United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

MAY 22 2009

In Reply Refer To:
13410-2009-F-0240

Memorandum

To: Manager, Washington Fish and Wildlife Office
Lacey, Washington

From: Manager, Division of Conservation and Hydropower Planning,
Washington Fish and Wildlife Office,
Lacey, Washington

Subject: Biological Opinion for the Issuance of a Section 10(a)(1)(A) Enhancement of Survival Permit to Port Blakely Tree Farms, L.P., for the Morton Block Safe Harbor Agreement (FWS Reference: 13410-2009-F-0240), in Lewis and Skamania Counties, Washington.

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion based on our review of the proposed issuance of an Enhancement of Survival Permit (Permit) (TE-212229-0) to Port Blakely Tree Farms, L.P., for the Morton Block Safe Harbor Agreement. Issuance of the proposed Permit is pursuant to Section 10(a)(1)(A) and Section 7(a)(1) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act). This formal consultation is in accordance with section 7(a)(2) of the Act.

Port Blakely Tree Farms, L.P., is requesting that the Service enter into a 60-year agreement that would authorize incidental take for the threatened northern spotted owl (*Strix occidentalis caurina*) (owl) and threatened marbled murrelet (*Brachyramphus marmoratus marmoratus*) (murrelet) that may arise from forest management activities addressed in the proposed Safe Harbor Agreement.

This consultation evaluates the effects of the proposed action on the owl and murrelet, as well as designated critical habitat for these species, and concludes that the proposed action is "not likely to jeopardize the owl or murrelet, or adversely modify designated critical habitat for the owl or murrelet. We also determined that the proposed action would not likely adversely affect bull trout (*Salvelinus confluentus*), bull trout critical habitat, or other listed fish species.

The Project is located in Lewis and Skamania Counties, Washington. A complete record of this consultation is on file at the Service's Washington Fish and Wildlife Office in Lacey, Washington.

If you have any questions about this memorandum or the attached Biological Opinion, please contact Mark Ostwald at (360) 753-9440.

Endangered Species Act – Section 7 Formal Consultation

Biological Opinion for the Safe Harbor Agreement, Landowner Option Plan, and Cooperative Habitat Enhancement Agreement: Port Blakely Tree Farms, Morton Block

U.S. Fish and Wildlife Service Reference: 13410-2009-F-0240

Agency:

U.S. Fish and Wildlife Service
Region 1
Portland, Oregon

Consultation conducted by:

U.S. Fish and Wildlife Service
Washington Fish and Wildlife Office
Lacey, Washington

May 22, 2009

Ken S. Berg, Manager
Washington Fish and Wildlife Office

5/22/09
Date

TABLE OF CONTENTS

Table of Figures

Table of Tables

INTRODUCTION

BACKGROUND

This document constitutes the U.S. Fish and Wildlife Service's (Service) Biological Opinion regarding the Service's issuance of an Enhancement of Survival Permit (Permit) to Port Blakely Tree Farms, L.P., (Port Blakely) for the Morton Block Safe Harbor Agreement (SHA) and its effect on the threatened northern spotted owl (*Strix occidentalis caurina*) (owl) and threatened marbled murrelet (*Brachyramphus marmoratus marmoratus*) (murrelet), and critical habitat for owls and murrelets. The Service determined that there would not likely be any adverse effects to any other listed, proposed, or candidate fish, wildlife, or plant resources as a result of this action. This determination is based primarily on the Forest Practices Habitat Conservation Plan (HCP) and its continued applicability in the action area should the Service issue the proposed Permit. The issuance of the Permit would not alter the riparian protection derived from riparian management zones or unstable slope protection areas, nor would it alter road construction, management, and abandonment standards. The proposed Permit is also not expected to have a measurable effect on road densities or locations.

This Biological Opinion is based primarily on information provided in the document entitled: Safe Harbor Agreement, Landowner Option Plan, and Cooperative Habitat Enhancement Agreement: Port Blakely Tree Farms, Morton Block (ICF Jones and Stokes 2009) and the other sources cited herein. A complete record of this consultation is on file at the Service's Washington Fish and Wildlife Office in Lacey, Washington.

CONSULTATION HISTORY

From the spring of 2007 to December 2008, the Service met with and provided technical and policy assistance to Port Blakely in the development of the SHA. The application for the Permit was received on December 17, 2008. The draft SHA (ICF Jones and Stokes 2008), draft Implementation Agreement and draft Environmental Assessment (USFWS 2008a) were made available for a 30-day comment period on December 17, 2008 (73 FR 76680). At the same time, a news release was sent to State and Federal elected officials, Native American Tribes, nongovernmental organizations, and the media. One comment was received from the Washington Department of Fish and Wildlife (WDFW) and it was incorporated into the final SHA. The final EA (USFWS 2009) was made available in February 2009.

Consultation was initiated on April 7, 2009.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Service proposes to issue a Permit in accordance with their authority and responsibility under section 10(a)(1)(A) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act). The Permit applicant is Port Blakely Tree Farms, L.P., who has prepared and submitted an application based upon the document Safe Harbor Agreement, Landowner Option Plan, and Cooperative Habitat Enhancement Agreement: Port Blakely Tree Farms, Morton Block. Port Blakely is also seeking a similar agreement with Washington State Department of Natural Resources (WDNR) under the State's forest practices rules.

Safe Harbor Agreements are voluntary agreements between the Service and cooperating nonfederal landowners. They are designed to benefit federally endangered and threatened species by giving landowners assurances that the Service will not impose future restrictions on their land as a result of conservation actions on their part. In other words, these agreements essentially relieve landowners of liability under the Act if conservation practices on their land attract and/or perpetuate the presence of federally listed species.

In a Safe Harbor Agreement, the landowner agrees to maintain, create, restore, or improve habitat for endangered or threatened species. The Service, working with the landowner, establishes a baseline condition for each species and determines whether the proposed actions will result in a net conservation benefit. The negotiated baseline can exceed the current condition in some cases. Safe Harbor Agreements also allow two categories of incidental take (50 CFR 17.32(c)(1)(ii)): one is a result of management activities and the other is a result of returning the lands to baseline. Safe Harbor Agreements provide assurances to nonfederal landowners interested in using their lands to benefit Act species, but who also want to avoid subsequent restrictions on land use.

In this instance, the SHA would apply to an area in the Western Washington Cascades Physiographic Province (USFWS 2008) in the vicinity of Morton, Washington, known as Port Blakely's James G. Eddy Tree Farm, also known as the Morton Block, in Lewis and Skamania Counties, Washington (Figure 1). These lands are composed of parcels of varying size, totaling approximately 45,306 acres of primarily second-growth Douglas-fir and western hemlock forest. The project lands border national forest lands in several areas, and also border State-managed lands.

Port Blakely has requested that the SHA apply to both owls and murrelets, and address actions common to forestry operations: timber-sale layout, precommercial thinning, commercial thinning, regeneration harvests, salvage harvest, road construction and maintenance, yarding and hauling, planting, site-preparation, vegetation management, slash disposal, and administrative actions associated with forest management, such as surveys, inventory, and harvest unit lay-out. The 60-year SHA would also address enhancement activities such as snag creation. See section 4.1.2 of the SHA for a more complete description of proposed forestry activities.

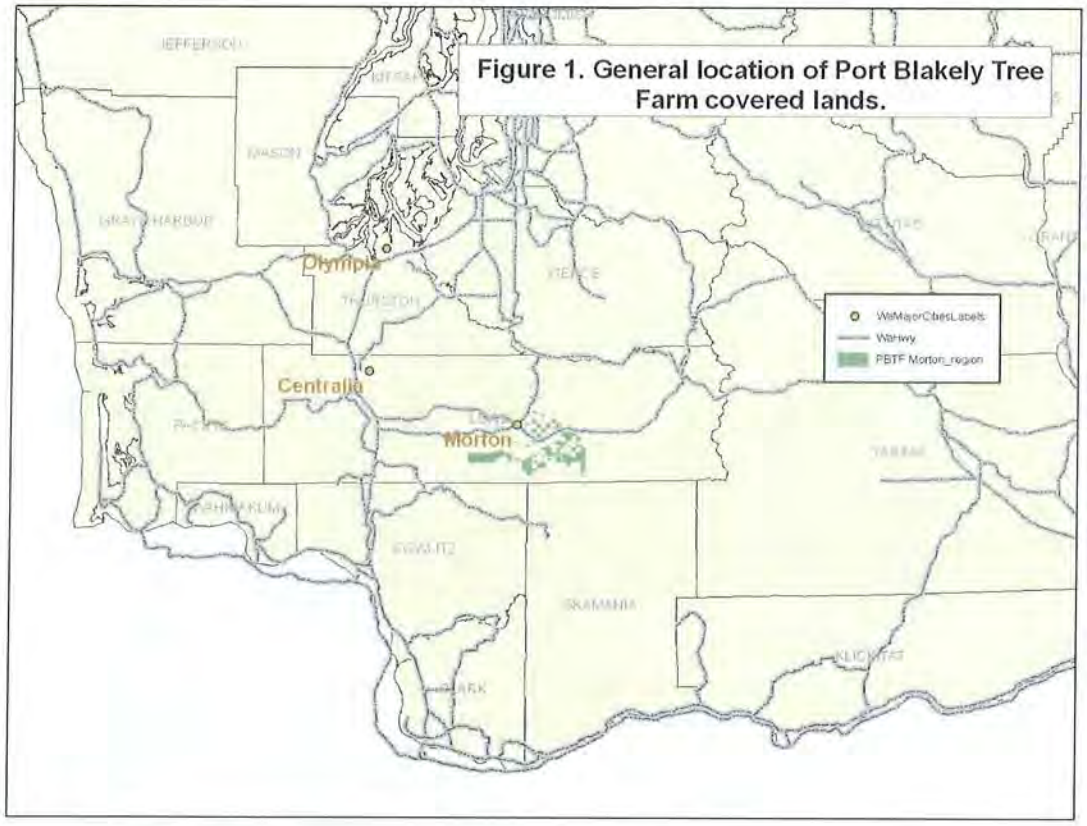

Figure 1: General Location of Port Blakely Tree Farm Covered Lands.

Conservation Measures

A series of commitments are contained within the SHA that address landscape conditions and the activities conducted by Port Blakely. While Safe Harbor Agreements are voluntary, Port Blakely is offering these conservation measures to ensure that a net conservation benefit is achieved for both owls and murrelets.

When used in the context of the Act, conservation measures are actions that are included by the Federal agency as an integral part of the proposed action. Conservation measures in the SHA include: 1) Establishing an average harvest rotation of 60 years (instead of the industry standard of 45 years); 2) Conducting a snag conservation and development program; 3) Identifying and retaining Special Management Areas; 4) Identifying and retaining Special Set-aside Areas to provide a greater amount of older forest habitat within the covered area than would occur under current forest practices rules; 5) Implementing limited protective measures for owl and murrelet nesting locations; and 6) Monitoring and Reporting that includes, among other measures, marking a sample of snags and defective trees to be used in studies for effectiveness of snag-creation methods. See SHA sections 4.1 through 4.5 for more information on the conservation measures.

Spotted Owl

The SHA describes in detail the beneficial actions provided for the owl. SHA Section 4.1.4 describes the details of the Special Management Areas; SHA Section 4.1.5 describes the details of the Special Set-aside Areas; and SHA Section 4.2.2 describes the amounts of owl dispersal habitat. SHA Section 4.1.6 describes the prescriptions for retention of defective trees and creation of snags. There are three prescription options for retention of defective trees and creation of snags during commercial thinning entries and two prescription options during regeneration harvests. During commercial thinning, prescription 1 leaves two defective trees per acre, prescription 2 leaves one defective tree/acre and creates one snag/acre, and prescription 3 creates 2 snags/acres. During regeneration harvests, prescription 1 creates 20 snags per 100 acres and retains six green recruitment trees per acre, and prescription 2 retains 2 snags per acre (either residual or created) and leaves 3 green recruitment trees per acre.

SHA Section 4.1.7 describes the occupied nest site provisions for owls. Conservation measures will include minimizing sound and visual disturbance and habitat alteration of a nest site (including 70-acre core) for a minimum of 3 years. Port Blakely will provide this conservation and protection for up to three owl nest sites in any given year during the term of the SHA. Port Blakely will follow the guidelines currently utilized by the Service (USFWS 2003). Port Blakely will use data collection and site specific information to help inform development of longer-term strategies.

Marbled Murrelet

Port Blakely identified 498 acres as the most likely places for "potential habitat" to exist or develop during the 60-year SHA, and protected these areas for the life of the SHA. These areas are displayed on Figure 3-6 of the SHA. Under Forest Practice Rules and absent the SHA, approximately 380 acres of the 498 acres would be currently available for timber harvest (*in litt.* Blake Murden).

The SHA describes in detail the actions directed toward the murrelet. SHA Section 4.1.5 describes the Special Set-aside Areas, and SHA Sections 3.3.2 and 4.2.3 describe the amounts of murrelet habitat for permanent conservation. Port Blakely will not be conducting murrelet audio visual surveys to determine occupancy on their lands. However, if through some means an occupied site was reported on the covered lands, Port Blakely would implement short-term measures for the site as described in SHA Section 4.1.7. If the site is on one of the parcels associated with the 498 acres, it would be protected and left undisturbed for the permit term. If the site occurred in a riparian zone or some other Special Management Area, and extended beyond those specified acres, Port Blakely will protect some of the associated habitat for a minimum of 3 years. See SHA Section 4.1.7 for further details and a description of this process.

SHA Section 4.1.7 describes the timing restrictions for an occupied murrelet site that is incidentally identified. If there is a known occupied site, Port Blakely will follow Washington State Forest Practice Rules for disturbance measures. Port Blakely would implement daily restrictions during the April 1 to August 31 "critical nesting season" as defined by the State (WAC 222-16-010) and comply with the State restrictions during the daily peak activity period which is 1 hour before official sunrise to 2 hours after official sunrise and 1 hour before official sunset to 1 hour after official sunset. The following activities will be prohibited within 0.25 mile

of occupied sites during these daily peak activity periods during the nesting season: road construction, operation of heavy equipment, blasting, timber felling, yarding, and helicopter operations. Slash disposal or prescribed burning will be prohibited within 0.25 mile of occupied sites during the critical nesting season. A 1 mile distance would be applied for blasting. As more biological information becomes available regarding sound and visual disturbance and operational distances, Port Blakely would be willing to modify these distances after discussion with the Service.

While the majority of Port Blakely lands will be on an average 60-year harvest rotation, some areas will not be harvested. The SHA describes Special Set-aside Areas and Special Management Areas (of which there are approximately 4,784 acres) as locations distributed throughout the covered lands that will not be harvested. Over time these designated areas are anticipated to develop into mature forest. Many of these areas are within unmanaged riparian zones; however, some are outside of riparian areas.

Current riparian habitat conditions for most of the Port Blakely riparian zones are young forest and resemble upland forests, with a few exceptions. However, over the duration of the Permit term, riparian zones should mature and develop more-complex forest structure, potentially providing spotted owl habitat for dispersing, roosting, and foraging.

Due to the 60-year rotation, improvements are expected in the amount of relatively mature forest across the landscape. There will also be corresponding reductions in the amount of young forest (0 – 40 years) across the landscape. In addition, the quality of that relatively mature forest will improve as it will be slightly older and have additional time to develop more complex structure and larger trees. The application of commercial thinning in conjunction with snag retention and development at time of regeneration harvest and commercial thinning will improve the quality of those habitats.

Other than a few exceptions (Special Set-aside Areas and Special Management Areas, unstable slopes, riparian areas, and perhaps patches of leave trees when left next to national forest lands), the covered lands abutting national forest lands will be on an average 60-year regeneration harvest schedule. There will be no required forested buffer next to national forest lands. Depending on timber markets, logistics, and other factors, some stands will be harvested sooner and some several years later than the 60-year average. During the 60-year Permit term, a newly created edge next to national forest lands would most likely happen once in most cases; in unique cases, perhaps twice or not at all.

The net effect will be a series of reserves available for forests to mature that will be larger and better distributed than would otherwise occur. The managed lands will be older and will contain more structure. There will be less young forest and thus the landscape will be less fragmented. Protections to known sites, should they be identified, could be somewhat less than without the SHA. This is because the covered lands are within a Spotted Owl Special Emphasis Area (SOSEA), which would require protection of 40 percent of the habitat within the estimated home range.

The Service anticipates that under the SHA about 11 percent of the landscape would develop into forests older than 80 years; about 20 percent would develop into owl dispersal habitat (over 40 to 50 years of age) on gentle slopes; about 5 percent would develop into dispersal habitat (over 50 years of age) on steeper, but still operable, lands; and about 3 percent would develop into 60 to 80 year old forest. We therefore anticipate that 39 percent of the landscape would eventually become dispersal habitat for owls; and, conversely, that only about 61 percent would be in younger age classes.

Therefore, the Service considers that activities involving the cutting or harvest of trees (including precommercial thinning, commercial thinning, regeneration harvest, and salvage) could be direct results of Permit issuance. Even though this would not be the case in most instances, and the net effect would be a reduction in harvest frequency, the Service analyzes all such harvest activities as direct effects of the SHA and Permit issuance (See *Framework for Effects Analysis*).

Interrelated and Interdependent Activities

The Service has determined that there are no interrelated and interdependent actions associated with issuance of a Permit to authorize take of owls and murrelets. The effect of the Permit will be implementation of a combination of landscape and harvest-unit measures that have already been described, as well as potentially fewer restrictions should owls or murrelets occupy the property. We do not expect any measurable changes in road management, nor do we expect changes in loading and hauling, planting, vegetation or slash control, or administrative actions. For instance, we do not expect any change in slash control and therefore have not analyzed the effects of smoke. There may be some subtle differences in timing of harvest, as well as quality of wood and volume of wood extracted at different time periods; however, it is difficult to estimate differences between scenarios with and without the Permit, especially given the diverse factors of natural disturbances and social and economic considerations. Once harvested timber is hauled from Port Blakely property, it will be transported on major roads and processed at facilities where we do not expect any impacts to listed species.

As a result of this review, the Service does not expect any interrelated or interdependent activities to be associated with issuance of the proposed Permit that can be reasonably anticipated or that would be expected to have any effects on wildlife species. Therefore, we do not analyze any interrelated or interdependent activities in this Biological Opinion.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the federal action, including interrelated and interdependent actions, and not merely the immediate area involved in the action (50 CFR §402.02). Subsequent analyses of the environmental baseline, effects of the action, cumulative effects, and levels of incidental take are based upon the action area as determined by the Service.

In delineating the action area, we evaluated the farthest reaching physical, chemical, and biotic effects of the action on the environment. We believe that physical (e.g., windthrow) and biotic (e.g., increased risk of predation) effects of the action may emanate as far as 200 ft from Port Blakely ownership.

The action area for the purposes of this Biological Opinion includes:

- Covered lands owned by Port Blakely totaling approximately 45,306 acres in Lewis and Skamania County near Morton, Washington; and

- Private, State, and Federal lands within 200 ft of Port Blakely ownership.

The action area includes State, Federal, and private ownership composed primarily of forest land. See section 3.3.1 of the SHA for a more complete description of lands addressed in the proposed SHA.

DESCRIPTION OF ANALYTICAL FRAMEWORK

Framework for the Jeopardy and Adverse Modification Analyses

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analyses in this Biological Opinion rely on four components: (1) the Status of the Species, which evaluates the Species' rangewide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) Cumulative Effects, which evaluates the effects of future, nonfederal activities in the action area on the species. These four components are presented separately below for the owl and murrelet.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the species' current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The jeopardy analysis in this Biological Opinion places an emphasis on consideration of the rangewide survival and recovery needs of the species and the role of the action area in the survival and recovery of the species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Adverse Modification Determination

This Biological Opinion does not rely on the regulatory definition of "destruction or Adverse modification" of critical habitat 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this Biological Opinion relies on four components: (1) the Status of Critical Habitat, which evaluates the rangewide condition of designated critical habitat for the species in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended recovery function of the critical habitat overall; for critical habitat, this section also evaluates those factors at the provincial / conservation-zone scale; (2) the Environmental Baseline, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs and how that will influence the recovery role of affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future, nonfederal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units. These four components are presented separately below for critical habitat.

For purposes of the adverse modification determination, the effects of the proposed Federal action on critical habitat are evaluated in the context of the rangewide condition of the critical habitat, taking into account any cumulative effects to determine if the critical habitat rangewide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the species.

In the case of the owl, the analysis in this Biological Opinion places an emphasis on using the intended rangewide and provincial-scale recovery functions of owl critical habitat and the role of the action area relative to those intended functions as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

In the case of the murrelet, the analysis in this Biological Opinion places an emphasis on using the intended rangewide and Conservation Zone recovery functions of Marbled Murrelet Critical Habitat and the role of the action area relative to those intended functions as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

Please note that a "may affect, likely to adversely affect" determination for owl critical habitat that triggers the need for completing an adverse modification analysis under formal consultation is warranted in cases where a proposed Federal action will: (1) reduce the quantity or quality of existing owl nesting, roosting, foraging, or dispersal habitat at the stand level to an extent that it would be likely to adversely affect the breeding, feeding, or sheltering behavior of an individual owl; (2) result in the removal or degradation of an owl nest tree when that removal reduces the likelihood of owls nesting within the stand; or (3) prevent or appreciably slow the development

of owl habitat at the stand scale in areas of critical habitat that currently do not contain all of the essential features, but have the capability to do so in the future; such actions adversely affect owl critical habitat because older forested stands are more capable of supporting owls than younger stands. Adverse effects to an individual tree within owl critical habitat will not trigger the need to complete an adverse modification analysis under formal consultation if those effects are not measurable at the stand level.

A key factor in a "may affect, likely to adversely affect" determination for critical habitat that triggers the need for adverse modification analysis under formal consultation is whether, with implementation of the proposed Federal action, critical habitat (e.g., any PCE) will be measurably adversely affected. The resulting adverse modification analysis conducted during formal consultation addresses whether the affected critical habitat would remain functional (or retain the current ability for the primary constituent elements to be functionally established) to serve the intended conservation role for the species.

Activities that may destroy or adversely modify critical habitat are those that alter the PCEs to an extent that the conservation value of critical habitat for the murrelet is appreciably reduced. Activities that, when carried out, funded, or authorized by a Federal agency, may affect critical habitat and therefore result in consultation for the marbled murrelet include: (1) Removal, modification, or fragmentation of forested areas can directly impact nesting structures, nesting substrate, and the vertical and horizontal cover provided by the surrounding forest. Fragmentation of forested areas can result in habitat isolation and increased edge, which negatively impacts the quality of the remaining nesting habitat primarily through increased predation. Federal actions primarily impacting the marbled murrelet include timber harvest, salvage logging, hazard tree removal, and windthrow caused by harvest. (2) New and existing human activity, including recreation, agriculture, and urbanization, adjacent to and within forested areas can result in loss or modification of the PCEs. Human activity occurring in or near forested nesting areas can negatively impact the quality of nesting habitat, because they can significantly compromise the effectiveness of the forested areas in protecting adult incubating birds, eggs, or nestlings from predation (September 12, 2006 Federal Register; 71 FR 53851).

Framework for Effects Analysis

In this Biological Opinion, we address the effects of the Federal action of issuing a Permit to authorize take of owls and murrelets. With the approval of the SHA and the issuance of the associated Permit, Port Blakely receives assurances and certainty for their operations. The Service also receives additional assurance regarding the future for owls and murrelets on this landscape. In the absence of this SHA, future conditions are less predictable. It is difficult at times to distinguish between effects that would occur because of the Permit and effects that would occur regardless of the Permit, as well as the effects that would only occur in the absence of the Permit.

The SHA specifies voluntary conservation actions that lead to net conservation benefits for both species. We evaluate the degree to which the SHA is expected to provide both beneficial and negative effects to the owl and murrelet. This Biological Opinion will analyze when those

effects may occur during the 60-year Permit term, where in the landscape they may occur, what land-management activities may contribute to these effects, and ultimately, how these effects may influence the survival and recovery of the two species.

There are other requirements already in place under the HCP that will not be changed with this SHA. An important example of this is the riparian prescriptions implemented under the HCP. The riparian prescriptions will not be modified by the proposed SHA, and we are not analyzing those riparian management zones as part of the requirement to achieve a net conservation benefit. However, we acknowledge there will be some habitat contributions to the owl and the murrelet from riparian management zones, particularly later in the Permit term.

For owls we will analyze the SHA relative to effects to dispersal habitat between two Federal Managed Owl Conservation Areas (MOCAs). Although 59 percent of the project area occurs in a Conservation Support Area (CSA) and SOSEA, Port Blakely is not currently required to proactively manage for owl dispersal. We will evaluate dispersal habitat in quantity and quality over the covered lands, and effects to suitable habitat on adjacent lands. Beneficial effects will come from intentional proactive conservation actions – some of these are specified in the SHA, while others may be conducted by Port Blakely at their discretion. Along with the beneficial effects, we have also identified a series of Port Blakely management actions that may negatively affect the species. For these effects, we identify general locations (i.e., Federal lands) that could be affected, how many acres could potentially be affected at those locations, and when during the Permit term they may be most likely to occur. We assess the likelihood and extent of exposure to owls from these effects and what it means at the local and regional scale. We also identify some uncertainties associated with implementation of the SHA for owls, and analyze the SHA for its consistency with the owl recovery plan.

For murrelets, we analyze the SHA relative to effects to potential nesting habitat on the project lands and adjacent lands. We anticipate both beneficial and negative effects from implementation of the SHA. Beneficial effects are anticipated from intentional proactive conservation actions, primarily by conserving 498 acres of potential habitat. We have also identified a series of Port Blakely management actions that may negatively affect the species. For these effects, we identify general locations that could be affected, how many acres could potentially be affected at those locations, and when during the Permit term they may be most likely to occur. We assess the likelihood and extent of exposure to murrelets from these effects and what it means at the local level, the Conservation Zone level and, ultimately, rangewide. We identify uncertainties for murrelets with implementation of the SHA, and analyze the SHA for its consistency with the murrelet recovery plan.

Key Assumptions

The following highlights the key assumptions that were necessary for us to complete the jeopardy and adverse modification analyses. These key assumptions include: 1) the amount and location of suitable owl habitat over time; 2) probability of owl occupancy over time; 3) amount

and location of murrelet nesting habitat over time; 4) probability of murrelet nesting over time; and 5) probability, nature, and extent of salvage harvest activities over time; 6) timing of owl and murrelet exposure to management activities; 7) likelihood of windthrow; and 8) interior forest conditions.

Spotted Owl Habitat Projections

We projected future conditions in order to accomplish our goals in landscape planning. It was necessary to use different criteria than what would be normally used if we were only assessing current conditions on an individual site. Many such habitat criteria (e.g., number and size of snags, downed wood, understory shrubs) cannot be accurately predicted. We needed to rely on readily available inventory data and reasonable indicators of habitat capability into the future. We needed a system that could be reasonably projected across many stands over the life of the SHA.

Applying the best professional judgment of the Federal and State agency owl biologists and foresters providing technical assistance, in conjunction with the biologist and foresters provided by Port Blakely with site-specific and silvicultural knowledge, we developed a simple set of criteria to help us predict suitable dispersal habitat conditions over time. We assumed that stands of the following ages would provide dispersal habitat:

- 50-years old, if no commercial thinning had occurred or was expected
- 40-years old, if commercial thinning had occurred or was expected

In some cases, dispersal habitat conditions may develop more quickly, especially as a result of stochastic events such as ice storms. In other situations, dispersal habitat conditions may develop more slowly. We believe our definitions and projections represent reasonable and conservative approximations of present and future dispersal habitat conditions on the covered lands.

We utilized the *Biomapper* model to estimate the current amount of habitat within 10 historic spotted owl circles (1.82 miles representing the median annual home range). The *Biomapper* model (Davis and Lint 2005) was created for the Northwest Forest Plan 10-year monitoring effort and used remote sensing to estimate suitable habitat. It was updated to reflect timber harvest through 2003. Biomapper is a tool for estimation, and may overestimate habitat quantities due to the nature of this database. We also believe that the amount of habitat on national forest land may increase somewhat over the next 60 years. Considering all these factors together, we assumed that the Biomapper estimate derived from the spotted owl circles was a reasonable approximation of habitat quantities for this analysis.

Probability of Spotted Owl Occupancy

Port Blakely lands are only expected to provide enhanced dispersal habitat over the course of the Permit period. Therefore, we do not expect nests within stands that only provide for dispersal conditions, or with only a minor component providing for foraging. The likelihood of owls nesting in a Port Blakely riparian zone is low. Protection of riparian zones by State law is a

relatively recent phenomenon, and protected riparian zones were previously more narrow than currently required. Current levels of protection have only been in place since 2001 and most riparian zones are not expected to provide nesting habitat during the 60-year Permit term.

The chance of owl nesting in a Special Set-aside Area may be higher than the chance of them nesting in riparian zones, but it is still considered to be low. In the case of the Special Set-aside Areas, these areas have the oldest forest on the covered lands and hence may be more likely to eventually develop into nesting habitat than other areas on the covered lands. The 498 acres of Special Set-aside Areas are comprised of 16 forest patches, ranging from 7.9 acres to 91 acres in size and with a median size of 11.96 acres (SHA Figure 3-6). In the western Cascades of Washington, the median amount of old growth and mature forest for 13 owl pair home ranges was 3,281 acres (Thomas et al. 1990, p. 195). The Special Set-aside Areas by themselves do not provide the landscape levels of habitat needed by owl pairs. Nevertheless, because of the current stand age, we assume these areas are the most likely to develop nesting habitat characteristics on the covered lands over the next 60 years.

Marbled Murrelet Habitat Definition and Projections

Soil type, aspect, tree species, and elevation can all influence how quickly trees can mature and develop the forest structure that determines murrelet habitat. The development of murrelet habitat does not happen quickly after disturbance that eliminates entire stands, such as regeneration harvest. The Marbled Murrelet Recovery Plan (USFWS 1997a, p. 6) states that "the effects of deforestation...can persist for 100 to 200 years until forests have grown to achieve structure that permits murrelet nesting."

The Washington Fish and Wildlife Office developed the following definition of suitable murrelet nesting habitat. However, for purposes of the designing the SHA, we accepted a different definition put forth by Port Blakely. Our analysis of effects in this Biological Opinion reflects the broader, more conservative Service definition that follows.

Potential murrelet nesting habitat in Washington is typically found in old-growth or mature forest types (Hamer and Nelson 1995) generally characterized by large trees containing nesting platforms, a multistoried stand, and a moderate to high canopy closure (USFWS 1997, pg 40). The presence of platforms is the most important habitat characteristic of murrelet nesting habitat. A platform is a relatively flat surface at least 4 inches in diameter (10 centimeters (cm)) and 33 ft (10 meters) high in the live crown of a coniferous tree. Platforms may be horizontal branches, mistletoe, witches brooms, or other natural deformities and structures such as squirrel nests. Vertical and horizontal cover and substrate such as moss and lichen are important structural attributes of platforms (Huff et al. 2006) and the number of canopy layers and the presence of mistletow in forest stands have been shown to be strongly correlated with active nest sites in Washington (Hamer et al. 2008).

Tree diameter and height have been positively correlated with platform size and the abundance of platforms; however, this relationship will vary depending upon tree species and growing conditions. Known nest sites have occurred in stands dominated by Sitka spruce (*Picea stitchensis*), western hemlock (*Tsuga heterphylla*), and Douglas fir (*Pseudotsuga menziesii*)

(USFWS 1997, pg. 41) but also containing western red cedar (*Thuja plicata*) trees. Overall, nest trees in Washington, have been greater than 19 in (48 cm) in diameter-at-breast-height and greater than 98 ft (30 m) tall (Hamer and Nelson 1995).

In summary, the presence of platforms is the most important habitat characteristic. Any forested area with a residual tree component (large, older trees), small patches of residual trees, or one or more platforms can be considered to be potential marbled murrelet nesting habitat (Evans-Mack et al. 2003). However, for the purposes of consultation, the Washington Fish and Wildlife Office considers potential nesting habitat to have at least 2 platforms per acre and a minimum patch size of 5 acres. The platforms may be clumped in one area or dispersed throughout the forested area, but the average number of platforms/acre should be at least 2.

In the absence of information about each stand and factors such as moss depth, platform densities, and other such relevant factors, the Service, WDFW, and Port Blakely agreed that for the purposes of designing the SHA, stand age would be used as an indicator of potential habitat. The SHA uses an 81-year or older threshold for predicting "potential" murrelet habitat for purposes of identifying conservation opportunities. Port Blakely's forest inventory data shows that once stands are over 81 years old on the covered lands, they typically contain some trees that may be greater than 32 inches diameter at breast height (dbh) with large limbs that could contain potential platforms for murrelets. The SHA also utilized a 7-acre minimum patch size, consistent with State Forest Practices rules, but not necessarily consistent with the Service's definition of suitable habitat, which includes a 5-acre minimum patch size. We explore the consequences of this difference in the effects analysis below.

Salvage Harvest on Covered Lands

We assume that, over the 60-year Permit term, catastrophic events such as windstorms, ice storms, fires, and localized pathogens will occur. Some of these events may become more frequent and/or more severe with the changing global climate. Port Blakely has described their considerations and decisions for when they apply salvage as a management tool. In many cases, these events may not be severe enough to warrant any salvage; in other cases, Port Blakely would enter the stands and conduct timber harvest. Depending on the level of salvage, these entries would either resemble a regeneration harvest or a commercial thinning. Because the Service is already examining both of these activities (regeneration harvest and commercial thinning), there was no need to separately analyze salvage harvest which would be relatively unpredictable. For these reasons, we believe there will be no increase in harvest rates overall, or increase in amount of suitable habitat impacted, as a result of any additional salvage operations that may occur as a result of catastrophic events, including those induced by climate change. For these reasons, we believe our analysis of habitat impacts is appropriate and reasonably accurate.

Timing of Operations and Murrelet Exposure

Much of the project area is located at moderate to moderately high elevations (671 to 4,331 ft elevation). Some operations may be possible during September through February at lower elevations, or even September and October in some higher portions. However, Port Blakely will not be implementing any timing restrictions unless there are known owl or murrelet nests and no

surveys are planned. Therefore, for purposes of this analysis, we assumed that all activities related to timber harvest (including thinning) would occur during the nesting seasons for owls and murrelets.

Windthrow

Rollerson and McGourlick (2001) reported an average distance of penetration of windthrow into standing timber was about 12 meters (40 ft). Various studies in different locations and settings have generally reported a range of distances. This landscape is not particularly vulnerable to catastrophic windthrow compared to some other landscapes in southwestern Washington located closer to the coast. In this analysis, we assume that windthrow effects would extend up to 200 ft into adjacent stands.

Rollerson and McGourlick (2001) also reported windthrow in British Columbia averaged about 21 percent of the standing timber along stream edges. Windthrow rates in riparian areas of Washington and Oregon are variable and have been reported to average 5 percent (Mobbs and Jones 1995; Hobbs and Hallbach 1981 *as cited in* Grizzel and Wolf 1998), 10 percent (TFW 1994), 12 percent (Sherwood 1993), 22 percent (Andrus and Froehlich 1988), and 29 percent (Steinblums 1978). In general, very high levels of windthrow or breakage are only infrequently encountered. Depending on severity, the effects of windthrow may result in habitat degradation or loss.

Edge Effects

In some cases, researchers have been able to detect effects of an edge for considerable distances into stands. For instance, detections of changes in relative humidity can extend 240 meters into forest patches (Chen et al. 1995, p.74). Changes in interior forest conditions from the presence of an edge can include sunlight, wind, humidity, air temperatures, and other related changes. Forest edges can also provide habitat for potential predators of owls and murrelets. For purposes of this analysis, we assume that windthrow may degrade stands for a distance of up to 200 ft and in some cases, may eliminate habitat. In most cases, this distance will be substantially less. Therefore, we utilize the same 200-foot distance to assess exposure to changing forest conditions to owls and murrelets, and for predation effects to murrelets.

COMPREHENSIVE ENVIRONMENTAL BASELINE (applicable to owls and murrelets)

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

Port Blakely's Morton Block is bordered on the south and southeast by Federal lands. The central portions are bordered to the north by Riffe Lake and to the south by lands managed by the Weyerhaeuser Company. The southwestern portions of Morton Block are bordered to south by

lands managed by the Washington State Department of Natural Resources. The northern portions are interspersed with other private lands and are often bordered to the north by lands managed by West Fork Timber.

The covered lands have historically been managed as a commercial tree farm and were not owned by Port Blakely until 2004. The covered lands are predominately conifer forest and range in elevation from 671 to 4,331 ft (204 to 1,321meters). Patches of native forest are extremely rare. The structure of the forest reflects active management; it has low levels of downed wood, high canopy closure, simple canopy structure, and is composed of even-aged stands of conifer with few snags. Hardwoods may be somewhat more common within riparian and wetland areas. The majority of this land is considered to be operable either by ground-based equipment or cable-based systems. The property is well-stocked and is highly productive timberland.

The composition of the forest lands is primarily Douglas-fir (*Psuedotsuga menziesii*) with lesser amounts of western hemlock (*Tsuga heterophylla*), red alder (*Alnus rubra*), and other species. Some Pacific silver fir (*Abies amabilis*) is present at higher elevations. Nearly all the forest stands have been clearcut harvested at least once; some areas have been harvested twice. The current age structure is relatively diverse with the majority of management units composed of 20- to 60-year-old timber. We assume that there are no old growth forests on the covered lands and that any remaining mature stands are likely to be very small in size. Port Blakely identified 498 acres in 16 discrete patches ranging from 7.9 acres to 91 acres in size and 84 to 128 years in age. The median patch size is 11.9 acres (Port Blakely GIS provided to Service and SHA Section 3-6). A few stands regenerated from a fire in the 1950's; these stands and other multi-canopy stands occur within areas that will be protected by the SHA (*in litt.* Blake Murden). Current conditions for riparian zones are generally young forest and these zones resemble the surrounding upland forests, with a few exceptions.

Within the action area, timber harvest, and associated silvicultural activities and road management, are the primary land uses. Few other activities occur that would have substantial effects on the species in question. Timber harvest is more likely to occur on private and State lands than on Federal lands. Federal lands are managed according to the Northwest Forest Plan (USDA and USDI 1994). State lands are managed according to the WDNR's HCP for State lands (WDNR 1997). Those State lands which are located within and adjacent to the action area are not managed with any particular role for the conservation of owls. Private lands are either managed according to the HCP (WDNR 2005), or in the case of West Fork Timber, according to their HCP for their Mineral Tree Farm (West Fork Timber Company – *see* Murray Pacific Corporation 2003, 2005). The Murray Pacific HCP contains a strategy to manage for dispersal habitat for owls. These lands contain both open and gated roads. There are few restrictions to travel by foot across these lands and lands of all ownerships are used for recreation of various types. Recreation on these lands has little effect upon the habitat and generally has minor amounts of sound associated with it beyond the open road system. Some of these lands are subject to nontimber forest uses, such as firewood cutting and gathering of berries, mushrooms, and florals. These lands are often used for big game hunting as well.

COMPREHENSIVE CUMULATIVE EFFECTS (applicable to owls and murrelets)

Cumulative effects, as defined in 50 CFR 402.02, include the effects of future State, tribal, local, or private actions that are reasonable certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

On-going Commercial Forest Management

The Service anticipates that existing non-federal forest lands in the action area will continue to be cut as they reach harvestable diameters and stocking levels. Existing roads will be maintained to access the forest stands and some new roads will be constructed to access timber resources. Some roads may be abandoned over time due to their location in places that are difficult to maintain properly. State lands and lands managed by West Fork Timber Company will be managed according to their respective HCPs. The harvest of timber on other nonfederal lands in the action area will be conducted under the State's forest practices rules. Even-aged harvest on a 45-year rotation usually occurs on private forest land in the project area at the present time and the recent trend has been a shortening of the rotation. Any areas within the action area not harvested during the duration of the Permit will continue to grow and develop improved habitat characteristics, but these are likely to be limited to rule-protected areas such as riparian and wetland buffers and areas of potentially unstable slopes, or areas on which operations are not feasible (such as small areas with poor deflection and not easily accessible by ground-based equipment or cables.

Recreation

Recreation activities (primarily fishing, camping, and boating) will continue to occur on Riffe Lake and at its campgrounds. There will be visual and auditory disturbance to wildlife in the area due to human presence and the operation of motorized water craft.
The covered area also provides access to a variety of recreation sites and activities including the Cowlitz Wildlife Area, Tacoma Power's Taidnapam Park, Glenoma Community Park, Cispus River take-out area for kayaks, Dog Mountain hang-gliding site and hunting, fishing, hiking, mountain biking, and horseback riding. Driving access is allowed on roads without gates and access behind locked gates is allowed for nonmotorized use only. There will be sound and visual disturbance to wildlife in the area due to human and horse presence and motorized vehicles on roads.

Residential and Commercial Development

Residential and commercial development is expected to continue to occur near the action area in Morton and other places. The effects of development to covered species are expected to increase as the size of the developed area increases. New residential and commercial development would be expected to result in a loss of wildlife habitat. Development is most likely to occur along established roads and highways, and near existing communities. Nearby development could have effects within the action area.

Transportation Infrastructure

U.S. Highway 12 provides east-west passage through the area and State Routes 7 and 508 provide access to Morton and the action area from the north. It is expected that transportation infrastructure will be maintained and possibly expanded in the future. Large transportation projects would likely trigger a section 7 consultation and are not considered here. However, an increase in roads and road improvements can result in the loss or degradation of wildlife habitat, or an increase in other activities associated with those roads.

NORTHERN SPOTTED OWL – Status through Conclusion

STATUS OF THE SPECIES: Spotted Owl

The owl was listed as threatened on June 26, 1990. It was listed due to widespread habitat loss across its entire range and the inadequacy of existing regulatory mechanisms to provide for its conservation (USFWS 1990). More detailed accounts of the ecology, threats, conservation needs, and rangewide status are found in the Service's final recovery plan (USFWS 2008).

The owl inhabits structurally complex forests from southwest British Columbia through the Cascade Mountains and coastal ranges in Washington, Oregon, and California, as far south as Marin County (USFWS 2008, Appendix A,). Since listing, many populations of owls continue to decline, especially in the northern parts of the subspecies' range, even with extensive maintenance and restoration of suitable habitat in recent years. Managing sufficient habitat for the owl now and into the future is essential for its recovery. However, it is becoming more evident that securing habitat alone will not recover the owl. Based on the best available scientific information, competition from the barred owl (*S. varia*) poses a significant and complex threat to the spotted owl. Past habitat loss and current habitat loss are also threats to the owl, even though loss of habitat due to timber harvest has been greatly reduced on Federal lands, as well as State lands and substantial portions of private lands, for the past 2 decades.

Federal lands provide the major contribution for owl recovery. According to the owl recovery plan, in the western Physiographic Provinces, MOCAs are recommended to provide habitat for the recovery of the spotted owl. Outside of MOCAs, substantially all older and more structurally complex multi-layered confer forests on Federal lands are to be maintained in the western Provinces. CSAs are intended to support the MOCA network. CSAs are areas between or adjacent to MOCAs where habitat contributions by private, State, and some Federal land managers are expected to increase the likelihood that owl recovery is achieved, shorten the time needed to achieve recovery, and/or reduce management risks associated with the Recovery Strategy and Actions. For more information on the MOCA and CSA network and the status of the owl, see the recovery plan (USFWS 2008 pp. 12-28, Appendix C).

Scientific research and monitoring indicate that owls generally rely on mature and old-growth forests because these habitats contain the structures and characteristics required for nesting, roosting, and foraging. Although owls can disperse through highly fragmented forested areas, the stand-level and landscape-level attributes of forests needed to facilitate successful dispersal

have not been thoroughly evaluated or described. Because the conservation approach of the SHA is focused on dispersal habitat for owls, we focus the following discussing on the science that is relevant to this part of the owl's life history.

Only a few studies have investigated the function of owl dispersal habitat in detail. In an Oregon study, dispersing juvenile owls selected closed-canopy forests over open-canopy forests with older forest used most frequently (Miller et al., 1997, p. 146). Dispersing juvenile owls selected equally between less fragmented forests and more fragmented forests, although it was speculated / proposed that clearcuts may act as a barrier and decrease continued transient dispersal (Miller et al, 1997, p. 147). Owls regularly dispersed through highly fragmented forests, but large areas of nonforested habitat appear to have inhibited dispersal (Forsman et al. 2002, p. 22).

In Washington, the mean juvenile dispersal date from the natal territory was September 30, with most birds remaining in temporary home ranges from late October and remaining there for several months (Forsman et al. 2002). From February to April these birds would move again, frequently a considerable distance before residing at a location for their second summer. Forsman and others (2002) reported that median natal dispersal distances ranged from 13.5 km (8.4 miles) for radio marked males to 22.9 km (14.3 miles) for radio marked females

Mortality of owls during dispersal is high, but determining a definitive cause of that mortality can be problematic. Prey availability is probably an important factor during dispersal because many dispersing owls die from starvation (Miller 1989, as cited in Miller et al 1997, p. 147). Of 386 juvenile owls that were radio marked, 188 died before or during dispersal (Forsman et al. 2002, p. 18). Where the source of mortality was discernable, 68 percent died from predation, 26.2 percent starved, and 5.7 percent died from accidents. In many cases it was unclear if owls were killed by predators or were scavenged after they were already dead or dying of starvation. Thus, starvation may have played more of a role in mortality than realized.

Owls feed primarily on small arboreal and semi-arboreal forest mammals with the average prey size of 74 to 116 grams (0.16 to 0.26 pounds)(Courtney et al. 2004, pp. 4-27). In western Washington, the northern flying squirrel (*Glaucomys sabrinus*) is the primary prey species of owls (Thomas et al, 1990, p. 202). Voles (*Microtus spp.*), deer mice (*Peromyscus spp.*), snowshoe hares (*Lepus americanus*), and other mammals are also prey.

Small-mammal communities are similar in composition in young forests (both naturally and artificially regenerated) to those in old-growth forests. However, old-growth forests support 1.5 times more individuals and biomass than managed forest (Carey and Johnson, 1995, p. 336). For example, from a study on northern flying squirrels from western Oregon, the northern flying squirrels mean density in second growth forests was 0.12 squirrels/ha (0.049 per acre) compared to 0.85 squirrels/ha (0.34 per acre) in old growth forest (Witt 1992, p. 921). Carey (2000) summarizes that flying squirrels tend to be most abundant in naturally regenerated forests greater than 100 years old. Rosenberg and Anthony (1992, pg 161 and 164) reported an average of 2.0 and 2.3 squirrels/ha (0.81 and 0.93 per acre) in young second-growth and old-growth stands respectively, and suggested that this species may be a habitat generalist. However, their second growth stands (ages 30 to 60 years) contained residual old growth components such as large woody debris, snags, and trees.

Carey (et al. 1997) studied northern flying squirrel den sites in Oregon and Washington, including the Olympic Peninsula and the Puget Trough. Carey found that flying squirrel den sites included: cavities in live and dead old-growth trees; cavities, stick nests and moss nests in small (10 to 50 cm (3.9 to 19.7 inches) dbh) second growth trees; dens in cavities in branches of fallen trees; and dens in decayed stumps of old growth-trees and suppressed young trees. Two-thirds of all dens were located in live trees. Flying squirrel dens were in naturally formed cavities, cavities excavated by woodpeckers, and nests built by Douglas squirrels or flying squirrels (Carey et al. 1997, p. 686).

ENVIRONMENTAL BASELINE: Spotted Owl

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

Conservation Needs of the Owl in the Action Area
The recovery plan for the owl (USFWS 2008) identified important habitat areas for owl conservation. The recovery plan designated large habitat blocks as MOCA 1s to support 20 or more pairs of owls and small habitat blocks as MOCA 2s for more than one pair of owls but less than 20. The recovery plan also designated CSAs between or adjacent to MOCAs for the further likelihood for owl recovery. The arrangement of two "MOCA 2s" and a CSA relative to Port Blakely lands is displayed in Figure 2. There is only one small parcel location that abuts MOCA 05, with considerably more Port Blakely ownership against location MOCA 04.

The CSA shares the same boundary as the State designated Spotted Owl Special Emphasis Area, called the Mineral Block/Link SOSEA (WAC 222-16-086). This SOSEA primarily emphasizes dispersal support. Because Port Blakely is also applying for a Landowner Option Plan from the WDNR, the SHA frequently references the term SOSEA.

Approximately 59 percent (26,878 acres) of the covered lands occur within the Mineral Block/Link SOSEA and CSA. The remainder of the ownership occurs outside of these designated owl areas near Riffe Lake. The SOSEA has a dual role for dispersal and demographic support. Almost all of Port Blakely ownership is within the area designated for dispersal; however, 1 percent (480 acres), comprised of 5 separate parcels, is within the SOSEA combination area for both dispersal and demographic support.

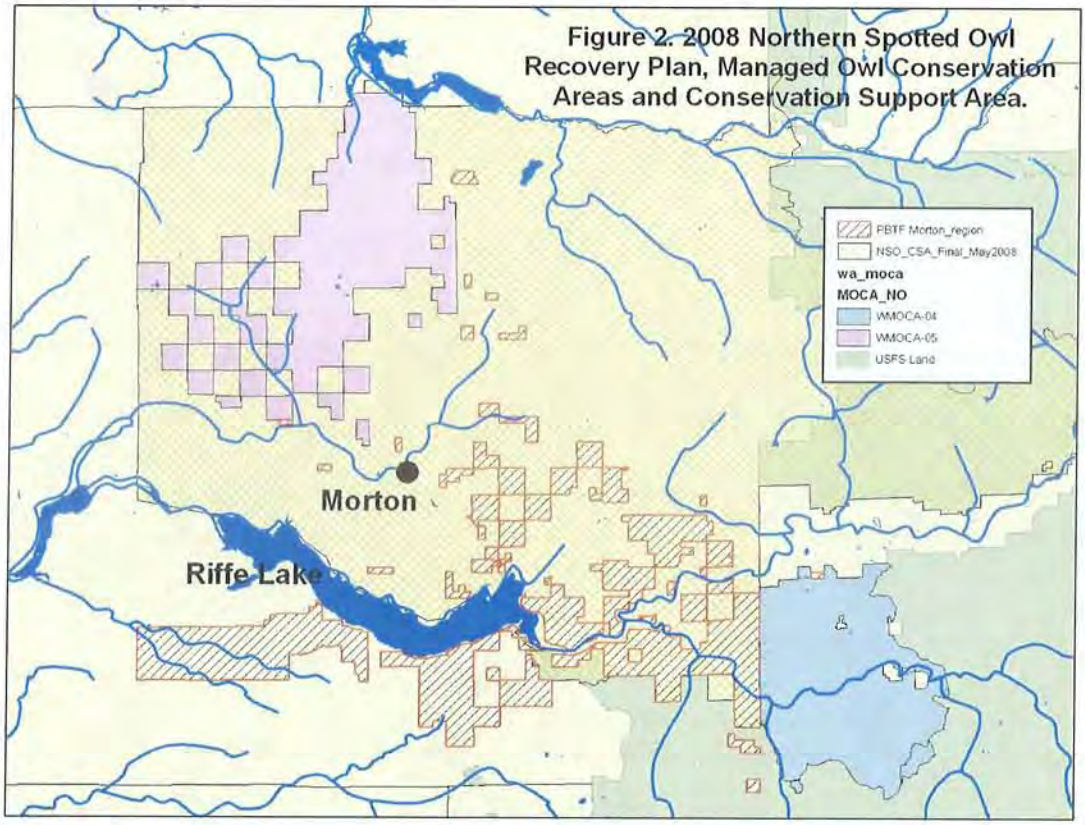

Figure 2: 2008 Northern Spotted Owl Recovery Plan, Managed Owl Conservation Areas and Conservation Support Area.

Habitat Quantity and Quality in the Action Area

The structure of the forest reflects active management; it has low levels of downed wood, high canopy closure, simple canopy structure, has few snags, and is not representative of owl habitat. However, there are likely small (less than 20 acres) and occasional scattered patches of forest that would meet the definition of Young Forest Marginal habitat (WAC 222-16-085 and SHA 3.3.1). Table 1 shows the acres in different age classes.

Table 1: Current Acreage in Each Stand Age Class (Port Blakely 2008).

Age	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81 +
Acres	8,462	2,405	10,918	6,661	8,084	5,425	1,913	390	632

Owl Numbers, Distribution, and Reproduction in the Action Area

Owl sites are historically known on the adjoining national forest lands. There haven't been any recent owl surveys for these owls so their current occupancy status and location is unknown. The national forest provides the largest patches of suitable spotted owl habitat in the area and is expected to provide more habitat in the future. It is reasonable to assume that there are still

viable owl territories on Federal lands. Port Blakely will not be conducting owl occupancy surveys as part of their normal management activities.

There are 10 known owl territories that overlap the covered lands (Table 2, USFWS GIS). The SHA reports 9 owl circles that overlap covered lands because the East Creek Nisqually River owl site is absent from Port Blakely records. The majority of suitable habitat within these 10 territories occurs on national forest lands. Most of these owl site centers were mapped beyond 0.7 mile of the covered lands; however, three owl site centers (#948, #230, and #229) were mapped within 0.7 mile of the property line.

Acreage figures are provided in Table 2 for ownership within the 0.7-mile and 1.82-mile radius, and also estimates of suitable habitat within the 0.7-mile and 1.82-mile radii by ownership. The suitable habitat estimates from this table should not be considered absolute, as the remote sensing *BioMapper* model has been shown to have inconsistencies with field-verified habitat determinations. However, *BioMapper* provides an independent assessment of potential habitat amounts, and whether the habitat is on the covered lands or national forest lands.

Table 2: Port Blakely Tree Farm (PBTF) - Morton Region - Spotted Owl Management Circles. Summary of land ownership and estimated owl habitat in circles based on 2003 remote sensing data.

SITE NAME	SITE NO	LAST YEAR	STATUS (2003)	Federal Lands in 1.8 mi circle (acres)	Percent of 1.8 mi circle on Federal Lands	PBTF Lands in 1.8 mi circle (acres)	Percent of 1.8 mi circle on PBTF Lands	Total NSO Habitat Acres within 1.8 mi radius circles (all lands 2003)	Percent habitat in 1.8 mi circle (all lands)	NSO Habitat on Federal Lands in 1.8 mi circles (2003)	NSO Habitat on PBTF Lands in 1.8 mi circles (2003)	Total NSO Habitat Acres within 0.7 mi radius (all lands)	PBTF Lands in 0.7 mi circle (acres)	NSO Habitat on PBTF Lands in 0.7 mi circles
COPPER CANYON	948	1993	1	4,216	65%	2,155	33%	2,688	41%	2,376	313	621	99	30
COWLITZ RIVER LOWER	230	1990	1	2,888	44%	2,712	42%	2,101	32%	1,774	307	362	281	56
SCHOOLEY CREEK	223	1992	1	4,777	73%	1,596	24%	2,134	33%	1,880	227	377	0	0
QUARTZ CREEK LOWER	229	1995	1	5,402	83%	1,065	16%	3,494	54%	3,310	186	414	167	52
CISPUS RIVER LOWER	215	1995	1	5,951	91%	581	9%	3,240	50%	3,114	128	519	0	0
VANSON	246	1989	3	5,667	87%	349	5%	3,755	58%	3,723	31	682	0	0
IRON CREEK BUTTE	1172	1995	3	6,323	97%	202	3%	3,047	47%	3,027	18	653	0	0
FOURMILE CREEK - BENHAM	1171	1995	3	6,368	98%	159	2%	2,051	31%	2,037	12	386	0	0
EAST CREEK - NISQUALLY R	1060	1993	3	4,477	69%	29	0%	1,629	25%	1,482	3	143	0	0
AMES CREEK	832	1992	1	6,304	97%	39	1%	2,665	41%	2,659	0	349	0	0

Notes:

This table was created to summarize data from an ArcGIS spatial analysis. Spotted owl site data are from the Gifford Pinchot National Forest GIS database (2004). Spotted owl habitat data is based on the Biomapper habitat model created for the Northwest Forest Plan 10 year monitoring effort (Davis and Lint 2005). The Biomapper habitat is based on remote sensing data collected from 1994 -1996, and has been updated to reflect clearcut timber harvest through 2003. Biomapper tends to overestimate owl habitat when compared to on-the-ground assessments. Experience on the Gifford Pinchot NF has shown that many Douglas-fir plantations that are 40-60 years-old which provide dispersal habitat for spotted owls are typed as suitable habitat in Biomapper. The above data should be viewed as approximate values only, with the knowledge that some habitat acres on non-federal lands have likely been harvested from 2003 to the present.

Citation: Davis, R., and J. Lint. 2005. Habitat status and trends. Chapter 3 in Northwest Forest Plan—the first 10 years (1994–2003): status and trends of northern spotted owl populations and habitat. Lint, Joseph, tech. coord. 2005.Gen. Tech. Rep. PNW-GTR-648. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 176 p.

Total acres in 1.8 mi radius = 6519

Total acres in 0.7 mi radius = 986

Vince Harke, Fish and Wildlife Biologist
Washington Fish and Wildlife Office, Lacey, WA
January 29, 2009.

Port Blakely and the previous landowners conducted owl occupancy surveys on the covered lands. These surveys did not precisely follow Service protocols, and didn't include all their lands, but the surveys do provide useful information on the likelihood of owl presence. According to these surveys, there are no known territorial sites centers on the covered lands. One owl site center, last observed in 1990, is almost on the Port Blakely – national forest property line in Section 12, T11N, R05E, but the site center is on national forest land by 50 ft (USFWS GIS). The last year an owl was detected on the covered lands was 12 years ago (1997). This was a single bird that was not observed later that year or in following years, and this site was never recorded as a territorial site. The site is located several miles due east of Morton in Section 36, T13N, R05E.

EFFECTS OF THE ACTION: Spotted Owl

Introduction

The Port Blakely SHA describes voluntary conservation actions that are expected to lead to net conservation benefits to owls. To issue a Permit under section 10(a)(1)(A) of the Act, there needs to be a reasonable expectation of net conservation benefits that lead directly, or indirectly, to the recovery of the covered species (64 FR 32706; June 17, 1999, *Federal Register*) and 50 CFR 17.22 and 17.32. As such, there should be beneficial effects that contribute to the species, and this section of the Biological Opinion will analyze those effects.

We evaluate two categories of effect: one is a result of management activities and the other is a result of returning the lands to baseline conditions at the end of the 60-year term.

Factors Considered in Effects Analysis

Habitat Quality and Quantity

Nesting habitat is not expected to develop in areas managed on an average 60-year rotation. The locations where nesting habitat may occur already, or be most likely to develop in the future, will be the 498 acres targeted for murrelet conservation that are protected for the life of the Permit. While nesting habitat is not expected to develop in riparian zones, if it should, existing Forest Practices rules would apply.

Port Blakely has done some field investigations to type habitat on their lands and the results indicate that, of the four habitat types defined in the Forest Practices rules (old forest, sub-mature, young forest marginal, and dispersal), only young forest marginal and dispersal habitat occur on their lands (SHA section 3.3.1). Young forest marginal is low quality suitable habitat and is not common on the covered lands. Over the Permit term, very limited amounts may be harvested.

While the SHA is designed to provide dispersal habitat, we do expect this dispersal habitat to provide some foraging function. We also expect isolated roosting opportunities will exist as well.

Occupancy

We assume that any owl site likely to be affected by management activities under the SHA is or will be centered on adjacent Federal or nonfederal lands. The 498 acres conserved for murrelets, Special Set-Aside Areas, and Special Management Areas may develop suitable nesting habitat but that habitat will be in very small patches and are unlikely to support nest sites over time. However, there is a likelihood that a nest site may be established in one of these patches over the course of the Permit term if adjacent managed stands develop into Young Forest Marginal habitat. We also expect that any owl sites established on the covered lands are not likely to be detected and consequently protected because there is no commitment to survey.

Vulnerability of Transient Owls to Site-specific Effects

The covered lands are expected to provide dispersal and limited foraging opportunities for transient owls. Activities that remove dispersal habitat or produce sound or visual disturbance stressors may lead to the temporary or permanent displacement of such owls but not direct injury.

Beneficial Effects

The purpose of this SHA is to improve the quality and quantity of dispersal habitat for juvenile owls between two MOCA 2s, which is consistent with the owl recovery plan. Port Blakely will also implement owl conservation measures outside of the CSA on the southern side of Riffe Lake (Figure 2). Riffe Lake may inhibit dispersal directly across it, as large bodies of water elsewhere have been speculated to inhibit dispersal. For example, Forsman and others (2002, p. 23) speculated that Hood Canal and Puget Sound inhibit dispersal. It is uncertain whether Riffe Lake would inhibit or reduce the dispersal of owls across of the lake. Although the lake could potentially increase dispersal distance, owls could probably circumnavigate around Riffe Lake for access to the two MOCAs. Thus, all of the SHA lands, both inside and outside of the CSA, are expected to contribute to spotted owl dispersal between the two MOCA's, though the value of lands within the CSA is higher.

Since the listing of the owl in 1990 there have been questions on how to apply silviculture as a tool to produce more owl prey (Thomas et al. 1990, p. 210). Northern flying squirrels are the predominant prey species for owls in western Washington and they depend on cavities in trees or tree deformities for key components of their life cycle. Due to past management history Port Blakely lands are snag and wildlife tree scarce. Thus, one relevant issue for this SHA was improving the quantity and quality of snags and wildlife trees to benefit owl prey. Port Blakely offered a snag and defective tree program (SHA Section 4.1.6).

The primary approach to make higher quality dispersal habitat is implementing a defective tree and snag creation strategy and extending the harvest rotations to an average of 60 years. The intent of this approach is to improve prey resources for dispersing owls, not just provide the physical space for owls to fly through stands. Previous HCPs have addressed dispersal of owls, and many of these HCPs have also focused on providing foraging habitat to facilitate dispersal and connectivity, and have included adaptive management. Throughout this Biological Opinion, the term dispersal habitat is used to indicate habitat that may also provide opportunities for foraging.

Because juvenile owls can spend many months dispersing, it is important that they have adequate forage resources to increase their chance of survival. The SHA commits to protecting and developing snags to benefit northern flying squirrels, and ultimately, provide owls with increased prey. The details of the snag program are spelled out on page 4-16 of the SHA. The program emphasizes protecting snags and defective trees, and if they are absent, creating snags. Defective wildlife trees and/or snags would be conserved or created at both the commercial thinning entry and at regeneration harvest.

Dispersal habitat amounts are expected to increase over the 60-year SHA (Figure 3). The SHA definition of dispersal habitat is stands older than 40 years old if commercially thinned, and older than 50 years old if not commercially thinned. The amount of closed canopy forest providing dispersal habitat gradually becomes higher during the SHA term. In addition, later in the term – for instance the last 2 or 3 decades – higher quality dispersal habitat is provided due to the maturation of Port Blakely riparian areas, Special Set-aside Areas, and scattered wildlife trees throughout the landscape left from previous harvest units. At the later stages of the SHA, as commercial thinning and regeneration harvest units managed under the SHA mature with retained wildlife trees, these areas should be providing higher quality habitat. Thus, owl dispersal habitat should be higher in quality later in the term in comparison to earlier.

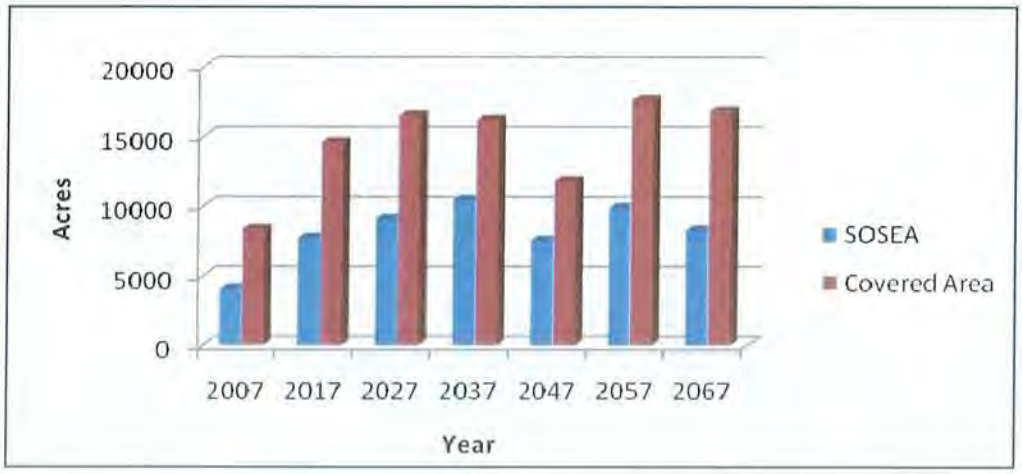

Table 3: Amount of spotted owl dispersal habitat on the covered lands both in and outside of SOSEA and CSA (Port Blakely 2008).

Another beneficial effect is the landscape planning perspective associated with this SHA and the State Landowner Option Plan/Cooperative Habitat Enhancement Agreement process. Managing owl circles under the regulatory framework of "decertification" (i.e., changing regulatory status from occupied to unoccupied/historic) likely contributes to owl declines over time and has been questioned for its effectiveness (Buchanan and Swedeen 2005, p 45). As owls periodically shift their site centers and the regulatory circles shift with them, habitat can be harvested within the original circle, precluding future occupancy by any owls and compromising recovery. Port Blakely's management for enhanced dispersal habitat, irrespective of owl circle locations, will benefit owl sites on adjacent federal lands and the juveniles that disperse from those sites.

It is illustrative to compare the definition and amounts of dispersal habitat under this SHA with the definition and amounts that Thomas and others prescribed in 1990 for a dispersal approach for Federal lands. Thomas and others (1990) identified a strategy for dispersal between Habitat Conservation Areas that stipulated 50 percent of the forest matrix in each quarter township maintained in stands of timber with a mean dbh of 11 inches or greater with at least 40 percent canopy closure. The SHA provides habitat that exceeds these forest structural criteria, but landscape amounts will be less than 40 percent of the covered lands at any one time. At the start of the SHA, approximately 18 percent of the covered lands will be in dispersal habitat. With the SHA, the amount of dispersal habitat is expected to peak in the year 2057 at 39 percent. Of this 39 percent, 10.6 percent will be in stands over 80 years old.

Without the SHA, Port Blakely would comply with the Forest Practice Rules for riparian buffers, unstable slopes, and other requirements. Thus, the amount of dispersal habitat would peak at the current amount of 18 percent and decline to 8 percent in the first decade as upland areas that minimally met dispersal habitat were harvested. After those areas were harvested, dispersal habitat would only occur in locations where retention of trees is required by Forest Practice Rules, principally in riparian zones (See SHA section 4.2.2).

Implementation Uncertainties

We acknowledge there is uncertainty regarding the effectiveness of some of the conservation approaches to benefit owl dispersal. For example, the amount of additional benefit that occurs from managing on a 60-year average rotation versus a shorter 45-year rotation is difficult to measure or quantify. We expect that an additional 15 years of rotation age will provide a slightly more complex canopy, more cover within stands, and in some cases more shrubs and other components that benefit owl dispersal. The other benefit of a longer rotation is the increase in relative amounts of dispersal habitat across the landscape. With a 45-year rotation (assuming an average age of 45 years to achieve dispersal habitat conditions), little of the operable lands would provide dispersal habitat. With a 60-year rotation, 25 percent of the operable lands would provide dispersal conditions.

It is also difficult to measure the degree to which the snag and defective tree program will provide habitat for prey species as desired, or whether sufficient numbers of snags would be conserved to increase prey densities to a degree that would benefit dispersing owls. The techniques used in Port Blakely's snag creation program may not create ideal decay processes in every tree that is treated, but we do expect some benefits to accrue. In this SHA, we are anticipating there will be some use of created snags by flying squirrels and other prey. The WDNR has been creating snags in an area several miles north of the covered lands and casual observation indicates those snags are being used by primary cavity excavators. The response to these created snags and their use by spotted owl prey has not been quantified relative to the levels of use observed on natural snags.

While there are uncertainties associated with implementation of the SHA, those uncertainties do not lead to an increase in risk to the species. For example, we do not predict that intentional snag creation will reduce the survival of dispersing owls. If snags are not used by spotted owl prey,

owls would be no better off than without those snags. In summary, we believe that the increased harvest rotation accompanied with the snag and defective tree program will accrue some level of benefits to dispersing owls, but with no additional risk compared to a shorter rotation.

To address some of the uncertainties mentioned above, Port Blakely will collaborate with other parties to better understand how their management will influence dispersal habitat conditions on the covered lands (SHA Sections 4.4 and 4.5). Port Blakely's commitment to conserve, create, and monitor snags in light of the existing uncertainty is an aspect of their SHA that is compatible with our SHA policy that states that a SHA can be "areas to test and develop new and innovative conservation strategies."

Adverse Effects from Management Activities

We have identified adverse effects to owls from the covered management activities associated with the SHA. These adverse effects would vary spatially and temporally and potentially occur on and adjacent to the covered lands. We have identified the following sources that may cause effects during the Permit period: 1) Removal of suitable habitat on Port Blakely lands; 2) Forest edge effects to adjacent national forest lands; 3) Forest edge effects to Port Blakely lands and adjacent nonfederal lands; and 4) Sound and visual disturbance on all affected lands.

Direct Injury or Mortality

In extreme cases, timber harvest activities can result in direct mortality of adults, eggs, or young. Such cases are rare, but direct mortality due to timber felling has been documented (Forsman et al. 2002). The potential risk for owls to be struck and killed or injured by falling trees during timber harvest is highest in the area relatively close to the nest tree. During timber harvest, non-breeding adult owls can reasonably be expected to move away from the area and avoid injury. However, nesting owls tending to reproductive activities such as incubation or brooding may be reluctant to leave the area (Delaney et al. 1999) and therefore, may be vulnerable to such injury. Fledglings, whether in or out of the nest, may also be at risk of direct mortality due to the effects of tree felling, or might disperse prematurely in response to the disturbance and thus be subject to predation or starvation outside of the nest grove. Potential effects to eggs range from the implications of parental abandonment (Drent 1972; White and Thurow 1985) to destruction during tree felling. These kinds of effects are only likely during the breeding season and then only if breeding activities are underway in proximity to the management activities.

Overall, habitat conditions on the covered lands are not expected to provide nesting opportunities. However, undetected nesting owls may be exposed to management activities. The risk of removing an unknown owl nest tree is extremely low, however, because we believe that nest trees will only occur within small patches of protected areas. It is also extremely unlikely that harvest activities on the covered lands occurring directly adjacent to potential nest sites on national forest lands would lead to direct injury or mortality. In summary, implementation of the SHA is not expected to result in direct mortality of owls on the covered lands or adjacent national forest lands.

Removal of Habitat

The harvest of suitable nesting habitat is not expected to occur within the term of the SHA, as it is not expected to develop outside of the 498 acres conserved for murrelets. It is the intent of the SHA to provide dispersal habitat (with a foraging component) in the managed landscape. The intent is for transient owls to use the covered lands for dispersal and foraging. While benefits to territorial owls on national forest lands are not the purpose of the SHA, these benefits may still accrue. The subsequent removal of this habitat could then affect owl sites in closest proximity to Port Blakely lands. However, it is important to realize that extant owl habitat on national forest lands will be protected, and new habitat should be developing on those lands over the Permit term. Thus, if development of new Federal habitat exceeds loss due to natural processes, the removal of dispersal habitat on Port Blakely lands is not expected to substantially affect owl territories on national forest lands.

The SHA in chapter 4.1.7 describes the response of Port Blakely in the event of spotted owl occupancy on the covered lands. In the unlikely event a territorial spotted owl occupied the covered lands and was identified, Port Blakely has agreed to defer a harvest unit or portion of a harvest unit that could help retain the site. They would protect up to 3 owl sites for any given year (SHA Section 4.1.7). Port Blakely could voluntarily choose to protect more acreage, or more sites, but those outcomes cannot be determined with any certainty now. With the approach specified in the SHA for this situation, owls would be provided an opportunity for reproductive success a minimum of 3 years, but considering the amounts of habitat normally associated with reproductively successful sites, we would not expect such sites to be consistently successful or persistent for many years.

The long-term survival of a reproducing owl pair centered on the covered lands, that also had a significant portion of its home range on the covered lands, would not be expected. As previously stated, however, we believe it is unlikely that an owl site will be established on the managed areas of the covered lands.

Regeneration harvest that removes foraging habitat near owl site centers may significantly disrupt normal behavioral patterns. Sites which may become occupied in the future may be subject to these effects following the 3 years of protection specified in the SHA. While the SHA indicates that 3 years of protection would be provided to owls that happen to be detected, it is possible for an owl nest site to become established in the protected areas on the covered lands and not be detected. Subsequently, that site would be subject to adverse effects from regeneration harvest of nearby habitat. Based on our professional judgment and application of a worst-case scenario analysis, we believe that it is likely that owls associated with no more than two such sites would be subject to disruption of normal behaviors during the life of the SHA. We also believe that it is likely that owls associated with no more than an additional two sites located on Federal lands may be similarly affected over the course of the SHA.

While most of the habitat harvested under the SHA will be dispersal habitat at best, or dispersal habitat with some foraging components, there might infrequently be very limited amounts of young forest marginal habitat that is removed. Removal of this habitat has the potential to adversely affect territorial owls. This would be most likely to occur in areas adjacent to national forest lands and protected areas on the covered lands. For owl site centers on adjacent national forest lands, we anticipate that sufficient habitat will exist within these territories to support such

owls even in the event of harvest activities, particularly later in the Permit term. However, for owl sites established in protected areas on the covered lands, removal of young forest marginal habitat could occur in close proximity (within a 0.7-mile radius) to a territorial site center with less habitat, and have more significant adverse effects. On an annual basis, it is our best professional judgment that approximately 5 acres of young forest marginal habitat would be harvested within 0.7 miles of territorial site centers in protected areas on the covered lands. The 0.7-mile radii of these site centers are expected to support less than 50 percent suitable habitat and thus we believe there is a likelihood that the normal behaviors of owls associated with these territories would be disrupted. These effects are most likely to occur later in the Permit term.

Dispersal habitat will be removed on an annual basis. As the SHA is implemented over time, it will become more likely that areas subject to regeneration harvest would support dispersal habitat. We anticipate that eventually a little over 600 acres of dispersal habitat could be harvested per year. Such harvest would most likely displace transient or dispersing owls, but is not expected to significantly disrupt normal behaviors.

We do not anticipate adverse effects as a result of thinning activities. Precommercial thinning and commercial thinning will occur in stands that are too young to be owl habitat. Likewise, we do not anticipate habitat degradation from creation of snags that may occur independently of commercial thinning or regeneration harvest. Such activities will not occur frequently and if conducted, would likely occur in reserves on the covered lands that do not currently meet spotted owl habitat requirements. If it occurred, snag creation would be expected to enhance the value of areas for owls and would not degrade existing habitat.

Sound and Visual Disturbance

The use of chainsaws, heavy equipment, and helicopters all introduce increased levels of sound into the environment. The Service completed an analysis of the potential for injury associated with disturbance (visual and sound) to owls (USFWS 2003). In that analysis, we concluded that behaviors indicating potentially significant disruptions to owls are flushing from an active nest and aborted feedings to young. Flushing can increase the risk of predation and/or physical harm to the young. An aborted feeding represents a significant disruption of normal behavioral patterns.

The determinations made in that analysis, and the associated injury threshold distances are based in part on research by Delaney and others (1999) who documented that Mexican spotted owls (*Strix occidentalis lucida*) flushed from their roosts when chainsaws were operated within a distance of 197 ft. Delaney et al. (1999) found that Mexican spotted owls, both during and outside the nesting season, did not flush from helicopter sound unless the sound was at least 92 decibels (dB) using the "A scale" weighting filter for frequencies (A). Sound as low as 92-95 dB(A) can cause owls to flush, so we set the sound-only injury threshold at 92 dB(A). The threshold established in the 2003 analysis for heavy equipment and motorized tools was 35 yards, and for chainsaws falling trees and cutting downed wood was 65 yards.

Based on these data, the Service determined the injury threshold distance for sound associated with activities addressed in this document (felling large trees with multiple chainsaws and/or heavy equipment) to be 65 yards or 195 ft. For consistency with other effects analyzed in this Biological Opinion, we report our estimates of exposure rates based upon a 200-foot distance.

The Service notes that scientific data related to injury threshold distances associated with sound and visual disturbance is limited, and we continue to collect pertinent data related to the issue. Consequently, the injury threshold distances used here may be adjusted in the future, when warranted, based on best available science.

Although Port Blakely has agreed to implement timing restrictions on their property for known sites, they will not be conducting owl surveys and we cannot assume that owls will be detected. Consequently, we anticipate that operation of equipment associated with timber harvest (i.e., chainsaws and heavy equipment) may annoy territorial owls to the extent that normal behavior patterns are disrupted.

Port Blakely's activities could cause sound and visual disturbance to owls on national forest lands. Port Blakely will not be implementing any special timing restrictions when operating next to national forest lands so unknown owls that are close to those activities could be disturbed. Based on the historically known locations of owl sites on national forest lands, and in particular two sites in close proximity to Port Blakely lands (owl site numbers 948 and 230), could be affected by sound and activity associated with the covered activities. Because of the elevation of Port Blakely lands that abut the national forest, activities generating sound from heavy equipment and chainsaws are more likely to occur during the summer months and therefore more likely to impact owls during the nesting season.

National Forest Lands

We anticipate that owls associated with approximately 4.2 acres of potential habitat on national forest land could be exposed to sound and visual disturbance on an annual basis as a result of regeneration harvest and another 2.0 acres as a result of commercial thinning. Precommercial thinning has the potential to affect owls associated with another 1.0 acres of national forest per year, but the sound from this operation may be greatly ameliorated by the density of young vegetation and the lack of sound and smaller amount of movement from felling trees. Precommercial thinning would generally involve isolated chainsaws and operations would move through the stand very quickly.

Covered Lands

We anticipate that owls associated with fewer than 80 acres of suitable owl habitat per year could be affected by sound and visual disturbance from regeneration harvests adjacent to Special Management Areas and Special Set-aside Areas that may become suitable dispersal or foraging habitat during the 60-year Permit term. Our estimates for acres of Special Management Areas and Special Set-aside Areas exposed to sound and visual disturbance on an annual basis are fewer than 39 acres from commercial thinning. These estimates assume that all Special Management Areas and Special Set-aside Areas are less than 400 ft in depth and potentially subject to such effects. We expect that no more that two owl sites (two owl pairs) will be disturbed by these activities.

Our estimates for Special Management Areas and Special Set-aside Areas exposed on an annual basis to sound and visual disturbance are fewer than 20 acres from precommercial thinning. The sound from this operation may be greatly ameliorated by the density of young vegetation and the smaller amount of movement anticipated from the felling of pre-commercial trees.

Precommercial thinning would also generally involve isolated chainsaw operations and harvest would occur very quickly. We do not anticipate any disruption or impairment of any owls as a result of these activities.

We anticipate that snag creation in the absence of regeneration harvest or commercial harvest will be rare. Should it occur, it would occur within Special Management Areas and Special Set-aside Areas, most of which would not meet habitat criteria at the time of such enhancement action. The Special Management Areas and Special Set-aside Areas that are currently habitat or might develop into habitat in the near future would be even less likely to receive such enhancement actions because the intent of any such enhancement would be to address areas which lack habitat characteristics. It is also not anticipated that such areas would be immediately adjacent to stands that meet habitat criteria. Such limited treatments would be best targeted toward portions of the landscape that currently are deficient in such structure. The Service can foresee that from zero to as many as 4 acres per year could be treated in this manner. We anticipate that the sound created in such cases would be unlikely to result in a significant disruption of behavior of owls in the areas.

Other Nonfederal Lands

It is possible that riparian and unstable-slope-reserve areas on adjacent lands could be subject to sound and visual disturbance from activities on the covered lands. Some of these reserve areas may develop into dispersal or foraging habitat during the 60-year term of the SHA. We estimate that owls associated with 13.5 acres, 6.6 acres, and 3.4 acres could be exposed to sound and visual disturbance from regeneration harvest, commercial thinning, and precommercial thinning respectively. Riparian management zones and unstable slope leave patches would tend to cross property lines and so would not be completely independent in location; therefore, it is not as likely that a reserve area on adjacent properties would be exposed to sound effects from regeneration harvest immediately across the property line. However, some of these reserves will still be near operable areas. Therefore our estimates of affected acres are likely too high. However, even if some riparian or unstable-slope-reserve areas on adjacent nonfederal lands were subject to such disturbance, transient or single owls would not likely be disturbed by such sound to a large degree and should be able to conduct their normal and essential behaviors without significant disruption. We recognize that the potential for dispersal habitat developing on State lands may be somewhat higher than other adjacent nonfederal lands (e.g., State lands may be managed under a slightly longer harvest rotation and wildlife tree retention program), but we do not believe that the differences are large enough to warrant a separate analysis.

Windthrow

Windthrow (as well as stem breakage) can be chronic (endemic), episodic, or catastrophic. Catastrophic windthrow occurs infrequently and affects both stable and unstable areas. Chronic windthrow is mostly found in less-stable stands (Miller 1985). Stands that are less stable are those that are likely to suffer mortality from suppression and other factors, regardless of windthrow.

Windthrow rates in Washington and Oregon are variable and have been reported to average 5 percent (Mobbs and Jones 1995; Hobbs and Hallbach 1981 *as cited in* Grizzel and Wolff 1998), 10 percent (TFW 1994), 12 percent (Sherwood 1993), 22 percent (Andrus and Froehlich 1988),

and 29 percent (Steinblums 1978). In a study by Rollerson and McGourlick (2001), riparian windthrow averaged about 21 percent of the standing timber along stream edges in British Columbia. They note there were a large number of plots with only a minor amount of windthrow and conversely only a limited number of areas with substantial amounts of windthrow. The average distance of penetration into standing timber was about 12 meters (40 ft). They also noted that buffers exposed on both sides were more vulnerable and that "feathered edges" had lower amounts of windthrow.

Slope, soil characteristics, aspect, tree species, and wind speed and direction can all influence windthrow potential. Depending on the severity and direction of the wind, the presence of a clearcut can at least double tree-fall rates for a distance of more than 150 meters (about 500 ft) into a stand composed of 50 to 60 meter (164 to 197 ft) high second-growth trees in California study (Reid and Hilton 1998, p. 78). Stathers et al. (1994) found that most damage from clearcut boundaries extends 30 to 60 ft of the clearcut boundary. If we assume an average tree height of 150 ft (a common assumption for western WA), the physical area affected by windthrow would likely extend 150 to 200 ft into the adjacent stand.

Assessment of Effects:
Federal Lands: A Port Blakely regeneration harvest directly next to national forest lands could potentially facilitate windthrow on those lands. For this Biological Opinion, we consider the effects of windthrow to be limited to 200 ft into the remaining forest.

Windthrow within edges in national forest stands due to regeneration harvest on Port Blakely's lands could reduce the function of owl habitat on those lands at a localized scale. Suitable roost trees, canopy cover, and snags could be affected by increased windthrow. However, with the SHA, the chance of accelerating windthrow is probably less likely than without it, because of the extended rotations, Special Set-aside Areas, Special Management Areas, and leave tree patches, prescribed by the SHA. Without the SHA, regeneration harvest would be more frequent. The chance of windthrow along the edge is also highest in the first few years following the creation of an opening. After several years, tree roots and limbs adjust to reduce windthrow potential.

Windthrow and other edge effects (i.e., loss of interior forest conditions) may occur from the timber harvest that is used to regenerate stands. We anticipate that approximately 4.2 acres of suitable owl habitat on national forest land could be exposed to potential windthrow and/or edge effects on an annual basis. Regeneration harvest that eventually results in degradation of adjacent habitat is anticipated to impair essential behavioral patterns of territorial owls.

Of the suitable habitat for the 10 owl circles that overlap Port Blakely lands, the majority occurs on national forest lands. Due to the amount of Port Blakely lands within the 0.7-mile radius for the two owl sites (Site Numbers 948 and 230 – see Table 2), windthrow is more likely to result in habitat loss that significantly impairs essential behaviors of owls in those territories.

Project Lands: Windthrow facilitated by adjacent regeneration harvest may affect riparian zones and may also affect some Special Management Areas. If such areas develop habitat characteristics, windthrow could result in degradation of adjacent habitat. Because regeneration harvest could occur adjacent to the Special Set-aside Areas, windthrow could be facilitated

within Special Set-aside Areas. Without the SHA, approximately 380 acres of these Special Set-aside Areas would be available for harvest which would negate the formation of mature forest available for owls.

We anticipate that fewer than 80 acres of suitable owl habitat per year could be affected by edge effects on covered lands from regeneration harvests adjacent to Special Management Areas and Special Set-aside Areas which may become suitable habitat during the 60-year Permit term. These edge effects would persist for a number of years until the stand regenerates sufficiently to ameliorate those effects. For wind effects, the effects would last several years until the adjacent stand becomes more windfirm, which generally occurs within the first 5 years. Interior forest conditions may take longer to recover.

Other Nonfederal Lands: The Service anticipates that nearly zero to as many as 13.5 acres per year of adjacent nonfederal ownership may be exposed to edge effects such as windthrow or loss of interior forest conditions from regeneration harvest on the covered lands. These 13.5 acres would primarily be in riparian management zones or areas retained for other reasons, such as unstable slopes. Riparian management zones and unstable slope leave patches would tend to cross property lines and so would not be completely independent in location; therefore, it is not likely that a reserve area on adjacent properties would be exposed to effects of regeneration harvest immediately across the property line. However, even if some riparian or unstable slope reserve areas on adjacent nonfederal lands were affected by windthrow, we assume that only transient or single owls would likely be exposed to those effects. The magnitude of adverse effects on these non-territorial birds is not expected to rise to the level of significant disruption or impairment of behavior.

Effects of the Proposed Action on Barred Owl Distribution
The degree to which the proposed SHA would influence the distribution of barred owls is difficult to quantify. Barred owls currently occur in the action area. It is unclear if forest management has an effect on the outcome of interactions between barred owls and spotted owls (Courtney et al. 2004). Recent studies comparing habitat characteristics of barred owl and spotted owl territories have indicated that barred owls will occupy sites with fewer acres of mature forest than spotted owls (Herter and Hicks 2000; Pearson and Livezey 2003). Consequently, timber harvest that reduces habitat availability for spotted owls may give barred owls a competitive edge with respect to habitat occupancy following project implementation. However, our understanding of these potential effects is very limited. The purpose of the SHA is to retain the most structurally complex forest in Special Set-aside and Special Management Areas, and to contribute to the development of dispersal habitat across the covered lands.

Effects of Returning to Baseline

Safe Harbor Agreements allow landowners to return their lands to baseline. There are no known owl site centers on the covered lands and likely no suitable nesting habitat. Thus, a baseline that used nesting sites or high quality habitat would be zero. Therefore, Port Blakely and the Service chose to use 8,360 acres of dispersal habitat as the baseline for purposes of the SHA. At the end of the Permit, Port Blakely will have approximately twice the amount of dispersal habitat than presently available. They do not intend to return their lands to the baseline of 8,360 acres during

the term of the SHA. However, Port Blakely can legally terminate the SHA prior to its expiration and return their lands to baseline at any time. For purposes of this analysis, however, we assume that Port Blakely will implement the SHA for the full term of the Permit.

If Port Blakely chooses to harvest down to the baseline at the end of the Permit term, they would harvest approximately 8,433 acres (16,794 – 8,361 = 8,433 acres) of dispersal habitat. The rate at which Port Blakely returned their lands to baseline would probably be influenced by logistics and market demands, but we expect it would occur over a period of several years to a decade.

The adverse effects of a return to baseline conditions at the end of the Permit period are related to a reduction in dispersal capability through a loss of dispersal habitat, reduced canopy cover and stand complexity, and reductions in prey availability. These changes in the landscape would likely result in reduced dispersal and/or foraging success of transient owls but is not anticipated to significantly disrupt or impair behaviors. Juvenile owls would be less likely to successfully disperse between MOCAs. Dispersal would still be possible, but the quantity and quality of habitat would be reduced to its current levels.

CUMULATIVE EFFECTS: Spotted Owl

Cumulative effects, as defined in 50 CFR 402.02, include the effects of future State, Tribal, local, or private actions that are reasonable certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

In addition to the effects discussed in the Comprehensive cumulative Effects section, the Service notes that effects of the West Fork and State lands HCPs will be that continued harvest of timber will likely occur. On these lands, we anticipate a mixture of rotation ages, landscape conditions, variable density thinning, as well as strategic pruning of lower branches in some cases to assist with flying space, will occur that will produce some dispersal habitat by design or default. We anticipate continued timber harvest on other ownerships that will remove dispersal habitat or will occur earlier in stand development and will preclude development of dispersal habitat. As these activities are conducted, they will generate effects to owls which include sound and visual disturbance as well as indirect effects such as increased windthrow.

It is unlikely that recreational activities will disturb owls. Many activities will occur on the lakes or in designated recreational sites. Dispersed recreation will often occur on existing roads where background levels are naturally high. In some cases, gathering of firewood may disturb owls that are located nearby. Sound associated with nearby residential developments may displace or disturb transient owls, but owl site centers are not expected to establish in these areas. Other forest effects as a result of nearby development may include spread of forest pathogens, soil compaction from motorized vehicles, and increased risk of fire. These effects may result in

degradation or loss of spotted owl habitat. Conversion of habitat for residential, commercial, or industrial purposes may result in the direct and permanent loss of small amounts of habitat. Similarly, effects associated with existing transportation corridors may affect a small amount of habitat, but that habitat would not currently be viewed as high value habitat for owls.

INTEGRATION AND SYNTHESIS: Spotted Owl

Consistency with the Spotted Owl Recovery Plan

The Port Blakely SHA is consistent with our recovery plan for the owl. Consistency with the recovery plan for the owl is noted for Recovery Actions 11, 13, and 14.

Recovery Action 11 is "Design and conduct experiments on forest stand structure to better understand relationships between spotted owl habitat, spotted owl prey, and spotted owl demographic response". The Port Blakely SHA will be implementing a snag conservation and creation program on private lands at a scale that to our knowledge has not been attempted in Washington. Its purpose is to improve spotted owl prey. The SHA would not be a "cause-and-effect experiment", but provides the impetus for future research. The SHA (section 4.4) states that Port Blakely will work cooperatively with USFWS, WDFW, WDNR, and other entities that have expertise, in designing a statistically robust snag monitoring study within two years of the start date of the SHA. Port Blakely will also map all leave tree areas, and mark a sample of snag and defective trees for use in snag monitoring studies.

Recovery Action 13 is "Encourage applicants to develop Habitat Conservation Plans/Safe Harbor Agreements that are consistent with the recovery objectives". This SHA is predominately in a CSA/SOSEA intended for dispersal support. The Port Blakely SHA is consistent with this recovery action.

Recovery Action 14 is "Establish a comprehensive incentives program to develop creative opportunities for non-Federal landowners to engage in management strategies consistent with the recovery objectives". For Port Blakely operations, the SHA along with its assurances acted as an incentive to grow their timber rotations an average of an extra 15 years. This, along with other conservation measures, is expected to improve owl dispersal habitat. This approach works for Port Blakely and provides enhanced conservation for owls.

Summary of Integration and Synthesis

The SHA is anticipated to result in increased availability of dispersal habitat and improved quality of this habitat so that some foraging opportunities will be available. The SHA will establish both Special Management Areas and Special Set-aside Areas that will also provide dispersal habitat. Port Blakely's SHA is expected to improve foraging opportunities over time with implementation of their snag retention and development program. Negative effects are

generally expected to be fewer and less frequent with implementation of the SHA. Potentially, some reduced habitat protection would be afforded to individual sites should they become established and known. Known sites would be protected without the SHA, but identification of sites may be limited under the SHA.

Unless the SHA provides improved conditions for owls, it is unlikely they would occupy project lands and therefore experience the small amount of negative effects from management activities. As the benefits accrue over time, the possibility of some associated negative effects also increases.

CONCLUSION: Spotted Owl

After reviewing the current status of the owl, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's Biological Opinion that the SHA, as proposed, is not likely to jeopardize the continued existence of the owl.

Dispersal capability between two MOCA's is expected to be improved with implementation of the SHA. Based on this net conservation benefit provided by the SHA, it is our Biological Opinion that potential negative effects to owls will not appreciably reduce the likelihood of survival and recovery of the owl.

CRITICAL HABITAT: Spotted Owl from Status through Conclusion

STATUS OF SPOTTED OWL CRITICAL HABITAT

This Biological Opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act and the August 6, 2004, Ninth Circuit Court of Appeals decision in Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service (No. 03-35279) to complete the following analysis with respect to critical habitat.

Legal Status

On January 15, 1992, the Service designated owl critical habitat within 190 critical habitat units (CHUs) which encompassed nearly 6.9 million acres of Federal lands in California, Oregon, and Washington (57 FR 1796-1838). On August 13, 2008, the Service revised owl critical habitat into 29 units, comprised of 174 subunits, on approximately 5,312,300 acres of Federal lands in California, Oregon, and Washington (August 13, 2008; 73 FR 47326-47522).

Primary Constituent Elements

PCEs are the physical and biological features of critical habitat essential to a species' conservation. PCEs identified in the owl critical habitat final rule include forest types that support the owl across its geographic range when they occur in concert with a) nesting, roosting, foraging, and/or dispersal habitat, or b) lands capable of developing one or more of these habitats in the future (August 13, 2008; 73 FR 47347-47348).

Forests

Forest types that support the owl across its geographic range are primarily Sitka spruce, western hemlock, mixed conifer and mixed evergreen, grand fir, Pacific silver fir, Douglas-fir, white fir, Shasta red fir, redwood/Douglas-fir, and the moist end of the ponderosa pine coniferous forests zones at elevations up to approximately 3,000 ft near the northern edge of the range and up to approximately 6,000 ft at the southern edge of the range. These forest types may be in early-, mid-, or late-seral stages. This PCE is essential to the conservation of the species because it provides the biotic communities that are known to be necessary for the northern spotted owl. This PCE must occur in concert with at least one of the PCEs below (August 13, 2008; 73 FR 47347).

Nesting, roosting, and foraging habitat

This PCE includes the forest types described above that contain one or more of the following habitat types needed to meet the home range needs of territorial pairs of owls throughout the year or that are habitat-capable of developing one or more of these habitat types. (As used in this entry, areas that are ''habitat capable'' of developing an essential habitat component are those forest types described above, excluding serpentine soil areas, and that provide the requisite ecological conditions (e.g., moisture regime, soils, aspect, slope, potential vegetative community) for growing and sustaining the structural conditions required for that habitat component). A home range provides the habitat components essential for the survival and successful reproduction of a resident breeding pair of owls. The amount, quality, and configuration of these habitat types required for a home range varies according to local conditions and factors such as the degree of habitat fragmentation, proportion of available nesting habitat, and primary prey species. The core area of the home range is used most intensively and usually includes the nesting area. The remainder of the home range is used for foraging and roosting. The size of home ranges extend from approximately 2,955 acre (1,196 hectare) in the Oregon Cascades to approximately 14,271 acre (5,775 hectare) on the Olympic Peninsula of Washington. The size of core areas extends from approximately 500 acre (202 hectare) in the southern part of the species' range to approximately 4,057 acre (1, 642 hectare) in the northern part of the range (August 13, 2008; 73 FR 47347). The three habitat types within the home range of a owl are nesting habitat, roosting habitat, and foraging habitat.

Nesting habitat

Nesting habitat is essential to provide structural features for nesting, protection from adverse weather conditions, and cover to reduce predation risks. It includes a moderate to high canopy closure (60 to 80 percent); a multi-layered, multi-species canopy with large (generally greater than 30 inches dbh overstory trees; a high incidence of large trees with various deformities (e.g., large cavities, broken tops, mistletoe infections, and other platforms); large snags; large

accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for northern owls to fly. Patches of nesting habitat, in combination with roosting habitat, must be sufficiently large and contiguous to maintain owl core areas and home ranges, and must be proximate to foraging habitat. Nesting habitat can also function as roosting, foraging, and dispersal habitat (August 13, 2008; 73 FR 47347).

Roosting habitat
Roosting habitat is essential to provide for thermoregulation, shelter, and cover to reduce predation risk while resting or foraging. It differs from nesting habitat in that it need not contain those specific structural features used for nesting (such as trees with cavities, broken tops, and mistletoe platforms), but does contain moderate to high canopy closure (60 to 80 percent); a multi-layered, multi- species canopy; large accumulations of fallen trees and other woody debris on the ground; and open space below the canopy for owls to fly. Roosting habitat will also function as foraging and dispersal habitat, but not as nesting habitat due to lack of nesting structures (August 13, 2008; 73 FR 47347).

Foraging habitat
Foraging habitat is essential to provide a food supply for survival and reproduction. It contains some roosting habitat attributes but can consist of more open and fragmented forests or, especially in the southern portion of the range where some younger stands may have high prey abundance and structural attributes similar to those of older forests, such as moderate tree density, subcanopy perches at multiple levels, multi-layered vegetation, or residual older trees. Foraging habitat can also function as dispersal habitat (August 13, 2008; 73 FR 47348).

Dispersal habitat
This PCE includes forest types described above that provide one or both of the habitat components described below that are essential to the dispersal of juvenile and nonterritorial owls, or that are capable of developing one or both of these components. Dispersal habitat can occur in intervening areas between larger blocks of nesting, foraging, and roosting habitat or within blocks of nesting, roosting, and foraging habitat. Dispersal habitat is essential to maintaining stable populations by supporting transient owls which can fill territorial vacancies when resident owls die or leave their territories, and to providing adequate gene flow across the range of the species (August 13, 2008; 73 FR 47348). The two types of dispersal habitat are:

(A) Habitat supporting the transience phase of owl dispersal contains stands with adequate tree size and canopy closure to provide protection from avian predators and minimal foraging opportunities. This may include younger and less diverse forest stands than foraging habitat, such as even-aged, pole-sized stands, but such stands should contain some roosting structures and foraging habitat to allow for temporary resting and feeding during the movement phase.

(B) Habitat supporting the colonization phase of owl dispersal is generally equivalent to roosting and foraging habitat described above, although it may be in smaller amounts than that needed to support nesting pairs.

The critical habitat designation describes the PCEs essential to support the life history functions of the northern spotted owl in the amount and configuration required for the species' conservation. Because not all life history functions require all of the PCEs, not all of the critical habitat will contain all of the PCEs. Some units contain all PCEs and support multiple life processes, while some units contain only a portion of the PCEs necessary to support the species' particular use of that habitat. However, all of the critical habitat units in the designation support at least the first PCE described (forest-type) in conjunction with at least one of the other PCEs described above (August 13, 2008; 73 FR 47348).

Conservation Role of Critical Habitat

The conservation role of owl critical habitat is to identify those lands that are essential to the recovery of the species that may require special management considerations or protections (August 13, 2008; 73 FR 47344). Generally, the conservation role of owl critical habitat is to support a viable owl population at the rangewide scale by providing a network of functional units within each physiographic province (73 FR 47358). For a wide-ranging species such as the owl, where multiple CHUs are designated, each unit has a provincial and rangewide role in contributing to the conservation of the species. The size and distribution of the CHUs are based on the MOCAs recommended in the 2008 *Final Recovery Plan for the Northern Spotted Owl (Strix occidentalis caurina)* (USFWS 2008) in the western portion of the species range, and on proposed MOCAs recommended under Option 1 in the *Draft Recovery Plan for the Northern Spotted Owl* (USFWS 2007) in the eastern portion of the species range (August 13, 2008; 73 FR 47330).

The MOCAs comprise a network of both large habitat blocks (capable of supporting 20 or more breeding pairs of owls (MOCA 1s)), and small habitat blocks (capable of supporting up to 19 breeding pairs of owls (MOCA 2s)). The MOCAs (and subsequent CHUs) form a habitat network designed to support stable and well-distributed populations of owls over time and allow for movement of owls across the landscape (U.S. Fish and Wildlife Service 2008, p.13). The Federal lands comprising the MOCA network of the final recovery plan include areas of congressionally reserved lands, such as designated wilderness areas; these areas were therefore included in the recovery plan's assessment that the MOCA network is sufficient to achieve the recovery of the spotted owl. As in the 1992 designation of critical habitat, congressionally-reserved lands such as Wilderness Areas and national parks are not included within the boundaries of the critical habitat designation. However, the contribution of these congressionally-reserved areas must be considered in any evaluation of the sufficiency of the overall conservation habitat network for the recovery of the spotted owl (August 13, 2008; 73 FR 47328).

Current Condition of Critical Habitat

Summary of Rangewide Conditions

We designated 29 units as critical habitat for the owl on Federal lands in Washington, Oregon, and California. These areas encompass over 5.3 million acres. Currently we estimate that approximately 98 percent of these lands are "habitat capable" (i.e., lands that are capable of supporting forest types that owls use). Within the CHUs, many habitat areas are currently

fragmented primarily due to past timber harvest, wildfire, disease, and wind-throw. Based on the owl habitat data developed for monitoring the Northwest Forest Plan (Davis and Lint 2005), we estimate that approximately 50 percent of the lands within CHUs currently contain owl habitat (2.6 million acres). Given natural events such as fire, windstorms, and insect damage, not all habitat capable lands in a CHU are likely to be high quality habitat at any one time. However, these lands retain the physical and biological features necessary to allow for the growth of the habitat characteristics required by owls and are essential to achieving the area, quality, and configuration of habitat blocks required for recovery of the owl (USFWS 2008, p. 13).

Section 7 analyses of activities affecting owl critical habitat consider the effects of proposed actions on the ability of the critical habitat to support a viable owl population at the scale of individual CHUs, the physiographic province, and rangewide (73 FR 47358). Following the revision of critical habitat in August 2008, the Service has completed section 7 consultations on the removal of approximately 877 acres of suitable owl habitat within critical habitat units in the Oregon Cascades provinces (Table 3). The Service concluded that the effect of that habitat loss is not likely to destroy or adversely modify designated critical habitat.

Table 3: Changes in spotted owl suitable habitat within critical habitat from August 13, 2008, to present (May 22, 2009), resulting from Federal management actions and natural events by physiographic province.

Physiographic Province[4]		Evaluation Baseline[1]	Suitable[2] Critical Habitat Removed/Downgraded[3]			Percent Provincial Baseline Affected	Percent of Total Effects
		Acres of suitable habitat	Habitat loss to management activities	Habitat loss to natural events	Total		
WA	Olympic Peninsula	149,090	0	0	0	0	0
	Eastern Cascades	188,720	0	0	0	0	0
	Western Cascades	415,620	0	0	0	0	0
	Western Lowlands	0	0	0	0	0	0
OR	Coast Range	303,680	0	0	0	0	0
	Klamath Mountains	210,430	0	0	0	0	0
	Cascades East	109,140	873	0	873	0.8%	0
	Cascades West	498,020	4	0	4	0	0
	Willamette Valley	0	0	0	0	0	0
CA	Coast	53,480	0	0	0	0	0
	Cascades	137,010	0	0	0	0	0
	Klamath	583,690	0	0	0	0	0
Total		2,648,880	877	0	877	0	0

1. Revised critical habitat baseline is based on rangewide habitat maps developed by Davis and Lint (2005).
2. Nesting, roosting, foraging (NRF) habitat.
3. Includes effects reported by each field office.
4. Defined by the Northwest Forest Plan as the twelve physiographic provinces, as presented in Figure 3&4-1 on page 3&4-16 of the FSEIS (USDA and USDI 1994).

ENVIRONMENTAL BASELINE: Spotted Owl Critical Habitat

Regulations implementing the Act (50 CFR §402.02) define the environmental baseline as the past and present impacts of all Federal, state, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area which have undergone section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress. Such actions include, but are not limited to, previous timber harvests and other land-management activities conducted under the Northwest Forest Plan, Habitat Conservation Plans, and others. The environmental baseline for this action includes actions (as defined above) that have occurred since designation of critical habitat for the spotted owl.

The action area is located within the Southwest Washington Cascades Unit (Unit 5), which covers approximately 523,700 acres in King, Pierce, Thurston, Lewis, Skamania, Cowlitz, and minor amounts in Kittitas Counties, Washington, and is comprised of lands managed by the Mt. Baker–Snoqualmie, Gifford Pinchot, and Wenatchee National Forests. This unit includes three areas that, with approximately 122,500 acres of habitat or habitat-capable areas in the adjacent Wilderness and Mount Rainier National Park, meet the size requirement of large habitat blocks and one area wholly within critical habitat that meets the size requirement of a large habitat block. In addition, there are two areas wholly within critical habitat that meet the size requirement of small habitat blocks and one area that, with approximately 19,700 acres of habitat or habitat- capable areas in the adjacent Wilderness, meets the size requirement of a small habitat block.

Critical Habitat Subunit WA-04 is south of Randle, Washington, in the Cispus River watershed (Figure 2) and contains 29,028 acres of which 28,812 are habitat capable, and currently 14,841 acres (52 percent) are believed to be suitable owl habitat (USFWS 2008). Only 173 acres of WA-04 are located within 200 ft of the project lands and likely to be exposed to effects emanating from the proposed action (USFWS GIS). Of the 173 acres, we estimate that approximately 50 percent are currently functioning as suitable habitat. We also assume that nearly all of those 173 acres are habitat capable.

Critical Habitat Subunit WA-05 (located in the Mineral Block) (Figure 2) contains 37,811 acres of which 37,699 are habitat capable, and currently 12,781 acres (34 percent) are believed to be suitable owl habitat (USFWS 2008). Only 12 acres of WA-05 are located within the action area (USFWS GIS) and are likely to be exposed to effects emanating from the proposed action. We believe that a small percent of this land is currently habitat, but that most of it is habitat capable.

EFFECTS OF THE ACTION: Spotted Owl Critical Habitat

Factors Considered in Effects Analysis

In this analysis, we assumed that all of the potentially affected designated critical habitat is habitat capable. We utilized aerial photography to a limited extent to assess the current condition of the affected lands.

Degradation of Critical Habitat

There is no designated critical habitat on the covered lands. Port Blakely lands abut critical habitat in several areas along national forest lands (Figure 2). Impacts to critical habitat from implementation of the Forest Practices rules were previously analyzed in the Biological Opinion for the HCP (USFWS 2006). Because the level of harvest (frequency) would most likely decrease with this proposal, the effects would most likely be less than those described in that Biological Opinion. However, we briefly describe the effects that would emanate from Port Blakely operations as a whole because we cannot accurately describe the increment of difference in effects that would occur with and without the SHA. The Service believes, based upon our knowledge of the landscape and the regulatory environment, that the level of effects would likely be reduced with the SHA. Nevertheless, this analysis covers the gross amount of effect anticipated for the 60-year term of the SHA.
There is only one small parcel of project lands, a tract of approximately 80 acres, which abuts WA-05. Activities on this tract could affect 12 acres of designated critical habitat. A review of habitat conditions based upon aerial photography indicated that much of the 12 acres is likely in conifer forest somewhat older than 50 years. Federal lands within this section of land do show some signs of past harvest activity based upon the aerial photography. There are approximately 173 acres within 200 ft of the project lands that are designated as critical habitat within WA-04. Much of this land appears to be in conifer forest of mixed age.

Set-aside areas and patches of leave trees will at times border national forest lands. The other approximately 80 percent of Port Blakely land will be managed on an average 60-year rotation. There will be no required forested buffer next to critical habitat. Therefore we assume that about 2.3 acres of critical habitat may be degraded on an annual basis in WA-05. For WA-04, we believe that 12 acres could be potentially affected during the 60-year life of the SHA. The Port Blakely land adjacent to this critical habitat is currently about 50 years of age and would therefore likely be harvested in the next 5 to 15 years, perhaps slightly sooner than without the SHA.

We do not assume that any leave trees will be clumped along the property line, although that may occur as the location of the Federal land will be known and other aspects of this harvest unit may not utilize/encumber the required leave trees. Because there may not be a forested buffer, we anticipate windthrow to adversely affect the PCEs of critical habitat. Some of this critical habitat may be presently high-quality habitat that provides nesting, roosting, and foraging for owls. Our assessment indicates it is more likely composed of low-quality habitat presently. Wind can be expected to cause some trees to fall and become downed logs and open canopy. Some trees may snap and not only contribute downed wood but also contribute to snags. Openings in the canopy may result in release of second-story conifers or in release of understory shrubs. It is also possible that the openings in the canopy will result in degradation of the habitat values. Whether the effects are negative or positive will depend to some degree on the time frame. While immediately adjacent to a regeneration harvest unit, the effects may be more likely to be negative. Once the adjacent stand has grown to height where it provides adjacent cover, the effects will be less likely to be negative.

Given the extremely small percentage of the critical habitat unit that is anticipated to be adversely affected, we expect that the SHA will not measurably alter the ability of critical habitat to support a viable spotted owl population at the scale of individual CHU, the physiographic province, or rangewide.

CUMULATIVE EFFECTS: Spotted Owl Critical Habitat

Cumulative effects, as defined in 50 CFR 402.02, include the effects of future State, Tribal, local, or private actions that are reasonable certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

In addition to the effects discussed in the Comprehensive Cumulative Effects section, we anticipate continued timber harvest on other ownerships that will remove forest from areas adjacent to critical habitat within the action area. As these activities are conducted, they will generate effects to spotted owl critical habitat which include indirect effects such as increased windthrow.

Other forest effects as a result of nearby development may include spread of forest pathogens, soil compaction from motorized vehicles, and increased risk of fire. These effects may result in degradation or loss of spotted owl critical habitat, or the loss of forests adjacent to the critical habitat. Conversion of habitat for residential, commercial, or industrial purposes may result in the direct and permanent loss of small amounts of habitat. However, within the action area, it is expected that these effects are not very likely and would only affect approximately 800 ft of boundary between private lands and critical habitat.

CONCLUSION: Spotted Owl Critical Habitat

After reviewing the current status of the critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Services' Biological Opinion that the action, as proposed, is not likely to result in the destruction or adverse modification of owl critical habitat. This conclusion is based on the rationale that although the proposed action would result in adverse affects to critical habitat within the action area, these effects would not appreciably affect the function of CHUs to maintain a stable, self-sustaining, and interconnected population of owls within the Southwest Washington Cascades, the Washington Western Cascades Province, and across the species' range.

We anticipate some limited degradation of critical habitat that may occur as a result of indirect effects from the activities conducted during this project. This level of degradation, although highly dependent on meteorological conditions, is reasonably likely to occur with the implementation of the SHA. The effects likely to occur as a result of this action would be small in scope and extremely localized.

Although the proposed action has a localized adverse affect to critical habitat within the action area, critical habitat within the CHU, the subprovince, the province, and the range of the species will remain functional to serve the intended conservation role for the spotted owl.

MARBLED MURRELET – from Status to Conclusion

STATUS OF THE SPECIES: Marbled Murrelet

Legal Status

The marbled murrelet was federally listed as a threatened species in Washington, Oregon, and northern California effective September 28, 1992 (57 FR 45328 [October 1, 1992]). Listing factors included extensive removal of late-successional and old-growth coastal forests which serve as nesting habitat for murrelets, high nest-site predation rates and human-induced mortality in the marine environment from gillnets and oil spills.

In 2004, the Service determined that the California, Oregon, and Washington distinct population segment of the murrelet does not meet the criteria set forth in the Service's 1996 Distinct Population Segment policy (61 FR 4722 [May 24, 1996]; (Beissinger and Nur 1997 in USFWS 2004). However, the murrelet retains its listing and protected status as a threatened species under the Act until the original 1992 listing decision is revised through formal rule-making procedures, involving public notice and comment.

To fulfill the objective of stabilizing the population size, the Marbled Murrelet Recovery Plan (USFWS 1997a) (Recovery Plan), focuses on protecting adequate nesting habitat by maintaining and protecting occupied habitat and minimizing the loss of unoccupied but suitable habitat (USFWS 1997a, p.119). The Recovery Plan identified six Conservation Zones throughout the listed range of the species: Puget Sound (Conservation Zone 1), Western Washington Coast Range (Conservation Zone 2), Oregon Coast Range (Conservation Zone 3), Siskiyou Coast Range (Conservation Zone 4), Mendocino (Conservation Zone 5), and Santa Cruz Mountains (Conservation Zone 6).

Terrestrial Habitat Use

As discussed previously, murrelets are seabirds that fly inland to nest in the forest. They utilize platforms that are located high in large trees with sufficient flying space to access the nest, but still seek the protection of cover from nest predators. They exhibit high site fidelity and little is know about their potential to recolonize following disturbances. They are dependent on old-growth forests and forests with older tree structure.

Population Status

Demographic modeling results indicate murrelet populations are declining within each Conservation Zone and throughout the listed range (McShane et al. 2004). The juvenile to adult ratios observed at sea in the Conservation Zones are too low to obtain a stable population in any

Conservation Zone, which indicates murrelet abundance in all Conservation Zones will continue to decline until reproductive success improves. In other words, there is insufficient recruitment of juveniles to sustain a murrelet population in the listed range of the species.

Threats

Threats to murrelets in the marine environment include declines in prey availability; mortality associated with exposure to oil spills as well as gill net and other fisheries; contaminants suspended in marine waters; and visual or sound disturbance from recreational or commercial watercrafts (57 FR 45328 [October 1, 1992]; {USFWS (U.S. Fish and Wildlife Service), 1997 7454 /id;Ralph, 1995 4461 /id;McShane, 2004 3680 /id}. Activities, such as pile driving and underwater detonations, that result in elevated underwater sound pressure levels may also pose a threat to murrelets.

Threats to murrelets in the terrestrial environment include the latent effects of past habitat loss through extensive harvest of late-successional and old-growth forest and loss through natural disturbance such as wildfire and windthrow (Booth, 1991 6524 /id;Teensma, 1991 5414 /id;Ripple, 1994 4621 /id;Perry, 1995 4294 /id). Predation is expected to be the principal factor limiting murrelet reproductive success and nest site selection (Ralph et al. 1995); Nelson and Hamer 1995). Murrelets are subject to additional threats from diseases, genetics, low population numbers, and low immigration rates (McShane et al. 2004). Additionally, low levels of recolonization may make murrelets slow to recover from local disturbances.

Threats continue to contribute to murrelet population declines through adult and juvenile mortality and reduced reproduction. Juvenile to adult ratios observed at sea indicate there is currently insufficient recruitment of juveniles to sustain a murrelet population in the listed range of the species

Some of the threats to the murrelet population may have been reduced as a result of the species' listing under the Act, such as the protection of occupied nest sites under State Forest Practices Regulation, passage of the Oil Pollution Act and implementation of the Northwest Forest Plan (NWFP). However, no threats have been reversed since listing and with some threats, such as predation and West Nile Virus, may be increasing or emerging. Threats continue to contribute to murrelet population declines through adult and juvenile mortality and reduced reproduction. Therefore, given the current status of the species and background risks facing the species, it is reasonable to assume that murrelet populations in Conservation Zones 1 and 2 and throughout the listed range have little resilience to deleterious population-level effects and are at high risk of extirpation.

Conservation Needs

The recovery strategy presented in the final recovery plan indicates that the following short-term actions are critical and should be factored into decisions regarding areas that should be secured and how habitat should be maintained or improved: 1) maintaining occupied habitat; 2) maintaining large blocks of suitable habitat; 3) maintaining and enhancing buffer habitat; and 4)

decreasing risks of loss of nesting habitat due to fire and windthrow (USFWS 1997a p 121). As such, all occupied stands, and buffer habitat are important to the conservation of the murrelet given its current status, and even occupied stands far from marine waters are important for maintaining the distribution of the species (USFWS 1997a). Lands considered essential for the recovery of the murrelet within conservation zones 1 and 2 include suitable habitat on State lands within 40 miles of the coast and habitat within occupied murrelet sites on private lands (USFWS 1997A). Long-term conservation needs include maintaining nesting habitat, reducing predation and mortality, and increasing productivity.

Summary

Considering the life history characteristics of the murrelet, with the aggregate effects of inland habitat loss and fragmentation and at-sea mortality, the species' capability to recover from lethal perturbations at the population or metapopulation (Conservation Zone) scale is extremely low. The low observed reproductive rates make the species highly susceptible to local extirpations when exposed to repeated perturbations at a frequency which exceeds the species' loss-replacement rate. Also troublesome is the ineffectiveness of recovery efforts at reversing the ongoing lethal consequences in all demographic classes from natural and anthropogenic sources. Despite the relatively long potential life span of adult murrelets, the annual metapopulation replacement rates needed for long-term metapopulation maintenance and stability is currently well below the annual rate of individuals being removed from each metapopulation. As a result, murrelet metapopulations are currently not self-sustaining or self-regulating.

Accordingly, the Service concludes the current environmental conditions for murrelets in the coterminous United States appear to be insufficient to support the long-term conservation needs of the species. Although information is not sufficient to determine whether murrelets are nesting at or near the carrying capacity in the remaining nest habitat, activities which degrade the existing conditions of occupied nest habitat or reduce adult survivorship and/or nest success of murrelets will be of greatest consequence to the species. Actions resulting in the further loss of occupied nesting habitat, mortality to breeding adults, eggs, or nestlings will continue the current murrelet population decline throughout the coterminous United States.

Additional information on the status of murrelets, including their life history, population status, habitat abundance, threats, conservation needs, and conservation strategies is available in McShane et al. (2004) and USFWS (1994A).

ENVIRONMENTAL BASELINE: Marbled Murrelets

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

Murrelet Occupancy

Covered lands did receive some murrelet surveys to determine occupancy prior to 2003 under the older Pacific Seabird Group protocol, and these surveys do not comport with the newest protocol (2003). However, the areas previously surveyed have already been harvested and therefore any difference in detection probabilities between the two protocols is not likely to have a measureable effect on our analysis of future risk. While the older protocol did not provide the same degree of certainty as the newer protocol, it did provide general information about murrelet presence that is somewhat informative for establishing the baseline for the SHA.

Surveys conducted on the covered lands and near the covered lands revealed "presence" detections but no murrelet behavior that might signify an occupied site (Figure 4). There is an occupied site in the National Forest's western edge of the Mineral Block along with some other presence detections in that area. There is another occupied site on private lands immediately west of the Mineral Block. The Mineral Block occupied site is approximately 7 miles to the nearest Port Blakely parcel, which is an isolated small (approximately 80-acre) parcel.

There have been no extensive protocol surveys conducted on the covered lands, or the Mineral Block, and few recent protocol surveys in the action area. Thus, there may be more occupied sites in the action area than we are aware of. There is only one 80-acre parcel (Figure 4) of Port Blakely lands that borders the Mineral Block, and it is not part of the Special Set-aside Areas because it is less than 81 years old.

The available information indicates there are no known occupied murrelet sites on national forest lands south and east of Riffe Lake (Figure 4). There is old-growth habitat in this area, so there may be occupancy of which we are unaware. However, these national forest lands are more than 52 miles from the marine environment which may influence likelihood of occupancy. Nevertheless, all occupied stands are important to the conservation of the murrelet, and occupied stands far from marine waters are important in maintaining the distribution of the species.

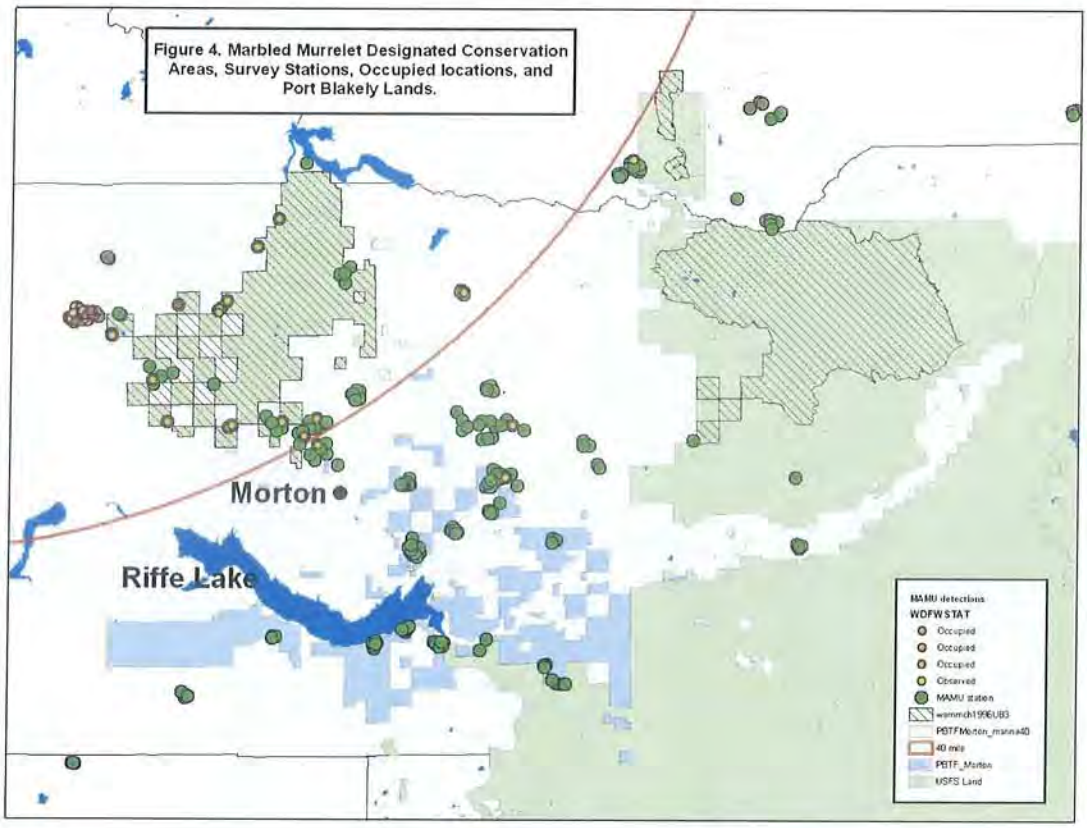

Figure 3: Marbled Murrelet Designated Conservation Areas, Survey Stations, Occupied Locations, and Port Blakely Lands.

Murrelet Habitat

The Port Blakely lands are entirely in Conservation Zone 1. The project lands have predominantly regenerated from clearcut harvesting in the past, and some areas have been clearcut harvested twice. As such, these stands are not likely to contain many trees larger than 30 inches dbh. There are no large patches of native forest on the covered lands. A few stands regenerated from a fire in the 1950s, but these stands and other multi-canopy stands occur within areas of the SHA that will not be harvested, for example in the Special Set-aside Areas and Special Management Areas or within the 498 acres conserved for murrelets *(in litt.* Blake Murden). However, the small amounts of older forest that occur on the covered lands are generally in small patches and are relatively fragmented. These small patches are expected to have relatively high amounts of edge, which can facilitate predation, and thereby reduce nest success.

The estimated amount of potential habitat on the covered lands, as determined from Port Blakely's methods, is also very low. Port Blakely identified potential habitat as patches of forest greater than 7 acres in size and greater than 81 years old. Using these criteria, Port Blakely

identified 498 acres that are "potential" murrelet habitat. Not all of these acres may support suitable habitat given the previous disturbance history and prevalence of Douglas-fir. However, there may be habitat acres outside of these 498 acres that are suitable, as described below.

There are a total of 54 acres in patches of 5 to 7 acres in size and greater than 81 years old on the covered lands that may provide potential habitat. Similar to the 498 acres, many of the 54 acres are not currently expected to provide suitable habitat.

The SHA commits to a baseline of 498 acres of potential murrelet habitat. These acres are mapped and will remain on the covered lands. As described later in this document, many of those acres are currently unlikely to be suitable habitat. If Port Blakely had desired, they could have completed a detailed field assessment to determine precisely how many acres met the physical criteria to determine suitability. It is our opinion that they would have found far fewer than 498 acres that met the definition of suitability. However, we believe that over the duration of the Permit, some of the areas that are not currently suitable might become suitable habitat.

EFFECTS OF THE ACTION: Marbled Murrelet

Introduction

The Port Blakely SHA describes voluntary conservation actions that are expected to lead to net conservation benefits to owls and murrelets. To issue a Permit under section 10(a)(1)(A) of the Act, there needs to be a reasonable expectation of net conservation benefits that lead directly, or indirectly, to the recovery of the covered species (64 FR 32717). As such, there should be beneficial effects that contribute to the species, and this Biological Opinion analyzes those effects.

Factors Considered in Effects Analysis

The Washington Fish and Wildlife Office developed the following definition of suitable murrelet nesting habitat. However, for purposes of designing the SHA, we accepted a different definition put forth by Port Blakely. Our analysis of effects in this Biological Opinion reflects the broader, more conservative Service definition that follows.

Potential murrelet nesting habitat in Washington is typically found in old-growth or mature forest types (Hamer and Nelson 1995) generally characterized by large trees containing nesting platforms, a multistoried stand, and a moderate to high canopy closure (USFWS 1997, pg 40). The presence of platforms is the most important habitat characteristic of murrelet nesting habitat. A platform is a relatively flat surface at least 4 inches in diameter (10 centimeters (cm)) and 33 ft (ft) (10 meters) high in the live crown of a coniferous tree. Platforms may be horizontal branches, mistletoe, witches brooms, or other natural deformities and structures such as squirrel nests. Vertical and horizontal cover and substrate such as moss and lichen are important structural attributes of platforms (Huff et al. 2006) and the number of canopy layers and the presence of mistletoe in forest stands have been shown to be strongly correlated with active nest sites in Washington (Hamer et al. 2008).

Tree diameter and height have been positively correlated with platform size and the abundance of platforms; however, this relationship will vary depending upon tree species and growing conditions. Known nest sites have occurred in stands dominated by Sitka spruce (*Picea stitchensis*), western hemlock (*Tsuga heterphylla*), and Douglas fir (*Pseudotsuga menziesii*) (USFWS 1997, pg. 41) but also containing western red cedar (*Thuja plicata*) trees. Overall, nest trees in Washington have been greater than 19 inches (48 cm) in diameter-at-breast-height and greater than 98 ft (30 meters) tall (Hamer and Nelson 1995).

In summary, the presence of platforms is the most important habitat characteristic. Any forested area with a residual tree component (large, older trees), small patches of residual trees, or one or more platforms can be considered to be potential murrelet nesting habitat (Evans-Mack et al. 2003). However, for the purposes of consultation, the Washington Fish and Wildlife Office considers potential nesting habitat to have at least 2 platforms per acre and a minimum patch size of 5 acres. The platforms may be clumped in one area or dispersed throughout the forested area, but the average number of platforms/acre should be at least 2.

In the absence of information about each stand and factors such as moss depth, platform densities, and other such relevant factors, the Service, WDFW, and Port Blakely agreed that for the purposes of designing the SHA, stand age would be used as an indicator of potential habitat. The SHA uses an 81-year or older threshold for predicting "potential" murrelet habitat for purposes of identifying conservation opportunities. Port Blakely's forest inventory data shows that once stands are over 81 years old on the covered lands, they typically contain some trees that may be greater than 32 inches diameter at breast height (dbh) with large limbs that could contain potential platforms for murrelets. The SHA also utilized a 7-acre minimum patch size, consistent with State Forest Practices rules, but not necessarily consistent with the Service's definition of suitable habitat, which includes a 5-acre minimum patch size. We explore the consequences of this difference in the effects analysis below.

Port Blakely's forest inventory data shows that once stands are over 81 years old on the covered lands they typically contain some trees that may be greater than 32 inches dbh with large limbs that could contain potential platforms for murrelets. Port Blakely identified 498 acres as "potential habitat" using a modification of the State Forest Practice Rules definition that defines potential habitat as 7-acre stands of 81 years and older. Port Blakely protected these acres for the life of the SHA. These areas are displayed on Figure 3-6 of the SHA. Under Forest Practice Rules and absent the SHA, approximately 380 acres of the 498 acres would be currently available for timber harvest (*in litt.* Blake Murden). As part of this analysis, we considered that some of the most important habitats for murrelets on the project lands might not occur in the absence of the SHA. The likelihood of adverse effects over time may increase as a result of the SHA, but in the absence of the SHA fewer benefits would occur as well.

Beneficial Effects

Port Blakely identified 498 acres in 16 discrete patches ranging from 7.9 acres to 91 acres of potential habitat as their baseline. The median patch size is 11.9 acres. Currently, these acres range in age from 84 to 128 years old (Port Blakely GIS provided to USFWS and SHA Section 3-6). We think for these specific acres this is an overestimate of truly suitable habitat based on

functional platforms and necessary forest characteristics. Port Blakely could have chosen a lower baseline that may have more accurately portrayed habitat suitability. However, their overestimate is not a problem ecologically because these stands will not be harvested during the term of the SHA. While it is likely that many of the 498 acres are not habitat, over the duration of the SHA some of these stands might mature into suitable habitat due to forest growth and maturation. With this in mind, the chance of occupancy increases in the future.

Implementation Uncertainties

We have identified specific uncertainties with the SHA. One implementation uncertainty is whether the stands over 81 years old presently would develop into suitable murrelet habitat during the life of the SHA. A second uncertainty is whether any stands younger than 81 years old now and those managed in the future on an average 60-year rotation could provide suitable murrelet habitat on the covered lands. The Service has assumed that this second scenario (of habitat in stands younger than 81 years old) is unlikely to occur. This assumption is based upon the low likelihood of such stands developing numerous large platforms with moss. Another uncertainty is the possibility of future occupancy. As forests in Special Set-Aside Areas and Special Management Areas mature over the 60-year Permit term, we anticipate that they may grow larger limbs and increase in habitat capability and perhaps develop suitable murrelet platforms. Therefore, the chance of occupancy, although small, increases later in the Permit term. Lastly, we do not understand the future murrelet population's ability to colonize newly developed habitats on the covered lands.

Effects of Management Activities

We have identified negative effects to murrelets from the covered management activities associated with the SHA; this includes the normal forest management operations as well as the return to baseline conditions. The SHA does not describe a detailed strategy for returning to baseline conditions, although it is permissible, provided the 498 acres of potential murrelet habitat are protected. The negative effects would vary spatially and temporally and potentially occur on and off the covered lands. We have identified the following sources that may cause effects: 1) Removal of suitable habitat on Port Blakely lands; 2) Forest edge effects to suitable habitat on national forest lands and Port Blakely lands; 3) Sound and visual disturbance and 4) Return to baseline.

Removal of Suitable Habitat on Port Blakely lands
We have identified two situations where potential murrelet habitat could be removed due to timber harvest. One is the removal of 5 to 7 acre patches that are older than 81 years old. The other is harvest in the managed landscape that is on an average 60-year rotation, where there are inclusions of older trees in portions of a harvest unit.

There are 54 acres total in patches from 5 to 7 acres and greater than 81 years old. These acres may become habitat over time if they are not already, and will be available for timber harvest. Since Port Blakely will not be conducting murrelet occupancy surveys, there will be no information concerning their occupancy status and little likelihood that occupancy would be confirmed. While murrelets normally select for larger stands, some occupied stands are small.

Murrelets have been reported nesting in patches of suitable habitat as small as 5 acres (Kim Flotlin, USFWS, pers. comm. 2009). Generally, we would expect patches this small to be embedded in a forest stand of younger and smaller size trees, in effect buffering the effects of edge (including higher predation) and increasing the likelihood that murrelet nesting would be successful in these stands. Over the life of the 60-year Permit term, we anticipate that all 54 acres are likely to be harvested.

Generally, stands that are managed on a 60-year average harvest rotation would not likely provide platform trees suitable for nesting. However, inclusions of older trees left from a previous harvest may be large enough to support suitable platforms and may not be easily identified in existing forest inventory data. We would expect these situations to occur infrequently and Port Blakely may be unaware of these cases because their forest inventory methods may be unable to locate them. If these situations occur, the individual trees, clumps, and surrounding forest could be harvested. The chance for occupancy is low for these places considering the landscape condition on the project lands, and considering the likely size of such inclusions.

We do not anticipate adverse effects as a result of direct habitat degradation from precommercial and commercial thinning, which will occur in stands that are too young to be murrelet habitat. Likewise, we do not anticipate degradation of murrelet habitat from any efforts to create additional snags within Special Set-aside Areas because site-specific assessments are likely prior to any such activities and murrelet habitat is unlikely to develop in most of these Special Set-aside Areas.

In summary, while the SHA indicates that 3 years of protection would occur if an occupied site is detected, no surveys are being conducted and it is unlikely that such sites would be identified. For the purpose of this analysis, we therefore assumed that timber harvest could potentially kill or injure any murrelets associated with these unprotected sites, whether they are the 5 to 7 acre patches greater than 81 years old or the inclusions of older trees (in clumps small smaller than 5 acres) in the managed portion of the covered lands. The probability of such a site being established is low, and it would likely be small and contain few nesting murrelets. However, it is reasonable to assume that one murrelet nest could be felled during the 60-year Permit term.

Forest edge effects to suitable habitat on national forest lands and Port Blakely lands
Suitable platform trees in the action area could be lost due to windthrow. This could occur on national forest, the covered lands and adjacent nonfederal lands. Regeneration harvest increases the likelihood of windthrow in adjacent stands and thus affects the quality of habitat and/or development of future habitat, and potentially increase future predation risk next to the clearcut edge. Malt and Lank (2007, p.160) using experimental murrelet nests suggest that disturbances by avian predators were significantly more frequent at clearcut edges relative to interiors. They also state that effects from recent clearcuts may decline over time as new vegetation matures.

Port Blakely owns acreage next to the national forest and regeneration harvest could result in windthrow that might affect suitable murrelet habitat and or unknown occupied sites on those national forest lands. Applying a 60-year average rotation harvest versus a 45-year rotation reduces the frequency of edge exposure and the impacts of that edge. Nonetheless, harvest activities on the covered lands are anticipated to result in increased predation risk and potential loss of habitat due to windthrow on adjacent national forest lands. This risk is highest for the one 80-acre Port Blakely parcel that adjoins the Mineral Block because it is closest to marine waters and adjacent to designated critical habitat. The Federal lands to the south and east of Riffe Lake exceed 52 miles from the coast (some are also beyond 55 miles) which may influence the probability and level of use by murrelets. The frequency of regeneration harvests is reduced by the SHA, thus the negative effects associated with regeneration harvest could be decreased due to less frequent exposure.

Port Blakely will also harvest directly adjacent to Special Set-aside Areas, Special Management Areas, and riparian zones. Over time, as these areas mature, the likelihood of occupancy will increase. However, with the SHA, the rotation age averages 60 years versus 45 without the SHA, thus providing deleterious edge effects less often than with a shorter rotation age. Nonetheless, harvest activities on the covered lands are anticipated to result in increased predation risk and potential loss of habitat due to windthrow within adjacent Special Set-aside Areas, Special Management Areas, and riparian zones.

These edge effects would persist for a number of years until the stand regenerates sufficiently to ameliorate those effects. For wind effects, the effects would last several years until the adjacent stand becomes more windfirm, which generally occurs within the first 5 years. Edge effects, including increased risk of predation and degraded interior forest conditions, may be more persistent but substantially reduced after approximately 30 years due to growth of adjacent trees.

We calculated that approximately 1.3 acres of suitable murrelet habitat on national forest land could be exposed to potential windthrow and/or edge effects on an annual basis (Appendix A). We anticipate that fewer than 6.6 acres of murrelet habitat per year to be affected by edge effects within Special Set-aside Areas and Special Management Areas on the covered lands. These effects are anticipated to significantly impair essential behavior of murrelets associated with these windthrow areas.

Sound and Visual Disturbance

The Service has determined that behaviors indicating potential injury to murrelets include flushing from a nest and aborted feedings. Flushing can increase the risk of predation and/or physical harm to the young. An aborted feeding represents a significant disruption of normal behavioral patterns. Based on Service analysis of the potential for injury associated with sight and sound disturbance to murrelets (USFWS 2003), using an injury threshold of 92 dB, the Service uses injury thresholds of 35 yards for heavy equipment and motorized tools, and 45 yards for chainsaws felling trees and cutting downed wood. In this Biological Opinion, we estimate an injury threshold for sound associated with the project (felling large trees with multiple chainsaws and/or heavy equipment) to be 45 yards, the larger of the two values. For consistency with the distance used in assessing other effects of this action, we report exposure rates based upon a distance of 200 ft. Scientific data related to injury threshold distances

associated with audio and visual disturbance are limited, and we continue to collect pertinent data related to the issue. Consequently, the injury threshold distances used here may be adjusted in the future, when warranted.

Because Port Blakely will not be conducting murrelet occupancy surveys on their lands or other ownerships, they will not know if potential murrelet habitat becomes occupied over the duration of the Permit term. If they are conducting management activities adjacent to an unknown occupied site, the sound and visual presence of those activities could disturb nesting murrelets. Management activities could adversely affect murrelet incubation, subject the nest to increased predation, or affect other important behavior patterns such as feeding.

Management activities on the covered lands have the highest likelihood for sound and visual disturbance of murrelets on national forest lands to the lands south and east of Riffe Lake and adjacent to an 80-acre unit adjacent to the Mineral Block. If the Forest Service identifies an occupied site on national forest lands, Port Blakely will implement specific timing restrictions for their management activities as detailed in the Description of the Action above.

As established above, the likelihood of murrelets nesting on the managed portion of the covered lands and being injured or killed during harvest operations is low. However, over the course of the 60-year Permit period, and given the limitations of Port Blakely's habitat definition and lack of surveys, there is a reasonable but low likelihood that harvest activities could inadvertently injure or kill an egg or bird or result in the loss of a tree that contains a nest. Consequently, we anticipate that a murrelet may be injured or killed during the Permit term.

The Service anticipates that the behavior of murrelets exposed to sound disturbance beyond the thresholds described will be significantly disrupted due to the operation of equipment associated with timber harvest (i.e., chainsaws and heavy equipment).

We anticipate that approximately 2.0 acres of potential habitat on national forest land could be exposed to sound on an annual basis as a result of commercial thinning and regeneration harvest of adjacent covered lands (0.7 and 1.3 acres per year respectively). An additional 0.3 acres of potential habitat on national forest land could be exposed to sound on an annual basis as a result of precommercial thinning of adjacent covered lands. The levels of sound from precommercial thinning will likely be less as a result of the type of intervening vegetation and the low-level of sound from tree felling.

We anticipate that fewer than 6.6 acres of suitable murrelet habitat per year could be affected by sound from regeneration harvests adjacent to Special Set-aside Areas and Special Management Areas, which may become suitable habitat during the 60-year Permit term. Without the Permit, only 1.6 acres within such Special Set-aside Areas and Special Management Areas would be affected, but this would be because fewer Special Set-aside Areas and Special Management Areas would exist. Approximately 380 acres (of the 498 acres) that are currently, or most-likely, to become murrelet habitat during the 60-year Permit term could be currently harvested if this Permit were not issued.

Fewer than 4.0 acres of Special Set-aside Areas and Special Management Areas would be exposed to sound from commercial thinning. Approximately 3 of the 4 acres are stands that could currently be harvested. These estimates of affected acres assume that all Special Set-aside Areas and Special Management Areas are less than 400 ft in depth and potentially subject to such effects. This is clearly an overestimate of the potential exposure.

Fewer than 2.0 acres of Special Set-aside Areas and Special Management Areas would be exposed to sound from precommercial thinning. Approximately 1.5 of the 2.0 acres is from stands that could be currently harvested. The sound from this operation may be greatly ameliorated from the density of young vegetation and the lack of sound from felling trees. Precommercial thinning would generally involve isolated chainsaws and operations would move through the stand very quickly.

Effects of Returning to Baseline

Safe Harbor Agreements allow landowners to return their lands to baseline. Port Blakely and the Service chose to use 498 acres of potential murrelet nesting habitat as the murrelet baseline for purposes of the SHA. At the end of the Permit, Port Blakely may harvest any additional murrelet habitat in excess of the 498 acres that has developed on the covered lands. Port Blakely does not intend to return their lands to the baseline of 498 acres during the term of the SHA although legally it can be terminated prior to its expiration. For purposes of this analysis, however, we assume that Port Blakely will implement the SHA for the full term of the Permit.

If Port Blakely chooses to harvest down to the baseline at the end of the Permit term, such harvest would likely be influenced by logistics and market demands and would likely occur over a period of several years to a decade. Because of this, any effects of loss of habitat would not be abrupt, but most likely be over a period of a few years.

Adverse effects to murrelets of a return to baseline conditions at the end of the Permit period are related to a reduction in nesting habitat and reproductive success. These changes in the landscape are anticipated to be very small in scope but may nonetheless significantly disrupt or impair behaviors of murrelets nesting in those stands.

CUMULATIVE EFFECTS: Marbled Murrelet

Cumulative effects, as defined in 50 CFR 402.02, include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

In addition to the effects discussed in the Comprehensive Cumulative Effects section, the Service notes that we anticipate continued timber harvest on other ownerships that will remove forest stands prior to their development of nesting habitat for murrelets. As these activities are

conducted adjacent to potential habitat, they may generate effects to murrelets which include sound and visual disturbance as well as indirect effects such as increased windthrow and predation.

It is unlikely that recreational activities will disturb murrelets. Many activities will occur on the lakes or in designated recreational sites. Dispersed recreation will often occur on existing roads where background levels are naturally high. In some cases, gathering of firewood may disturb murrelets that are located nearby. Sound associated with nearby residential developments could potentially displace or disturb murrelets, but murrelets are not expected to establish in or near these areas. Other forest effects as a result of nearby development may include spread of forest pathogens, soil compaction from motorized vehicles, and increased risk of fire. These effects might result in degradation or loss of murrelet nesting habitat, should they occur in proximity to Federal lands or unharvested portions of nonfederal lands. Conversion of habitat for residential, commercial, or industrial purposes may result in the direct and permanent loss of small amounts of forest land, but would be unlikely to affect murrelet habitat. Similarly, effects associated with existing transportation corridors may affect a small amount of forest land, but that forest land would not be expected to have the potential for murrelet nesting habitat.

INTEGRATION AND SYNTHESIS: Marbled Murrelet

Consistency with the Marbled Murrelet Recovery Plan

Implementation of the SHA is also consistent with the 1997 recovery plan for the murrelet. Recovery efforts should be directed toward increasing the size and distribution of murrelet populations and not furthering the gap in distribution between the Olympic Peninsula and southwestern Washington. The primary goal for nonfederal lands is the protection of occupied sites. There currently are no occupied sites on SHA lands; however, over the Permit term as forest stands over 81 years old mature, the likelihood of occupancy increases. The SHA will protect all stands that are both over 81 years old and more than 7 acres in patch size for the life of the SHA. These areas total 498 acres. The 1997 Recovery Plan (section 3.2.2) also states the importance of developing habitat and improving the distribution of habitat, which the SHA is intended to accomplish. There is no designated critical habitat on any Port Blakely lands proposed to be covered under the SHA. There is one very small Port Blakely parcel approximately 80 acres adjacent to critical habitat.

Summary

The landscape features are important determinants of the probability of occupancy by murrelets. Much of the project area is fragmented. Proximity to forest edge can reduce nest success (Manley and Nelson 1999). Most nest failures have resulted from predation (Nelson et al. 2006, p.18) and forest fragmentation increases the likelihood of predation.

The distance of marine waters is another consideration in determining the probability of occupancy. However, all occupied stands are important to the conservation of the murrelet, and occupied stands far from marine waters are important in maintaining the distribution of the

species. The project area is very far from marine waters. At this distance, it is believed the probability of occupancy may be lower than areas closer to marine waters; it is also believed that densities may be reduced within occupied areas.

The closest marine waters to the project area are in south Puget Sound, which has low densities of murrelets on the marine waters. This factor also contributes to our assessment of population risk. However, our assessment of population effects is influenced by the affected population being the less imperiled Puget Sound populations (as compared to the southwest Washington coastal population).

Therefore, we consider the population-level risk to be low as a result of actions on this landscape. We believe nest density, abundance, and probability of occupancy are lower both on the project area and the adjacent lands, than they would be in less fragmented habitats on another landscape. Predation risk is also higher on this landscape than it would be in an unfragmented landscape. Therefore, we believe there is a low probability of support to the larger population coming from the project lands and the action area.

Lastly, we do not anticipate loss of habitat beyond the lands that are estimated based upon conservative worst-case scenarios (e.g., between 5 and 7 acres in size and greater than 81 years old and inclusion of older trees in the 60 year managed landscape). The project lands most likely to be occupied in the future (even if that probability is quite low) would be the 498 acres designated for murrelet protection. Under the SHA they will be protected, even in the event Port Blakely chooses to return to baseline – these areas would still be retained until the SHA expired.

CONCLUSION

After reviewing the current status of the murrelet, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's Biological Opinion that the SHA, as proposed, is not likely to jeopardize the continued existence of the murrelet. The species will be provided with additional potential nesting habitat that will slightly improve its likelihood of survival and recovery.

CRITICAL HABITAT: Marbled Murrelet – Status through Conclusion

STATUS OF DESIGNATED CRITICAL HABITAT: Marbled Murrelet

This Biological Opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat within 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act and the August 6, 2004, Ninth Circuit Court of Appeals decision in Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service (No. 03-35279) to complete the following analysis with respect to critical habitat.

Critical habitat is defined in section 3(5)(A) of the Act as "the specific area within the geographic area occupied by the species on which are found those physical and biological features essential to the conservation of the species, and that may require special management considerations or protection, and specific areas outside the geographical area occupied by a species at the time it is listed, upon determination that such areas are essential for the conservation of the species." The Act defines conservation as the procedures necessary to bring about the eventual recovery and delisting of a listed species.

Legal Status

The final rule designating critical habitat for the murrelet (61 FR 26256 [May 24, 1996]) became effective on June 24, 1996. Critical habitat was designated with the objective of stabilizing population size. The principle factors affecting the murrelet and the main cause of its population decline has been the loss of older forests and associated nest sites and habitat fragmentation (57 FR 45328:45330 [October 1, 1992]).

Primary Constituent Elements

PCEs are the physical and biological features of critical habitat essential to a species' conservation. In the 1996 final rule designating critical habitat for the murrelet (61 FR 26255-26246; May 24, 1996, *Federal Register*), the Service identified two PCEs essential to provide and support suitable nesting habitat for successful reproduction. These are 1) individual trees with potential nesting platforms (PCE 1) and 2) all forested areas, regardless of contiguity, within 0.5 mile of individual trees with potential nesting platforms and a canopy height of at least one-half the site-potential tree height (PCE 2). Areas with just PCE 1, or both PCE 1 and PCE 2 are, by definition, considered to be critical habitat. These PCEs were deemed essential for providing suitable nesting habitat for successful reproduction of the murrelet, and thus its conservation. PCEs require special management considerations.

Conservation Role of Critical Habitat

CHUs for murrelets are intended to maintain a well-distributed population. Murrelet critical habitat was designated based on the identification of six criteria. These include 1) suitable nesting habitat, 2) survey data, 3) proximity to marine foraging habitat, 3) large contiguous blocks of nesting habitat, 5) rangewide distribution, and 6) adequacy of existing protection and management. In some areas, large blocks of Federal land can provide the necessary contribution for recovery of the species. However, in other areas, Federal ownership is limited and Federal lands alone cannot meet recovery requirements to reverse the current population decline and maintain a well-distributed population.

Activities that May Affect PCEs

The final rule (61 FR 26255-26271; May 24, 1996) states that "A variety of ongoing or proposed activities that disturb or remove primary constituent elements may adversely affect, though not necessarily 'adversely modify,' murrelet critical habitat as that term is used in section 7 consultations. Examples of such activities include, but are not limited to, 1) forest management

activities which greatly reduce stand canopy closure, appreciably alter the stand structure, or reduce the availability of nesting sites, and 2) land disturbance activities such as mining, sand and gravel extraction, construction of hydroelectric facilities and road building. Ultimately, actions may alter PCEs if they remove or degrade forest habitat, or prevent or delay future attainment of suitable habitat.

Distribution of Critical Habitat

The designated CHUs are distributed more or less evenly across the range of the species in Washington and Oregon, and less so in California. At the time of listing, designated critical habitat lands included 695 of the over 807 known-occupied sites on Federal lands, and 218 of the 354 known-occupied sites on nonfederal lands. Sites in Redwood National Park in California had not been entered into the database at the time of listing. Further, the Service did not include the marine environment in critical habitat, but instead relied on other existing regulations for protection of this area.

Thirty-two CHUs totaling 3,887,800 acres were designated on Federal, state, county, city, and private lands in Washington, Oregon, and California (61 FR 26255-26269; May 24, 1996) (Table 4). These individual units are coded by the state in which they occur and are individually numbered by unit and subunit (e.g., WA-01-a, OR-01-a, CA-01-a).

Table 4: Designated critical habitat by state, ownership, and land allocation.

State	Ownership	Land Allocation	Designated Critical Habitat (acres)
Washington	Federal Lands	Congressionally Withdrawn Lands	1,800
		Late Successional Reserves	1,200,200
		Federal Total	*1,202,000*
	Non-Federal Lands	State Lands	426,800
		Private Lands	2,500
		Non-Federal Total	*429,300*
		Washington's Overall Total	*1,631,300*
Oregon	Federal Lands	Late Successional Reserves	1,338,200
	Non-Federal Lands	State Lands	175,100
		County Lands	1,100
		Private Lands	900
California (Northern)	Federal Lands	Late Successional Reserves	477,300
	Non-Federal Lands	State Lands	175,500
		Private Lands	40,400
California (Central)	Non-Federal Lands	State Lands	34,800
		County Lands	8,000
		City Lands	1,000
		Private Lands	4,200
		Overall Total	*3,887,800*

The majority of these CHUs (78 percent) occur on Federal lands. In the selection of CHUs, there was a reliance on lands designated as Late Successional Reserves (LSRs) on national forest land. Most LSRs within the range of the murrelet in Washington, Oregon, and California were designated as critical habitat. LSRs, as described in the Northwest Forest Plan, are most likely to develop into large blocks of suitable murrelet nesting habitat given sufficient time. Critical habitat functions are also met by Federal lands not designated as critical habitat in national parks, Wilderness Areas, and portions of national forest lands designated as Adaptive Management Areas and Matrix lands that were found to be occupied by murrelets.

Although most of the areas designated as murrelet critical habitat occur on Federal lands, the Service designated nonfederal lands that met the selection criteria. These lands occurred in areas where Federal lands were insufficient to provide suitable nesting habitat for the recovery of the species. On nonfederal lands, 21 percent of critical habitat acres occur on state lands, 1.2 percent on private lands, 0.2 percent on county lands, and 0.003 percent on city lands.

The quality of forests occurring within the boundaries of the CHUs ranges from non-habitat (e.g., young plantations) to high-quality habitat (i.e., large blocks of old-growth forest). While significant amounts of high-quality murrelet habitat are present in some of the CHUs, much of the habitat in CHUs, particularly on non-Federal lands, is of lesser quality due to its occurrence in smaller, more fragmented blocks. Some of the highest quality murrelet habitat occurs in national parks and designated Wilderness Areas where harvest historically has not occurred. Given the high quality of this habitat and reduced threat of habitat loss or modification due to management objectives, designation of critical habitat was deemed unnecessary in national parks and Wilderness Areas.

Unlike the owl and the bull trout, the tracking of murrelet critical habitat removal and downgrading through section 7 consultations has not been well coordinated across its range. However, it has been estimated that an insignificant amount has been removed or downgraded. The Service is currently analyzing the current condition and amount of murrelet critical habitat in its listed range.

Critical Habitat in Washington State

Washington contains 11 CHUs which total approximately 1,206,000 acres (Table 5) (Excluding 426,800 acres of State land managed under a WDNR Habitat Conservation Plan and 1.088 acres managed under the Plum Creek Habitat Conservation Plan). The acreage of land protected by critical habitat and these Habitat Conservation Plans represents 42 percent of critical habitat within the listed range. Each CHU is made up of between two and seven subunits which range from 191 acres to over 100,000 acres. Also, no CHU is made up entirely of potential nesting habitat, but range between 9 and 53 percent potential nesting habitat.

In Washington State, there is a clear reliance on Federal lands to fulfill the functions for which critical habitat was designated. Eight CHUs contains Federal lands exclusively while one contains both Federal and private lands. These nine CHUs contain 78 percent of the total acreage of CHUs for the State. Critical habitat functions are also met by Federal lands not

designated as critical habitat in national parks, Wilderness Areas, and portions of Forest Service lands designated as Adaptive Management Areas and Matrix lands that were found to be occupied by murrelets.

Critical Habitat units do not include nonfederal lands covered by a legally operative incidental take permit for murrelets issued under section 10(a) of the Act (61 FR 26255-26278; May 24, 1996, *Federal Register*). Therefore, critical habitat designations were excluded on State and private lands upon completion of the WDNR State lands Habitat Conservation Plan (WDNR 1997) and modification of the Plum Creek Cascades Habitat Conservation Plan (Plum Creek 1996, 1999). The effects of these Habitat Conservation Plans and their effects on critical habitat were addressed in the January 1997 Biological Opinion (USFWS 1997b) for issuance of the WDNR Permit, and the December 1999 Biological Opinion (USFWS 1999) to modify the Plum Creek Habitat Conservation Plan based upon the I-90 Land Exchange.

In Washington, there have been minor amounts of critical habitat removed. The majority of loss of critical habitat has been through landslides and blow-downs. An insignificant amount was removed due to timber harvest or major fires. Therefore, recent critical habitat analyses under section 7 consultations were based on the amounts of critical habitat addressed in the final rule. However, these analyses addressed the effects of the loss on the individual critical habitat unit and other units in the listed range of the murrelet.

Summary

Murrelet critical habitat was designated in 1996 due to the high rate of nesting habitat loss and fragmentation. The objective of the designation was to stabilize the murrelet population size. Washington contains 11 CHUs and totals 1,204,000 acres, the majority of which is on Federal land. The Service identified two primary constituent elements for the CHU, specifically, 1) individual trees with potential nesting platforms, and 2) forested areas within 0.5 mile of individual trees with potential nesting platforms and a canopy height of at least one-half the site-potential tree height. Most of the areas designated as murrelet critical habitat occur on Federal land. The highest quality murrelet nesting habitat occurs on national parks and Wilderness areas where harvest historically has not occurred. Designating critical habitat in these areas was deemed unnecessary. The final rule describes activities that may adversely affect though not "necessarily modify" murrelet critical habitat and includes forest management activities, land disturbance activities, and harvest of certain types of commercial forest products.

Table 5: Murrelet Critical Habitat Units (CHU) and Sub-Units in Washington (excludes lands under WDNR Habitat Conservation Plan and Plum Creek Habitat Conservation Plan).

CHU Name	Total Acres in CHU	Total Acres of Potential MAMU Nesting Habitat (2003)	Percent of CHU with Potential MAMU Habitat	Ownership
WA-01-a	60,454	20,286	34%	LSR
WA-01-b	8,200	3,687	45%	LSR
WA-02-a	15,941	8,373	53%	LSR
WA-02-b	1,982	803	40%	LSR
WA-02-c	46,342	21,821	47%	LSR
WA-02-d	412	125	30%	LSR
WA-03-a	97,834	35,045	36%	LSR
WA-03-b	64,993	18,734	29%	LSR
WA-05-b	401	111	28%	PRIVATE
WA-05-c	297	27	9%	PRIVATE
WA-05-d	327	42	13%	PRIVATE
WA-05-f	191	28	15%	PRIVATE
WA-05-g	218	50	23%	PRIVATE
WA-06-a	71,536	22,002	31%	LSR
WA-06-b	44,195	17,137	39%	LSR
WA-07-a	78,133	19,052	24%	LSR
WA-07-b	1,075	286	27%	PRIVATE
WA-07-c	88,699	35,592	40%	LSR
WA-07-d	24,112	9,290	39%	LSR
WA-08-a	85,202	28,082	33%	LSR
WA-08-b	20,399	7,757	38%	LSR
WA-09-a	1,826	761	42%	CWD (Navy)
WA-09-b	108,074	47,882	44%	LSR
WA-09-c	6,918	3,018	44%	LSR
WA-09-d	13,051	4,039	31%	LSR
WA-09-e	48,827	16,488	34%	LSR
WA-10-a	76,586	23,874	31%	LSR
WA-10-b	41,953	14,391	34%	LSR
WA-10-c	25,706	11,033	43%	LSR
WA-11-a	72,196	13,665	19%	LSR
WA-11-b	11,139	1,375	12%	LSR
WA-11-c	37,572	7,029	19%	LSR
WA-11-d	51,360	9,320	18%	LSR
Totals	**1,206,153**	**401,204**	**Average: 33%**	
Above Acres Removed by I-90 Land Exchange and Plum Creek HCP Modification				
WA-10	418			
WA-11	670			

ENVIRONMENTAL BASELINE: Marbled Murrelet Critical Habitat

Regulations implementing the Act (50 CFR § 402.02) define the environmental baseline as the past and present impacts of all Federal, state, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area which have undergone section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress. Such actions include, but are not limited to, previous timber harvests and other land-management activities conducted under the NWFP, Habitat Conservation Plans, and others. The environmental baseline for this action includes actions (as defined above) that have occurred since designation of critical habitat for the murrelet.

Information used to update the environmental baseline includes the effects of 1) actions implemented under the NWFP on Federal lands which have undergone section 7 consultation; 2) section 10 incidental take permits with section 7 consultation completed; and 3) completed section 7 consultations conducted with other Federal agencies.

Within the action area, the only critical habitat designated is on national forest lands in the Mineral Block (Figure 4). There have been no recent activities within those lands (inside the action area) of which the Service is aware.

Within the WA-11-c, there are a total of 37,572 acres designated as critical habitat. Of the designated lands, there are a total of 7,029 acres of potential murrelet nesting habitat. Therefore, about 19 percent of the designated CHU is providing nesting habitat. There are 4,661 acres within this CHU that are located within 400 ft of private lands. While the designated habitat itself is located within a LSR, 12.4 percent of this land (the portion within 400 ft) could be affected by edge effects including smoke from adjacent private lands.

Within the action area, there are 12 acres of land that are designated as critical habitat. Based upon the Service's review of aerial photos, we believe the 12 acres of designated critical habitat are mature forest, probably at least 50 years of age. The area appears to have small inclusions of currently habitat capable stand conditions based upon a remote-sensing Expert Judgment layer (Raphael et al. 2006) that total 1.2 acres, but appear to be no more than 100 ft across, and occur in multiple patches as small as 0.25 acre.

EFFECTS OF THE ACTION: Marbled Murrelet Critical Habitat

We analyzed potential effects to critical habitat adjacent to the covered lands. We also used the expert judgment layer and aerial photos to provide additional information about the condition of the habitat and the potential and location of lands containing PCEs 1 and 2.

The Gifford Pinchot National Forest's Mineral Block contains designated critical habitat for the murrelet. There is one Port Blakely parcel that adjoins this critical habitat. Hence, implementation of the SHA will influence designated critical habitat or result in edge effects to national forest lands in this location. Harvest of that parcel could facilitate windthrow of critical

habitat and loss of PCEs 1 and 2. Suitable nest trees could be lost as a result. Predation to nesting murrelets could also be increased with an adjacent clearcut, but over time those effects would be minimized due to in-growth of stands on Port Blakely land. Due to its lower position on the south slope of a ridge, it is unlikely that harvest on Port Blakely property would result in catastrophic windthrow of adjacent Federal land, or that chronic windthrow would persist for any significant period following harvest.

There is only one small parcel of project lands, a tract of approximately 80 acres, which abuts critical habitat subunit WA-11-c. Activities on this tract could affect 12 acres of designated critical habitat. A review of habitat conditions as indicated by broad landscape-level interpretative layers as well as aerial photography indicated that much of the 12 acres is likely to be in conifer forest somewhat older than 50 years. While the data layer and photography were not in complete agreement, it is our assessment that portions of the CHU within 200 ft of Port Blakely property may provide some nesting opportunities currently. Larger patches with potential for suitable nesting habitat are located further than 200 ft from the property line. While the analysis indicates there may be some pieces of suitable habitat within the area affected, it also indicates that these would likely be in patches of 0.25 acres or less, or in narrow strips less than 100 ft across. These pieces and strips do appear to be located within a matrix of conifer forest about or somewhat older than 50 years in age. Federal lands within this section of land do show some signs of past harvest activity based upon the aerial photograph. Based on our review of the best available information, we anticipate that about 12 acres of critical habitat could be degraded by the indirect effects associated with regeneration harvest.

CUMULATIVE EFFECTS: Marbled Murrelet Critical Habitat

Cumulative effects, as defined in 50 CFR 402.02, include the effects of future State, Tribal, local, or private actions that are reasonable certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

In addition to the effects discussed in the Comprehensive Cumulative Effects section, we anticipate continued timber harvest on other ownerships that will remove forest from areas adjacent to critical habitat within the action area. As these activities are conducted, they will generate effects to murrelet critical habitat which include indirect effects such as increased windthrow and increased risk of predation.

Other forest effects as a result of nearby development may include spread of forest pathogens, soil compaction from motorized vehicles, and increased risk of fire. These effects may result in degradation or loss of murrelet critical habitat, or the loss of forests adjacent to the critical habitat. Conversion of habitat for residential, commercial, or industrial purposes may result in the direct and permanent loss of small amounts of habitat. However, within the action area, it is expected that these effects are not very likely and would only affect approximately 800 ft of boundary between private lands and critical habitat.

CONCLUSION: Marbled Murrelet Critical Habitat

After reviewing the current status of the critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's Biological Opinion that the action, as proposed, is not likely to result in the destruction or adverse modification of critical habitat. This conclusion is based on the rationale that although the proposed action would result in adverse affects to critical habitat within the action area, these effects would not appreciably affect the function of the CHU to serve the intended conservation role for murrelets in conservation Zone 1 or 2, or within the listed range.

There may be some limited degradation and loss of critical habitat that may occur as a result of indirect effects from the activities conducted. This level of degradation, although highly dependent on meteorological conditions, will be extremely localized.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. *Take* is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. *Harm* is defined by the Service as 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 behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). *Harass* is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The proposed SHA and its associated documents clearly identify anticipated adverse effects to covered species likely to result from the proposed action and the measures that are necessary and appropriate to minimize those adverse effects. All conservation measures described in the SHA, together with the provisions described in the associated Implementation Agreement and section 10(a)(1)(A) Permit, are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement pursuant to 50 CFR §402.14(i). Such terms and conditions are non-discretionary and must be undertaken by the USFWS so that they become binding conditions of the Permit issued to the Port Blakely, as appropriate, for the exemptions under section 10(a)(1)(A) and section 7(o)(2) of the Act to apply.

The Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Service: (1) fails to assume and implement the terms and conditions; or (2) If the Permittee fails to adhere to the section 10(a)(1)(A) Permit conditions, the protective coverage

of the Permit and section 7(o)(2) may lapse. The amount or extent of incidental take anticipated under the proposed SHA and associated reporting requirements are as described in the SHA and its accompanying section 10(a) (1) (A) Permit.

In order to monitor the impact of incidental take, the Washington Fish and Wildlife Office must report the progress of the action and its impact on the species as specified in the incidental take statement [50 CFR 402.14(i)(3)].

The Service anticipates that the proposed action is likely to result in the incidental take of owls and murrelets in the form of harm and harass. We anticipate incidental take of individuals of these species would typically be difficult to detect for the following reasons: (1) there is a low likelihood of finding injured or dead individuals of affected species due to one or more of the following factors: relatively low population density, secretive behavior and cryptic coloration, concealing habitat, small size, and sporadic distribution over a large portion of the landscape; (2) the large area associated with implementation of the proposed activities covered by the Permit; (3) the delayed effects of many of the activities that could take species and the take may manifest itself outside the covered lands or outside portions of the covered lands where activities are being conducted; (4) the rapid rate of decomposition after death; (5) the high probability of scavenging of dead individuals by predators; and (6) injured or affected individuals may suffer sub-lethal effects which are difficult to detect. For these reasons, we have used the amount of habitat removed or degraded as a surrogate for expressing the anticipated amount of incidental take in the form of harm or harass. Changes in habitat conditions are a reasonably good indicator of those forms of take.

Most take of either owls or murrelets is expected to be in the form of harass as a result of Permit-covered activities that create the likelihood of sub-lethal injury to individuals by annoying them to such an extent as to significantly disrupt their breeding, feeding, or sheltering behavior. A lesser amount of take of either species is expected to be in the form of sub-lethal harm as a result of by Permit-covered activities that actually injure these species by significantly impairing essential behaviors such as breeding, feeding, or sheltering. Even less likely is take in the form of harm as a result of habitat removal or degradation caused by Permit-covered activities that actually kills owls or murrelets by significantly impairing essential behaviors such as breeding, feeding, or sheltering.

Northern Spotted Owl

AMOUNT OR EXTENT OF TAKE

Based on the best information currently available on owl use of the project area, the Service anticipates that a total of two owl sites (4 birds) on Port Blakely lands and two owl sites (4 birds) on Federal lands could be taken as a result of this proposed action over the course of the Permit period. This incidental take is expected to be in the form of harm and harassment.

Harass

The Service anticipates incidental take of two owl pairs in the form of harass to occur from removal of foraging habitat near two owl site centers on Port Blakely land over the course of the Permit term.

We also anticipate incidental take in the form of harass to occur from sound generated during the operation of equipment associated with timber harvest (i.e., chainsaws and heavy equipment). We anticipate that one owl pair associated with approximately 4.2 acres of potential habitat on national forest land could be exposed to behavior-disrupting sound on an annual basis as a result of regeneration harvest and another owl pair associated with approximately 2.0 acres of habitat on national forest land could be exposed to behavior-disrupting sound on an annual basis as a result of commercial thinning.

We further anticipate the harassment of two owl pairs as a result of regeneration harvest adjacent to Special Management Areas and Special Set-aside Areas that may become suitable dispersal or foraging habitat during the 60-year Permit term. We anticipate that fewer than 80 acres of suitable owl habitat per year could be affected by sound from such regeneration harvests, and fewer than 39 acres per year from commercial thinning.

Harm

The Service anticipates incidental take in the form of harm to occur from indirect windthrow and other edge effects (i.e., loss of interior forest conditions) due to regeneration harvest on the covered lands. Approximately 4.2 acres of high quality suitable owl habitat on national forest land could be exposed to potential windthrow and/or edge effects on an annual basis. We anticipate that fewer than 80 acres of suitable owl habitat per year could be affected by these effects on covered lands from regeneration harvests adjacent to Special Management Areas and Special Set-aside Areas that may become suitable dispersal or foraging habitat during the 60-year Permit term. We anticipate these effects to harm two owl pairs on national forest lands and two owl pairs on covered lands over the course of the Permit period.

EFFECT OF THE TAKE

Take in the form of harm and/or harassment may occur. Unknown sites may be subject to effects derived from timber harvest during the breeding season, individuals may be subject to harm that impairs essential behaviors, or individuals may be subject to harassment and disruption of normal behaviors. For the reasons discussed in the "conclusion" section of this Biological Opinion, the Service determined that the level of anticipated take from the proposed action is not likely to result in jeopardy to the spotted owl.

Marbled Murrelet

AMOUNT OR EXTENT OF TAKE

Based on the best information currently available on murrelet use of the project area, the Service anticipates that undetected murrelets could be exposed to actions that cause incidental take. This incidental take is expected to be in the form of harm and harass.

Harass

The Service anticipates incidental take in the form of harass to occur from the operation of equipment associated with timber harvest (i.e., chainsaws and heavy equipment). We anticipate that murrelets associated with approximately 2.0 acres of potential habitat on national forest land could be exposed to behavior-disrupting sound on an annual basis as a result of commercial thinning and regeneration harvest of adjacent covered lands (0.7 and 1.3 acres per year respectively).

We also anticipate that murrelets associated with fewer than 6.6 acres of suitable murrelet habitat could be harassed annually by sound from regeneration harvests adjacent to Special Management and Special Set-aside Areas that may become suitable habitat during the 60-year Permit term. Murrelets associated with fewer than 4.0 acres of Special Management and Special Set-aside Areas could be harassed annually by sound from commercial thinning.

Harm

The Service anticipates incidental take in the form of harm to occur from indirect effects associated with regeneration harvests. Windthrow and other edge effects (e.g., loss of interior forest conditions and increased nest predation) may occur from these regeneration harvests. We anticipate that approximately 1.3 acres of suitable murrelet habitat on national forest land would be exposed to potential windthrow and/or edge effects on an annual basis. We anticipate that no more than 6.6 acres of murrelet habitat per year would be exposed to potential windthrow and/or edge effects within Special Set-aside Areas on covered lands.

The Service also anticipates incidental take in the form of harm to occur from habitat removal. We believe the probability of such an event is low and would likely involve no more than one nest. The Service anticipates that, over the life of the 60-year Permit term, approximately one acre of murrelet habitat could be harvested per year.

EFFECT OF THE TAKE

For the reasons discussed in the "conclusion" section of this Biological Opinion, the Service determined that the level of anticipated take from the proposed action is not likely to result in jeopardy to the murrelet.

Take in the form of harm and harassment may occur. Unknown sites may be subject to timber harvest during the breeding season, individuals may be subject to effects that impair essential behaviors, or individuals may be subject to disturbance and disruption of normal behaviors. For the reasons described in this Biological Opinion, the Service anticipates minimal probabilities of take.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

Pursuant to 50 CFR 402.14 (i)(1)(ii), reasonable and prudent measures are those measures the Service considers necessary to minimize the impact of the incidental taking. The SHA and all associated documents identify anticipated impacts to the owl and murrelet likely to result from the proposed action and the specific measures and levels of species and habitat protection that are necessary and appropriate to minimize those impacts. No additional reasonable and prudent measures and terms and conditions are necessary and therefore none are provided.

The Service will not refer the incidental take of any migratory bird for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-711), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on covered species or critical habitat, to help implement recovery plans, or to develop information. The Service offers the following conservation recommendations:

1. The Service should facilitate research and monitoring regarding the development and management of owl dispersal habitat on private lands.

2. The Service should conduct regular compliance monitoring and should review periodic implementation reports produced by Port Blakely to ensure this SHA is being implemented as agreed.

3. The Service should assist Port Blakely in coordinating with surrounding landowners, particularly the U.S. Forest Service, on issues relating to landscape management and pertinent data-collection, monitoring, or research.

4. Upon notification of murrelet occupancy on covered lands, the Service should work with other conservation partners to consider the potential option of land acquisition or purchase of easements, if such action is acceptable to Port Blakely and deemed appropriate by the Service after considering other conservation priorities elsewhere.

5. The Service should prepare a report summarizing the implementation of all conservation recommendations within 5 years of Permit issuance. This report should be made available to affected State and Federal agencies, the Tribes, other stakeholders, and interested members of the public. This report should also be kept in the implementation file for the SHA.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of the implementation of any conservation recommendations. This information should be provided in association with Conservation Recommendation 5 above.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the actions outlined in this Biological Opinion. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect covered species or critical habitat in a manner or to an extent not considered in this Biological Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the covered species or critical habitat that was not considered in this Biological Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

The factors enumerated above could include approved deviations from the proposed SHA that result from implementation of the adaptive-management program under the SHA. Adaptive-management changes to benefit one covered species may have adverse effects to the other covered species (or listed species which are not covered by the SHA). Should such adjustments occur to the extent that covered or listed species, or critical habitat, are adversely affected in a manner or to an extent not considered in this Biological Opinion, consultation would be reinitiated.

LITERATURE CITED

Andrus, C.W., B.A. Long, and H.A. Froehlich. 1988. Woody debris and its contribution to pool formation in a coastal stream 50 years after logging. Canadian Journal of Fisheries and Aquatic Sciences 45(12):2080-2086.

Becquey, J., and P. Riou-Nivert. 1987. L'existence de zones de stabilite des peuplements. Consequences sur la gestion. Revue Forestiere Francaise 39:323-334.

Beissinger, S.R. and M.Z. Peery. 2003. Rangewide analysis of juvenile ratios from marbled murrelet monitoring programs: Implications for demographic analyses. Report to the Fish and Wildlife Service Arcata Field Office. University of California, Berkeley, CA. 30pp.

Beissinger, S.R., and N. Nur. 1997. Population trends of the Marbled Murrelet projected from demographic analysis. Appendix B (pages B1-B35) in U.S. Fish and Wildlife Service, Recovery Plan for the Threatened Marbled Murrelet (Brachyramphus marmoratus) in Washington, Oregon and California. U.S. Fish and Wildlife Service, Portland, OR.

Booth, D.E. 1991. Estimating pre-logging old-growth in the Pacific Northwest. Journal of Forestry 89(10):25-29.

Buchanan, J.B. and P. Swedeen. 2005. Final briefing report to the Washington State Forest Practices Board regarding spotted owl status and forest practices rules. Washington Department of Fish and Wildlife, Olympia. 84 pp.

Carey, A.B. 2000 . Ecology of Northern Flying Squirrels: Implications for Ecosystem Management in the Pacific Northwest, USA. Pages 45-61 *in*: Goldingay, R.L., and Scheibe, J.L. (eds). Biology of Gliding Mammals. Filander Verlag Press, Fürth, Germany.

Carey, A.B. and M.L. Johnson. 1995. Small mammals in managed, naturally young, and old-growth forests. Ecological Applications. 5:336-352.

Carey, A.B., T.M. Wilson, C.C. Maguire, and B.L. Biswell. 1997. Dens of northern flying squirrels in the Pacific Northwest. Journal of Wildlife Management. 61(3):684-699.

Chen, J., J.F. Franklin, and T.A. Spies. 1995. Growing-season microclimatic gradients from clear-cut edges into old-growth Douglas-fir forests. Ecological Applications 5:74-86.

Courtney, S.P., J.A. Blakesley, R.E. Bigley, M.L. Cody, J.P. Dumbacher, R.C. Fleischer, A.B. Franklin, J.F. Franklin, R.J. Gutiérrez, J.M. Marzluff, and L. Sztukowski. 2004. Scientific evaluation of the status of the northern spotted owl. Sustainable Ecosystems Institute. Portland, Oregon. September 2004.

Cummins, E., J. Engbring, C. Turley, and N. Wilkins. 1993. Marbled murrelet protection on nonfederal forest lands in Washington. A report of the Science Advisory Group to the Forest Practices Board on marbled murrelet rule making. Unpublished report, September 1993. 4 pp.

Davis, R., and J. Lint. 2005. Habitat status and trends. Chapter 3 *in* Northwest Forest Plan—the first 10 years (1994–2003): status and trends of northern spotted owl populations and habitat. Lint, Joseph, tech. coord. 2005. Gen. Tech. Rep. PNW-GTR-648. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 176 p.

Delaney, D. K., T. G. Grubb, P. Beier, L. L. Pater, and M. H. Reiser. 1999. Effects of helicopter noise on Mexican spotted owls. Journal of Wildlife Management 63:60-76.

Drent, R. 1972. The natural history of incubation. Pages 262-311 in D.S. Farner (Ed) Breeding biology of birds. Washington, D.C. National Academy of Science.

Forsman, E.D., R.G. Anthony, J.A. Reid, P.J. Loschl, S.G. Sovern, M. Taylor, B.L. Biswell, A. Ellingson, E.C. Meslow, G.S. Miller, K.A. Swindle, J.A. Thrailkill, F.F. Wagner, and D. E. Seaman. 2002. Natal and breeding dispersal of northern spotted owls. Wildlife Monographs 149:1-35.

Grizzel, J.D., and N. Wolff. 1998. Occurrence of windthrow in forest buffer strips and its effect on small streams in northwest Washington. Northwest Science 72(3):214-223.

Hamer, T.E. 1995. Inland habitat associations of marbled murrelets in western Washington. Pages 163-189. *In*: Ralph, C.J., G.L. Hunt, M.G. Raphael, and J.F. Piatt (eds). Ecology and conservation of the marbled murrelet. U.S. Department of Agriculture Forest Service, Pacific Southwest Research Station, General Technical Report PSW-152, Albany, California. 420 pp.

Hamer, T.E. and D.J. Meekins. 1999. Marbled murrelet nest site selection in relation to habitat characteristics in western Washington. Hamer Environmental, Mt. Vernon, WA. 1998 Report. 28 pp.

Herter, D.R., and L.L. Hicks. 2000. Barred owl and spotted owl populations and habitat in the central Cascade Range of Washington. Journal of Raptor Research 34(4): 279-286.

Hicks, L.L., W. O. Vogel, D. R. Herter, R. J. Early, and H. C. Stabins. 2008. Plum Creek's Central Cascades Habitat Conservation Plan and Modeling for the Northern Spotted Owl. Chapter 21 In: Models for Planning Wildlife Conservation in Large Landscapes. Editors Millspaugh J.J., and F.R. Thompson, III. Academic Press. ISBN: 978-0-12-373631-4

Huff, M.H., M.G. Raphael, S.L. Miller, S.K. Nelson, and J. Baldwin. 2006. Estimating the amount of marbled murrelet nesting habitat on Federal land by using a systematic grid sampling strategy. Pages 61-96. *In*: Northwest Forest Plan - The first 10 years (1994-2003): Status and trends of populations and nesting habitat for the marbled murrelet. General Technical Report: PNW-GTR-650. U.S. Department of Agriculture, Forest Service, Portland, Oregon, 149 pp.

ICF Jones & Stokes. 2008. Safe Harbor Agreement, Landowner Option Plan and Cooperative Habitat Enhancement Agreement: Port Blakely Tree Farms, Morton Block. September (ICF J&S 00209.07). Prepared for Port Blakely Tree Farms, L.P.

Manley, I.A. 1999. Behaviour and habitat selection of marbled murrelets nesting on the sunshine coast. Master's thesis. Simon Fraser University, British Columbia, Canada. 163 pp.

Manley, I.A., and S.K. Nelson. 1999. Habitat characteristics associated with nesting success and predation at marbled murrelet nests. Pacific Seabirds 26:40.

Malt. J. and D. Lank. 2007. Temporal dynamics of edge effects on nest predation risk for the marbled murrelet. Biological Conservation 140. 160 -173.

McShane, C., T.E. Hamer, H.R. Carter, R.C. Swartzman, V.L. Friesen, D.G. Ainley, K. Nelson, A.E. Burger, L.B. Spear, T. Mohagen, R. Martin, L. Henkel, K. Prindle, C. Strong, and J. Keany. 2004. Evaluation reports for the 5 year status review of the marbled murrelet in Washington, Oregon, and California. EDA, Inc., Seattle, Washington, 370 pp.

Miller, G.S., R.J. Small, and E.C. Meslow. 1997. Habitat selection by spotted owls during natal dispersal in western Oregon. Journal of Wildlife Management 61:140-150.

Miller, K.F. 1985. Windthrow Hazard Classification. Forestry Commission. Leaflet 85. HMSO, London.

Mitchell, S.J. 2000. Stem growth responses in Douglas-fir and Sitka spruce following thinning: implications for assessing windfirmness. Forest Ecology and Management 135:105:114.

Mobbs, M.W., and B.C. Jones. 1995. Quinault Indian Nation. Riparian management zone project report. Quinault Indian Nation. Taholah, Washington. 50pp.

Murray Pacific Corporation. 1993. Habitat Conservation plan for the northern spotted owl on timberlands owned by the Murray Pacific Corporation, Lewis County, Washington. Tacoma, Washington. September 1993.

Murray Pacific Corporation. 1995. Amendment to the Habitat Conservation Plan and incidental take permit PRT-777837 for the northern spotted owl on timberlands owned by the Murray Pacific Corporation, Lewis County, Washington. Tacoma, Washington. May 1995.

Nelson, S.K. and T.E. Hamer. 1995a. Nest success and the effects of predation on marbled murrelets. Pages 89-97. *In*: Ralph, C.J., G.L. Hunt, M.G. Raphael, and J.F. Piatt (eds). Ecology and conservation of the marbled murrelet. General Technical Report. PSW-GTW-152. Pacific Southwest Experimental Station, U.S. Forest Service, Albany, California. 420 pp.

Nelson, S.K., T.E. Hamer, A.K. Wilson, and D.J. Meekins. 2003. Marbled murrelet nest tree and nest site selection. Pacific Seabirds. 30(1):51-52.

Nelson, S.K., M.H. Huff, S.L. Miller, and M.G Raphael. 2006. Marbled murrelet biology: Habitat relations and populations. Pages 9-30. *In*: Northwest forest plan- the first 10 years (1994-2003): Status and trends of populations and nesting habitat for the marbled murrelet. General Technical Report PNW-GTR-650. Pacific Northwest Research Station, U.S. Forest Service, Portland, Oregon.149 pp.

Nelson, S.K., and A.K. Wilson. 2002. Marbled murrelet habitat characteristics on state lands in western Oregon. Final Report, Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University, Department of Fisheries and Wildlife, Corvallis, Oregon. 151pp.

Pearson, R.R., and K.B. Livezey. 2003. Distribution, numbers, and site characteristics of spotted owls and barred owls in the Cascade Mountains of Washington. Journal of Raptor Research 37(4):265-276.

Perry, D.A. 1995. Status of forest habitat of the marbled murrelet. Pages 381-83. *In*: Ralph, C.J., G.L. Hunt, M.G. Raphael, and J.F. Piatt (eds). Ecology and conservation of the marbled murrelet. General Technical Report. PSW-GTW-152. Pacific Southwest Experimental Station, U.S. Forest Service, Albany, California. 420 pp.

Plum Creek Timber Company, L.P. 1996. Multi-Species Habitat Conservation Plan on Forestlands owned by Plum Creek Timber Company, L.P., in the I-90 Corridor of the Central Cascades Mountain Range, Washington. Plum Creek Timber Company, L.P., Seattle, Washington. 391 pp.

Plum Creek Timber Company, L.P. 1999. Final Description and Analysis of Modifications to Plum Creek Timber Company's Cascade Habitat Conservation Plan. Plum Creek Timber Company, Seattle, Washington. May 1999. 106 pp.

Ralph, C.J., G.L. Hunt, M.G. Raphael, and J.F. Piatt. 1995. Ecology and conservation of the marbled murrelet in North America: An overview. Pages 3-22. *In*: Ralph, C.J., G.L. Hunt, M.G. Raphael, and J.F. Piatt (eds). Ecology and conservation of the marbled murrelet. General Technical Report. PSW-GTW-152. Pacific Southwest Experimental Station, United States Department of Agriculture, Forest Service, Albany, California. 420 pp.

Raphael, M.G., B.M. Galleher, M.H. Huff, S.L. Miller, S.K. Nelson, and R.D. Young. 2006. Spatially explicit estimates of potential nesting habitat for the marbled murrelet. Pages 97-146. In: Northwest forest plan- the first 10 years (1994-2003): Status and trends of populations and nesting habitat for the marbled murrelet. General Technical Report PNW-GTR-650. Pacific Northwest Research Station, U.S. Forest Service, Portland, Oregon.149 pp.

Raphael, M. G., S, K. Nelson, P. Swedeen, M. Ostwald, K. Flotlin, S. Desminone, S. Horton, P. Harrison., D. Prenzlow Escene, and W. Jaross. 2008. Recommendations and Supporting Analysis of Conservation Opportunities for the Marbled Murrelet Long-Term Conservation Strategy. Washington Department of Natural Resources, Olympia, WA.

Reid, L.M., and S. Hilton. 1998. Buffering the buffer. General Technical Report PSW-GTR-168. Pacific Southwest Research Station. U.S. Forest Service, Arcata, CA.

Ripple, W.J. 1994. Historic spatial patterns of old forests in western Oregon. Journal of Forestry 92(11):45-49.

Rollerson, T., and K. McGourlick. 2001. Riparian Windthrow. Pages 139-155. In: Proceedings of the Windthrow Researchers Workshop. Richmond, British Columbia. 229pp.

Rosenberg, D.K. and R.G. Anthony. 1992. Characteristics of northern flying squirrel populations in young second- and old-growth forests in western Oregon. Can. J. Zool. 70:161-166.

Sherwood, K. 1993. Buffer strip dynamics in western Oregon Cascades. Master's Thesis. Forest engineering Department, Oregon State University, Corvallis, Oregon.

Stathers, R.J., T.P. Rollerson, and S.J. Mitchell. 1994. Windthrow handbook for British Columbia forests. British Columbia Ministry of Forests, Victoria, British Columbia. Working Paper 9401. 32pp.

Steinblums, I.J. 1978. Streamside buffer strips: survival, effectiveness, and design. Master's Thesis. Oregon State University, Corvallis, Oregon. 181pp.

Teensma, P.D.A., J.T. Rienstra, and M.A. Yeiter. 1991. Preliminary reconstruction and analysis of change in forest stand age classes of the Oregon coast range from 1850 to 1940. Technical Note OR-9. Bureau of Land Management, Salem, OR, 9 pp.

(TFW) Timber, Fish, and Wildlife Field implementation committee. 1994. Washington 1993 riparian management zone survey. Washington Department of Natural Resources. Timber/Fish/Wildlife Agreement. TFW-000-94-001. Olympia, Washington. 58 pp.

Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990. A conservation strategy for the northern spotted owl. Report of the Interagency Scientific Committee to address the conservation of the northern spotted owl. Unpublished interagency document. 458 pages.

Thomas, J.W., and M.G. Raphael (Eds.) 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. Report of the Forest Ecosystem Management Assessment Team (FEMAT). July 1993. Portland, OR: USDA Forest Service and the USFWS Bureau of Land Management.

USDA and USDI. 1994. (U.S. Department of Agriculture Forest Service, and U.S. Department of the Interior Bureau of Land Management). Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl; standards and guidelines for management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. Portland, Oregon.

US Fish and Wildlife Service. 1987. The northern spotted owl status review. Portland, Oregon.

_____. 1990. Endangered and Threatened Wildlife and Plants; determination of threatened status for the northern spotted owl. Fed. Reg. Vol. 55. 123: 26114-26194. June 26, 1990.

_____. 1997a. Recovery Plan for the threatened marbled murrelet (*Brachyramphus marmoratus*) in Washington, Oregon, and California. Portland, Oregon. 203 pp.

_____. 1997b. Biological Opinion for the issuance of a Section 10(a)(1)(B) Incidental Take Permit to the State of Washington Department of Natural Resources for the Washington Department of Natural Resources HCP.

_____. 1999. Biological Opinion, reinitiation of intra-Service consultation on the modification of Plum Creek's Cascades Habitat Conservation plan to accommodate the Interstate-90 Land Exchange. X-Reference: Incidental Take Permit (PRT-808398) (FWS Reference: 1-3-00-FR-0245; X-Reference: 1-3-96-FW-190; 1-3-98-FR-0357).

_____. 2003. Biological Opinion and letter of concurrence for effects to bald eagles, marbled murrelets, northern spotted owls, bull trout, and designated critical habitat for marbled murrelets and northern spotted owls from Olympic National Forest program of activities for August 5, 2003, to December 31, 2008. USDI Fish and Wildlife Service, Lacey, Washington.

_____. 2004. Marbled murrelet 5-year review process: overview. Portland, Oregon. 28 pp.

_____. 2006. Biological Opinion for the Issuance of a Section 10(a)(1)(B) Incidental Take Permit to the State of Washington for the Forest Practices Habitat Conservation Plan. Lacey, WA. 984 pp.

_____. 2007. Draft recovery plan for the northern spotted owl, *Strix occidentalis caurina*: Merged options 1 and 2. Portland, Oregon. 160 pp.

_____. 2008a. Draft Environmental Assessment. Port Blakely Tree Farms Morton Block Safe Harbor Agreement. U.S. Fish and Wildlife Service, Lacey, WA.

_____. 2008b. Final Recovery Plan for the Northern Spotted Owl, *Strix occidentalis caurina*. Portland, Oregon. 142 pp.

_____. 2009. Environmental Assessment. Port Blakely Tree Farms Morton Block Safe Harbor Agreement. U.S. Fish and Wildlife Service, Lacey, WA.

WDNR (Washington Department of Natural Resources). 1997. Final Habitat Conservation Plan, Olympia, Washington.

WDNR (Washington Department of Natural Resources). 2005. Final Forest Practices Habitat Conservation Plan, Olympia, Washington.

Witt, J, W. 1992. Home Range and Density Estimates for the Northern Flying squirrel, glaucomy sabrius, in western Oregon. Journal of Mammalogy. 73(4)921-929.

White, C.M., and T.L. Thurow. 1985. Reproduction of ferruginous hawks exposed to controlled disturbance. Condor 87: 14-22.

PERSONAL COMMUNICATIONS

Flotlin, K. 2009. Personal communication. . U.S. Fish and Wildlife Service, Washington Fish and Wildlife Office, Lacey, WA

IN LITT. REFERENCES

Murden, B. 2009. Port Blakely Tree Farms. Tumwater, WA. Emails to Mark Ostwald, Washington Fish and Wildlife Office, on amounts of habitat.

Maurice, K. 2009. U.S. Fish and Wildlife Service, Portland OR. Emails to Mark Ostwald, Washington Fish and Wildlife Office, on marbled murrelet habitat in Clatsop State Forest, OR.