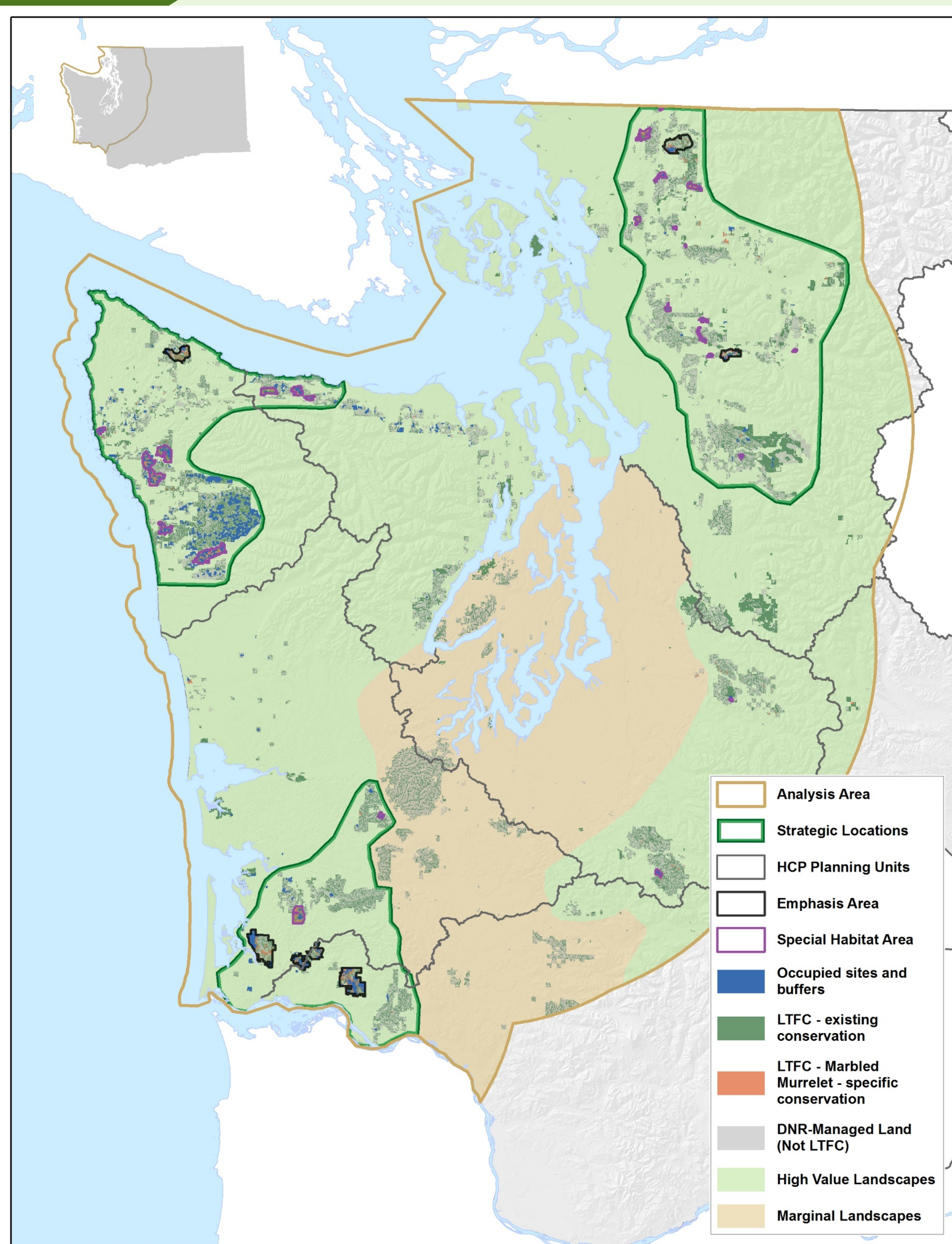




Alternative E

Acres of Marbled Murrelet-Specific Conservation

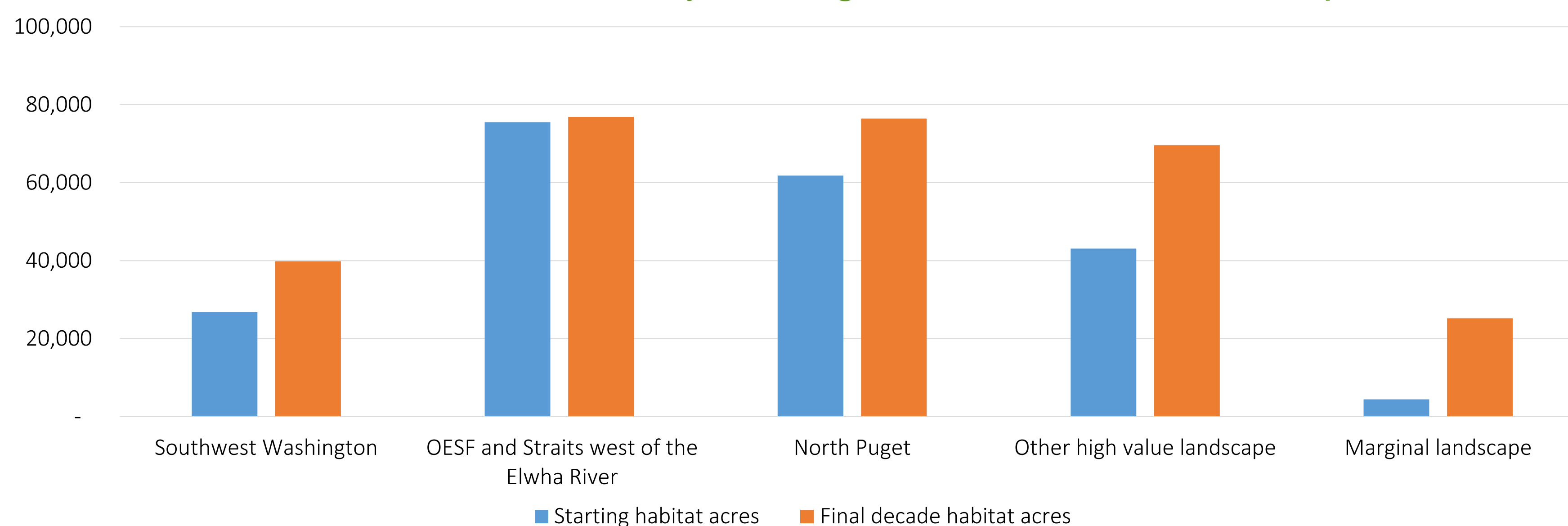
Type of conservation area	Estimated acres
Occupied sites	9,000
Occupied site buffers	13,000
Emphasis areas	14,000
Special habitat areas	14,000
High-quality marbled murrelet habitat	5,000
Total	55,000



Alternative Summary

- Occupied sites as described in Alternative B
- 328-foot (100-meter) buffers on occupied sites
- In OESF HCP Planning Unit, 164-foot (50-meter) buffers on occupied sites 200 acres or more
- High-quality marbled murrelet habitat (P-stage of 0.47 to 0.89)
- Emphasis areas as designated under Alternative C
- Special habitat areas as designated under Alternative D
- Where emphasis areas and special habitat areas overlap, the designation will be an emphasis area
- 622,000 (approx.) acres of long-term forest cover

Habitat Growth by Strategic Location and Landscape

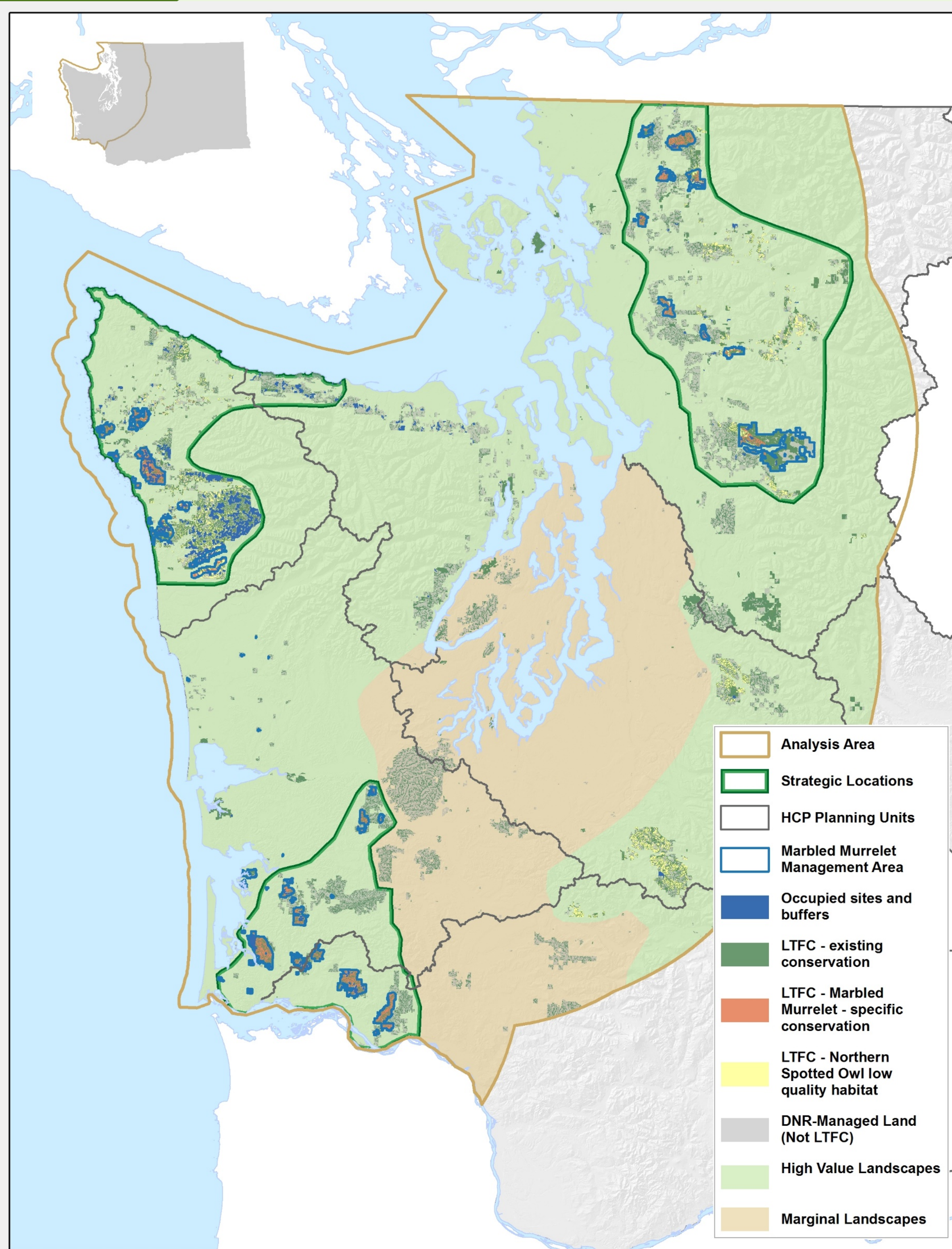




Alternative F

Acres of Marbled Murrelet-Specific Conservation

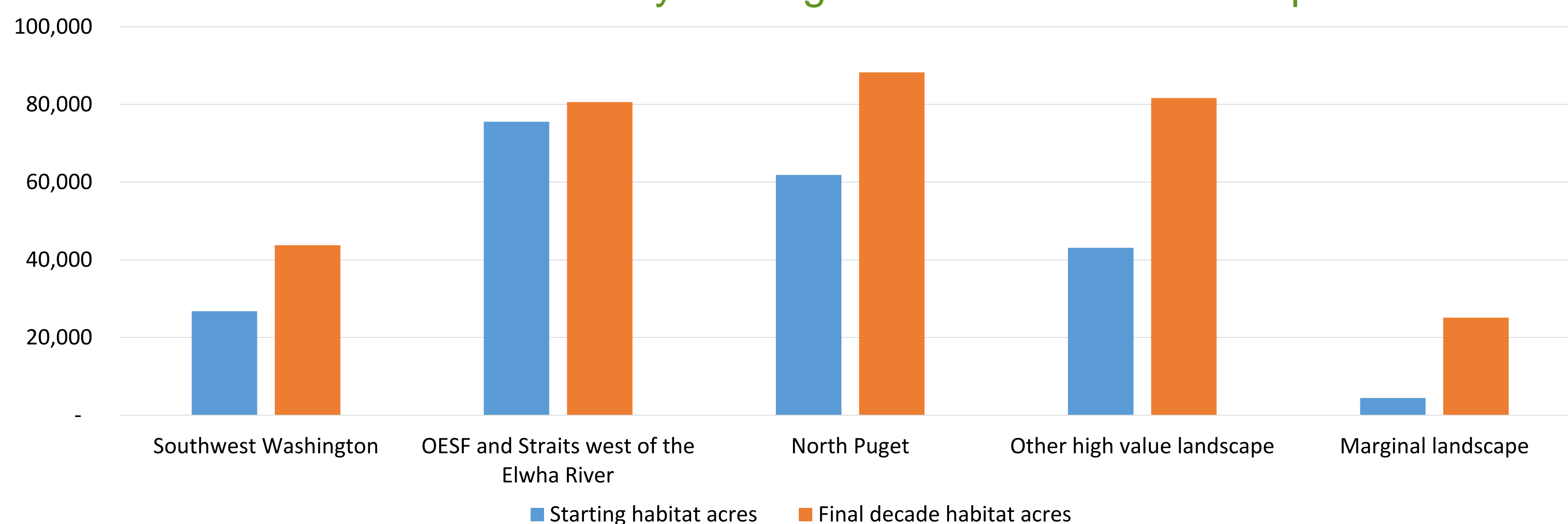
Type of conservation area	Estimated acres
Occupied sites	9,000
Occupied site buffers	16,000
MMMAs	79,000
Northern spotted owl low-quality habitat	72,000
Total	176,000



Alternative Summary

- Occupied sites as described in Alternative B
- 328-foot (100-meter) buffers on occupied sites
- Establishes marbled murrelet management areas (MMMAs) as recommended in the Science Team Report, and establishes MMMAs in the North and South Puget HCP Planning Units
- In the OESF HCP Planning Unit, 328-foot (100-meter) buffer on all northern spotted owl old forest habitat
- Existing mapped low-quality northern spotted owl habitat in designated owl conservation areas included as long-term forest cover
- Thinning allowed in MMMAs, outside of occupied sites, to enhance habitat development
- 743,000 (approx.) acres of long-term forest cover

Habitat Growth by Strategic Location and Landscape

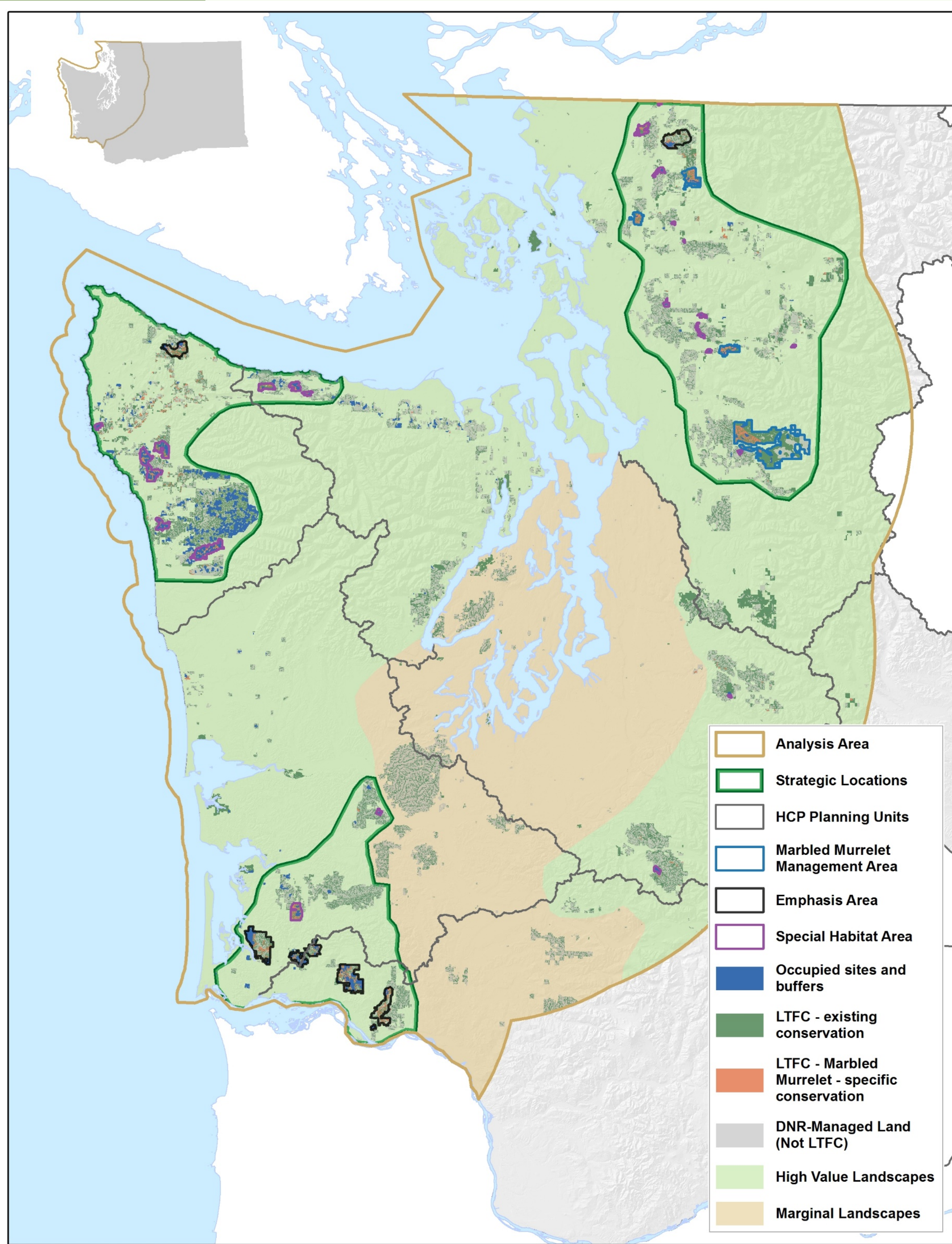




Alternative G

Acres of Marbled Murrelet Specific Conservation

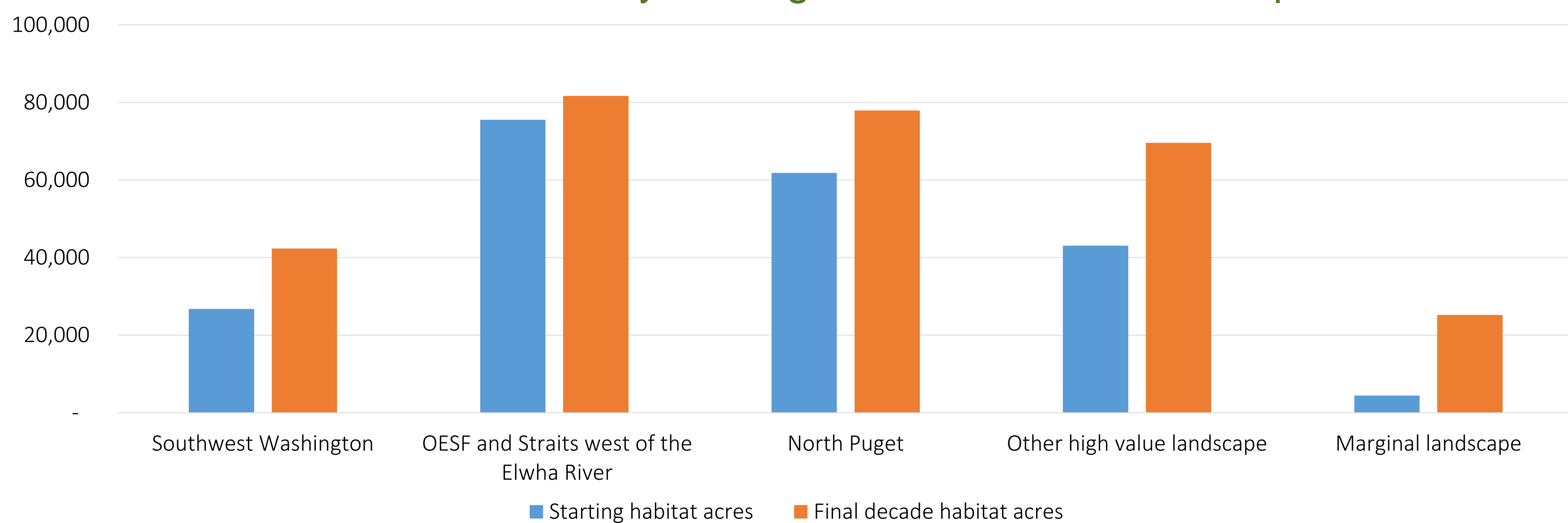
Type of conservation area	Estimated acres
Occupied sites	9,000
Occupied site buffers	16,000
High-quality habitat and low quality habitat in the OESF HCP Planning Unit	11,000
Emphasis areas	12,000
Special habitat areas	16,000
WDFW identified polygons	160
Marbled murrelet management areas	13,000
Total	76,000



Alternative Summary

- Occupied sites as described in Alternative B, with 328-foot (100 meter) buffers
- Emphasis areas designated under Alternative C
- Special habitat areas designated under Alternative D (if emphasis areas and special habitat areas overlap, the designation will be an emphasis area)
- Marbled murrelet management areas (MMMAs) in the North Puget HCP Planning Unit (9 MMMAs in 4 areas)
- MMA in the Elochoman block from Alternative F, managed as an emphasis area
- All habitat with P-stage value of 0.47 or higher throughout analysis area
- In OESF HCP Planning Unit, all current habitat
- Polygons of habitat identified by WDFW
- 643,000 (approx.) acres of long-term forest cover

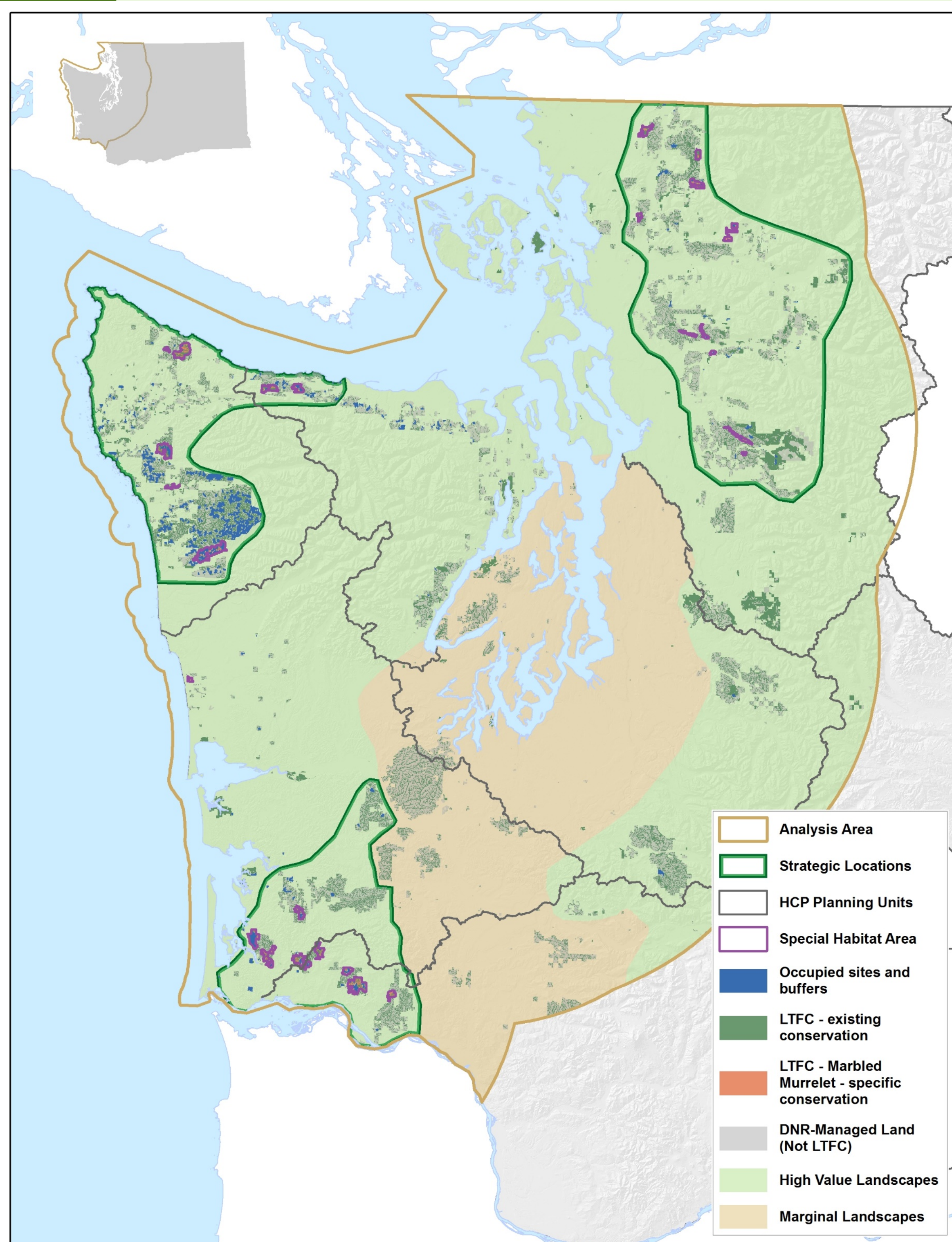
Habitat Growth by Strategic Location and Landscape





Alternative H

DNR's Preferred Alternative



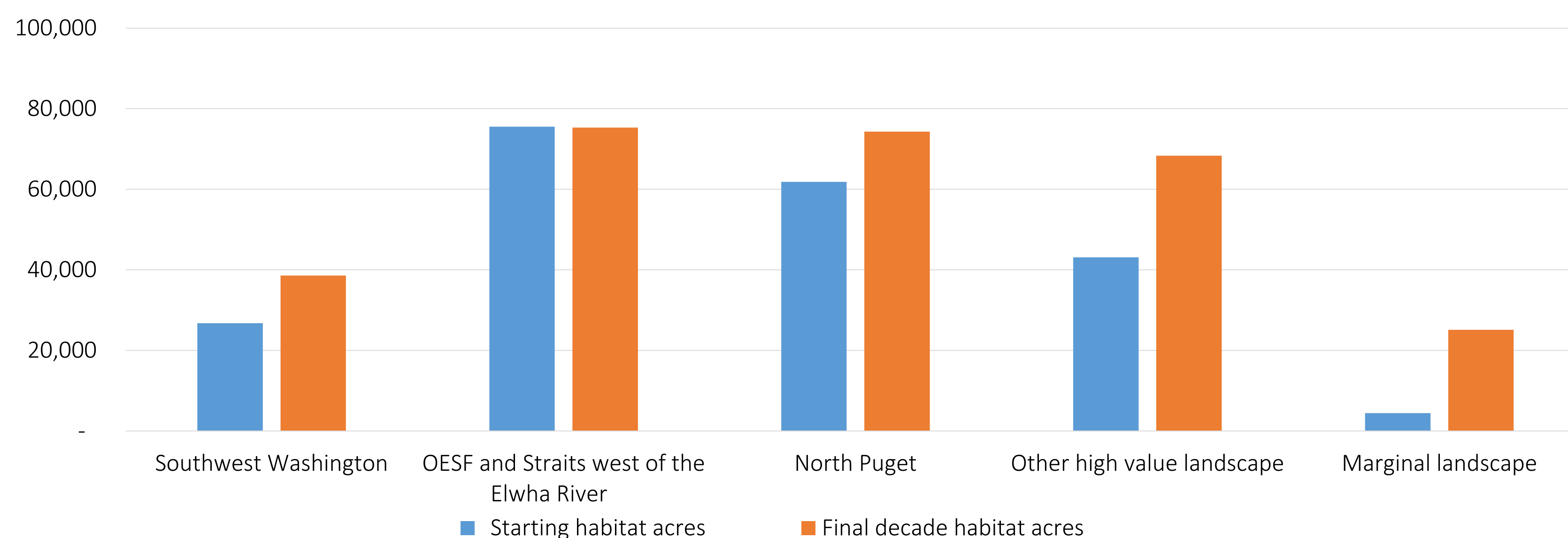
Acres of Marbled Murrelet-Specific Conservation

Type of conservation area	Estimated acres
Occupied sites	9,000
Occupied site buffers	16,000
Special habitat areas	18,000
Total	43,000

Alternative Summary

- Occupied sites as described in Alternative B, with 328-foot (100 meter) buffers
- 29 special habitat areas distributed across strategic locations
- Most special habitat areas have at least one occupied site
- All special habitat areas include current habitat, future habitat, and security forest
- Metered harvest of 3,600 adjusted acres of current habitat until the end of the first decade following implementation
- Accounts for uncertainties such as natural disturbance
- 610,000 (approx.) acres of long-term forest cover

Habitat Growth by Strategic Location and Landscape





Economic Impacts

Acres Available for Harvest

The economic impacts of a marbled murrelet long-term conservation strategy are primarily tied to changes in the acres available for harvest. Some forestland is currently unavailable for harvest due to existing conservation commitments or other limitations, which would be unchanged by a conservation strategy. Other land may currently be conserved as murrelet habitat, but would be released for harvest under one or more of the action alternatives.

	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G	Alt. H
State Forest Transfer Trust land	<i>% change in available acres, compared to Alternative A</i>						
Clallam County	9%	1%	3%	-1%	4%	-3%	1%
Cowlitz County	0%	0%	0%	0%	0%	0%	0%
Grays Harbor County	4%	4%	4%	4%	-2%	4%	4%
Jefferson County	3%	2%	2%	2%	2%	2%	2%
King County	0%	-1%	0%	-1%	-3%	-1%	0%
Kitsap County	0%	0%	0%	0%	0%	0%	0%
Lewis County	0%	0%	0%	0%	-1%	0%	0%
Mason County	0%	0%	0%	0%	0%	0%	0%
Pacific County	9%	-6%	-11%	-6%	-17%	-6%	-2%
Pierce County	0%	-1%	0%	-1%	-5%	-1%	0%
Skagit County	0%	-2%	-1%	-2%	-4%	-3%	-1%
Snohomish County	0%	-2%	-2%	-2%	-5%	-4%	-1%
Thurston County	1%	1%	1%	1%	1%	1%	1%
Wahkiakum County	20%	-10%	-14%	-10%	-27%	-16%	7%
Whatcom County	0%	-3%	-3%	-4%	-25%	-6%	-1%

The RDEIS estimates how the number of acres assumed to be currently available for harvest might change under the action alternatives. Some counties would see no significant change or see a slight increase in the acres available for harvest. Several other counties, particularly Pacific and Wahkiakum, could see notable decreases in acres available for harvest.

Revenue and Employment Impacts

Local reductions or increases in acres available for harvest would result in changes to:

- Trust revenues
- Forest tax revenue
- Sales and local tax revenue
- Timber-related employment

	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G	Alt. H
Estimated annual timber sale value change (compared with no action)	\$4 million	-\$3 million	-\$3 million	-\$3 million	-\$8 million	-\$6 million	-\$1 million

Estimated change reported here for the analysis area assumes a yield of 32 thousand board feet per acre, a price of \$350 per thousand board feet, and a harvest of 1/50 of the available acres each year. These assumptions do not account for all factors that influence potential timber volumes (see the sustainable harvest calculation for more information).