United States Department of the Interior

FISH AND WILDLIFE SERVICE
Western Washington Office
510 Desmond Drive SE, Suite 102
Lacey, Washington 98503
Phone: (360) 753-9440 Fax: (360) 753-9008

COPY

OCT 12 2000

Memorandum

To: Assistant Regional Director, Ecological Services, Portland, Oregon (Attention: Larry Salata)

From: Manager, Western Washington Office, Lacey, Washington

Subject: Biological and Conference Opinions for the Issuance of an Incidental Take Permit to Simpson Timber Company, Northwest Operations, for Simpson Washington Timberlands Habitat Conservation Plan, in Mason, Grays Harbor, and Thurston Counties, Washington (FWS Ref: 1-3-00-FWF-2098)

This document constitutes the U.S. Fish and Wildlife Service's (Service) Biological and Conference Opinions (Opinion) prepared pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act), on the potential effects of issuing a proposed incidental take permit to Simpson Timber Company (Simpson) for up to 46 species (with an additional five species proposed to be covered by the National Marine Fisheries Service) for a period of 50 years, pursuant to section 10(a)(1)(B) of the Act. These Opinions are based on the Service's review of the proposed Simpson Timber Company, Shelton, Washington Timberlands Multi-Species Habitat Conservation Plan (final HCP), located in Mason, Grays Harbor, and Thurston counties, Washington, and its effects on the marbled murrelet, bald eagle, bull trout (all Federally threatened species), and coastal cutthroat trout (a Federally proposed species), in accordance with section 7 of the Act. As per the No Surprises Regulations (50 ***CFR*** 17.3), the Service has also prepared Conference Opinions for 42 proposed Permit Species (all currently unlisted species) addressed by the final HCP. Note that the National Marine Fisheries Service (NMFS) is preparing a companion Biological/Conference Opinion on the subject section 10 permit application for coverage of anadromous salmonids under its purview, including chinook salmon, (currently listed as threatened in Puget Sound region), chum salmon (currently listed as threatened), coho salmon, pink salmon, and steelhead trout. NMFS will be evaluating a separate incidental take permit application from Simpson for the subject proposed action. The request for initiation of formal consultation was received by our office on April 6, 2000, and formal consultation was initiated on that date.

Listed Species or Designated Critical Habitat Not Covered by the Incidental Take Permit

Northern spotted owl

During informal and formal consultation for the proposed action, the Service considered anticipated effects to northern spotted owls (*Strix occidentalis caurina*), a Federally listed

threatened species, that might result from implementation of the action as proposed. Historically the Plan Area likely had large areas of appropriate habitat characteristics (mature to old-growth forest) and was almost certainly occupied by moderate numbers of northern spotted owls before logging occurred. Spotted owls may currently occupy the Plan Area; a pair of northern spotted owls were detected in August 2000 within and adjacent to the Plan Area. Washington Department of Fish and Wildlife (WDFW) located the site center for the pair on U.S. Forest Service lands in a patch of old growth coniferous forest, approximately 200 yards north of the Plan Area (Ann Potter, pers. com). A GIS analysis of the habitat within a 2.7 mile radius of this pair, named the Canyon River pair (Site # 456) in WDFW's spotted owl database, revealed a total of approximately 2,286 acres of habitat in the Plan Area, which exceeds the threshold of where there is a risk of incidental take. Furthermore, portions of the Plan Area occur within the 70-acre core and within 0.7-mile of the site center for this pair. Therefore, further loss of suitable habitat within the 70-acre core, the 0.7-mile circle and/or the 2.7-mile home range radius would create a likely risk of incidental take. The Service is not authorizing incidental take for spotted owls under this proposed action, and therefore loss or degradation of suitable habitat within the 2.7-mile home range radius of the site center that overlaps Simpson ownership is not exempted from take herein.

Northern spotted owls, due to their habitat limitations, are only likely to occupy a very small portion of the Plan Area during the proposed ITP term, due to past and future expected landscape modifications resulting from human activities, particularly logging. Almost all of the Plan Area is of younger forest age classes; age classes not used by northern spotted owls. The applicant has indicated that "take" coverage for northern spotted owls is not sought as part of the proposed ITP application, and that they will adhere to Federal laws. Thus take of spotted owls is not anticipated to occur as part of the proposed action, as take would be subject to the prohibitions of section 9 of the Act, and sites occupied by northern spotted owls would be adequately protected by the applicant to avoid take, including sufficient activity buffers.

Simpson is therefore operating under a take avoidance plan for the northern spotted owl, which in this current case, provides for no logging of suitable habitat within the 2.7-mile home range radius for the Canyon River pair (Site # 456). Two other spotted owl sites were centered in what is now the Plan Area, but are now considered historic (no longer occupied) as a result of protocol surveys conducted by WDFW from 1991 to 1994. After three consecutive years of survey following their initial discovery, WDFW reclassified the sites as historic due to lack of additional spotted owl detections (EIS).

Aside from take, potential adverse effects to northern spotted owls resulting from the subject action may include suppression of potential nesting or dispersal habitat (unoccupied), of value to northern spotted owl long-term survival. This potential suppression of owl habitat would result primarily from continued logging of forests in the Plan Area, keeping the Plan Area in perpetual younger age classes not utilized by northern spotted owls, and preventing development of older age classes (for the life of the proposed ITP term, plus an additional undetermined period related to forest succession processes).

However, with continued implementation of the Northwest Forest Plan and approved HCPs, sufficient core habitat for northern spotted owls will be retained or developed on the Olympic Peninsula and in southwest Washington, and will be utilized by owls as long as occasional dispersal between core areas occurs. Occasional dispersal of northern spotted owls between these core areas across the Plan Area may be necessary for genetic exchange, and/or "rescue"of core areas following extirpation, for long-term survival of the species, but this is undetermined. It is also undetermined whether conditions for this dispersal may or may not be sufficiently present across the Plan Area and/or environs during the period of the proposed action. However, the final draft recovery plan for the owl concludes that dispersal across the Plan Area between core areas to the north and south are not essential (U.S. Fish and Wildlife Service 1993).

Because the applicant has designed the proposed Plan, and committed, to avoid unauthorized take, and because the Plan Area, and potentially affected portions of the Assessment Area, are not essential for the long-term survival of species, the proposed action is not likely to adversely affect the northern spotted owl.

Critical Habitat

No designated critical habitat exists within the Plan Area, or on private lands within ten miles of the Plan Area. Critical habitat has been designated for northern spotted owl and marbled murrelet within the action area on Federal lands just north of the Plan Area, some of which is within Federal land portions of the Assessment Area; Simpson would not be able to acquire and add these Federal lands to the proposed ITP. Thus, no designated critical habitat would potentially be directly affected as a result of the proposed action. However, critical habitat could be somewhat degraded as a result of the indirect effects of timber harvest activities on Plan Area lands and/or on Assessment Area lands that may be acquired by Simpson over the proposed ITP term; portions of these lands lie directly adjacent to critical habitat for both species on Federal lands. Marbled murrelet critical habitat abuts the Plan Area/Federal lands border for 37 miles. Northern spotted owl critical habitat abuts the Plan Area/Federal lands border for 3.5 miles. Degradation of critical habitat could result from timber harvest along the Federal/Simpson border, and could be in the form of increased edge effects or susceptibility to blowdown. These effects are anticipated to be limited by the linear nature of the shared border, and the fact that many of the shared border areas do not currently have constituent elements established (on the Federal/critical habitat side of the border) within them at this time, although some forests on these Federal lands would likely develop successionally into suitable habitat with primary constituent elements over the life of the proposed ITP. Degradation of critical habitat constituent elements, such as would occur as a result of the proposed action, is likely to be along a linear edge, indirect and temporal, and widely spaced in time and place during the proposed 50 year ITP term, and, thus, relatively minor; constituent elements of critical habitat would not likely be substantially degraded. Thus, designated critical habitat for northern spotted owl or marbled murrelet is not likely to be adversely affected as a result of the proposed action. Northern spotted owls will not be discussed further herein.

Federally listed plants

This document also addresses potential adverse effects from the proposed ITP issuance on the Golden Indian-paintbrush (*Castilleja levisecta*), a Federally listed plant species. Golden Indian-paintbrush occurs in open grasslands in the Puget Trough. The substrate for this plant is generally composed of glacial outwash or depositional material. The species prefers sun, can tolerate partial shade, but will not tolerate a closed canopy. Golden Indian-paintbrush are found at elevations ranging from 10 to 300 feet (Sheehan and Sprague 1984). Golden Indian-paintbrush once occurred from Oregon to Vancouver Island in British Columbia, Canada. However, only ten known populations of this plant now exist in open grasslands ranging from south of Olympia in Thurston County, Washington, north through the Puget Trough to southwest British Columbia, Canada (62 ***FR*** 31740). None of the ten known populations occur within the action area, and undiscovered populations are unlikely in the action area and even less likely in the Assessment Area; therefore, Golden Indian-paintbrush is not likely to be adversely affected by the proposed action.

No other listed plants are known to occur within the action area. However, the white-top aster, *Aster curtus*, and the Frigid shootingstar, *Dodecatheon austrofrigidium*, are Federal species of concern and are identified by Washington State as sensitive and threatened species, respectively. Seven rare plant species (including white-top aster and Frigid shooting star) may occur within the Plan Area or action area; however, systematic plant surveys have not been done on Simpson lands. Many of the plant species of greatest management concern are associated with rivers, streams and wetlands (water lobelia and northern grass-of Parnassus), and these aquatic habitats would receive some protection in the Plan from proposed wetlands and streamside buffers. The plants discussed above are not addressed further herein.

INTRODUCTION

The proposed incidental take of up to 51 listed and unlisted species (the total number of species proposed for coverage by both the NMFS and the Service) would occur as the result of on-going mechanized timber harvest, log transportation, road construction, maintenance, and decommissioning, site preparation and slash abatement, tree planting, fertilization, silvicultural thinning, experimental thinning and management, wildfire suppression, vertebrate control, stream restoration, research and monitoring (including electrofishing), and harvest and management of minor forest products including firewood, floral brush, mushrooms and ferns consistent with the HCP and Implementation Agreement (IA) (July, 2000). The HCP proposes coverage of these actions on 261,575 acres of the forest land/tree farm owned by Simpson, plus additional surrounding lands that could be potentially acquired by Simpson (see Exhibit A in the IA) . Table 1 contains a list of the 51 species for which Simpson is seeking incidental take coverage from both NMFS and the Service.

Table 1. Species Included for Proposed Incidental Take Coverage in Simpson's Multi-species Habitat Conservation Plan (Status codes at end of Table).

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	FEDERAL RESPONSIBILITY
Headwater Species Association				
Torrent salamander	*Rhyacotriton olympicus*	FSC	SM	FWS
Tailed frog	*Ascaphus truei*	FSC	SM	FWS
Cope's giant salamander	*Dicamptodon copei*		SM	FWS
Western red-backed salamander	*Plethodon vehiculum*			FWS
Steep Tributary Species Association				
Cutthroat trout	*Oncorhynchus clarki clarki*	FP		FWS
Shorthead sculpin	*Cottus confusus*			FWS
Van Dyke's salamander	*Plethodon vandykei*	FSC		FWS
Flat Tributary Species Association				
Coho salmon	*Oncorhynchus kisutch*	FC		NMFS
Chum salmon	*Oncorhynchus keta*	FT		NMFS
Riffle sculpin	*Cottus gulosus*			FWS
Coast Range sculpin	*Cottus aleuticus*			FWS
Reticulate sculpin	*Cottus perplexus*			FWS
Speckled dace	*Rhinichthys osculus*			FWS
Brook lamprey	*Lampetra richardsoni*			FWS
Mainstem Species Association				
Chinook salmon; Puget Sound	*Oncorhynchus tshawytscha*	FT		NMFS
Steelhead trout; searun and resident	*Oncorhynchus mykiss*			NMFS
Pink salmon	*Oncorhynchus gorbuscha*			NMFS
Bull trout; Columbia R. and Coastal/Puget Sound pop.'s	*Salvelinus confluentus*	FT		FWS
Dolly varden	*Salvelinas malma*			FWS
Torrent sculpin	*Cottus rotheus*			FWS

Longnose dace	*Rhinichthys cataractae*			FWS
Pacific lamprey	*Lampetra tridentatus*	FSC		FWS
River lamprey	*Lampetra ayresi*	FSC		FWS
Western toad	*Bufo boreas*	FSC		FWS
Lentic Species Association				
Prickly sculpin	*Cottus asper*			FWS
Olympic mudminnow	*Novumbra hubbsi*		SC	FWS
Threespine stickleback	*Gasterosteus aculeatus*			FWS
Northwestern salamander	*Ambystoma gracile*			FWS
Long-toed salamander	*Ambystoma macrodactylum*			FWS
Red-legged frog	*Rana aurora*			FWS
Marbled murrelet	*Brachyramphus marmoratus*	FT	ST	FWS
Bald eagle	*Haliaeetus leucocephalus*	FT	ST	FWS
Harlequin Duck	*Histrionicis histrionicus*	FSC	SG	FWS
Band-tailed pigeon	*Columba fasciata*		SG	FWS
Roosevelt elk	*Cervus elaphus Roosevelti*		SG	FWS
Class 1 Snag Dependent Species - Typically use 8.0-14.0" dbh snags				
Downy woodpecker	*Picoides pubescens*			FWS
Black-capped chickadee	*Parus atricapillus*			FWS
Class 2 Snag Dependent Species - Typically use 14.1-20.0" dbh snags				
Western bluebird	*Sialia mexicana*		SM	FWS
Purple martin	*Progne subis*		SC	FWS
Chestnut-backed chickadee	*Parus rufescens*			FWS
Red-breasted sapsucker	*Sphyrapicus ruber*			FWS
Tree swallow	*Tachycineta bicolor*			FWS
Violet-green swallow	*Tachycineta thalassina*			FWS
Hairy woodpecker	*Picoides villosus*			FWS

Western screech owl	*Otus kennicottii*			FWS
Northern pigmy owl	*Glaucidium gnoma*			FWS
Northern saw-whet owl	*Aegolius acadicus*			FWS
Northern flicker	*Colaptes aurotus*			FWS
Class 3 Snag Dependent Species - Typically use >20" dbh snags				
Pileated woodpecker	*Dryocpops pileatus*		SC	FWS
Wood duck	*Aix sponsa*		SM	FWS
Common merganser	*Mergus merganser*		SG	FWS

Federal Status Codes:
FT - Federally threatened
FC - Federal candidate
FSC - Federal species of concern
FP - Federally proposed

State Status Codes:
ST - State threatened
SC - State candidate
SS - State sensitive
SG - State game species of concern
SM - State monitor species

FWS - Fish and Wildlife Service
NMFS - Nat. Marine Fish. Service

CONSULTATION HISTORY

Simpson owns forested land and operates timberland and wood product manufacturing operations in the northwestern United States. In Washington State, Simpson's timberland holdings include the Shelton Washington Timberlands, a tree farm covering 261,575 acres, that is located in portions of Mason, Grays Harbor, and Thurston counties, Washington.

On September 10, 1998, Simpson held a public meeting to discuss a proposed Landowner Landscape Plan (LLP), to be developed with WDFW, that would be implemented to address Washington State Forest Practices rules. At that time, the proposed LLP contained essentially the same elements as the HCP, and elements of the HCP were described at that meeting. In early 1999, Simpson decided to move ahead with competition of the HCP, followed by the LLP. As of September, 2000, the LLP process with Simpson had not been reactivated.

From 1997 to present, the Services provided technical and policy assistance to Simpson in development of the final HCP. Between April, 1997 and November, 1998, at least 46 meetings were held between the Services, Simpson and the following agencies, Tribes and organizations: Environmental Protection Agency (EPA), Washington Department of Natural Resources (DNR), Washington Department of Fish and Wildlife (WDFW),Washington Department of Ecology (DOE), National Audubon Society (NAS), Skokomish Indian Tribe (SKOK), Squaxin Island Indian Tribe (SQAX), Quinault Indian Tribe (QIN) Point No Point Treaty Council (PNPTC), and Northwest Indian Fisheries Commission (NWIFC). In addition, numerous field trips were held for these participants to give them perspectives of the Plan Area and the proposed management

actions. More than 200 additional discussions were held among these participants via phone calls, faxes, and electronic-mails. The Services prepared a Species List of threatened, endangered and proposed species known to occur in the proposed Plan Area on December 3, 1998 (FWS Reference: 1-3-99-SP-0061). This list was provided to Resources Northwest Consultants, on behalf of Simpson.

The National Environmental Policy Act (NEPA) Draft Environmental Impact Statement (DEIS) for the HCP was made available for a 62-day public comment period on October 26, 1999. The comment period was extended for 18 days to January 14, 2000 (65 ***FR*** 761), in response to requests from the public and concerns by the Service that the public would have inadequate opportunity to comment because of the holiday season. This resulted in a total comment period duration of 80 days. The Service and NMFS also solicited comments via letters mailed directly to individuals and organizations included on the Service's public notification mailing list. The Service and NMFS also advertised this comment period and extension by distributing news releases to newspapers, and radio and television stations in Western Washington.

The Services and Simpson prepared a final EIS on the Draft HCP (USDI 2000) and a Response to Public Comments on the Public Review Draft EIS (USDI 2000). These two documents were made available to the public on July 21, 2000. The Services have addressed public, tribal and agency concerns raised about the Draft HCP and discussed alternative approaches with Simpson.

This Biological and Conference Opinion is based on Simpson's final HCP and Implementing Agreement, amended technical appendices, including TMDL Technical Assessment Report, Implementation Agreement, as well as the Services' Final NEPA EIS, and Response to Public Comments on the Public Review draft of the NEPA EIS, several years of discussions and negotiations with Simpson and Washington Department of Fish and Wildlife personnel, site visits, technical reports, and other published literature as cited in this document and listed in the Literature Cited section. A complete administrative record of this HCP is on file in the Service's Western Washington Office in Olympia, Washington.

A request for initiation of formal consultation, dated March 30, 2000, from the Division of Consultation and Conservation Planning (Regional Office), was received on April 6, 2000. Initiation of consultation began on April 6, 2000, with receipt of Portland Regional Office's intra-Service section 7 evaluation form, wherein the Regional Office requested the Western Washington Office initiate formal consultation and conference on the proposed HCP.

BIOLOGICAL AND CONFERENCE OPINIONS

DESCRIPTION OF THE PROPOSED ACTION

Simpson (applicant) has prepared a multi-species HCP and applied for a section 10(a)(1)(B) incidental take permit (ITP) to comply with the Act and to address proposed commercial timber harvest activities. The proposed 50-year HCP and ITP would cover 261,575 acres of Simpson's

lands (Plan Area) plus additional unquantified lands (within the Assessment Area), primarily within the Chehalis River drainage in Mason and Grays Harbor counties, in northwestern Washington. It is the stated intent of Simpson to manage the Plan Area and portions of the

Assessment Area as commercial forest. The applicant has committed to a specific conservation plan for a list of species proposed for incidental take coverage (Permit Species) within the final HCP.

In accordance with the No Surprises regulation (50 ***CFR*** Part 17), we will only provide assurances for species that are adequately covered in the HCP, treated as if they were listed, and specifically identified on the ITP. Simpson is seeking incidental take coverage for numerous unlisted species, in the event that those species become listed sometime during the proposed 50-year ITP term. At this time, the Services will do Conference Opinions on the currently unlisted species, and identify them on the proposed ITP, but only activating take authorization if and when the species is listed. The proposed ITP would have a delayed effective date or dates, and authorization of incidental take would become effective if and when one of these currently unlisted species is listed. Note, however, that all conservation measures would be implemented immediately by the applicant, regardless of the current listing status of the individual species. If the proposed ITP is issued and a new species is listed that is on the ITP, we would review the effects analyses contained within this document, and update or revise the conclusions, as necessary. If the new analysis indicates that retaining a newly-listed species on the ITP would result in a potential jeopardy situation for that species, the Services may delete that species from the permits, but only after exhausting other remedies.

Simpson Lands

Simpson is requesting coverage for the Plan Area and for additional Assessment Area lands that they might acquire in the action area. Although undetermined within the final HCP, these lands (Assessment Area lands outside of the Plan Area) roughly total an additional 640,000 acres surrounding the Plan Area. These lands are not owned by Simpson, but some (likely a small portion) parcels may be acquired by them in the future. These lands are not described within the final HCP in detail. These lands are considered potentially directly affected by the proposed action, because the addition of these lands is conditionally authorized and directed by the Implementing Agreement (IA) for the subject action, pursuant to issuance of the proposed ITP. Thus, proposed "lands eligible for inclusion" which surround the Plan Area (see Section 10.0 and Exhibit A of the IA, and Figure 2 of the HCP), are part of the proposed action herein.

Only actions specifically described in the HCP, IA, and ITP, occurring inside the 261,575-acre Plan Area, or within the additional 640,000 acres of the Assessment Area, are covered by the Opinions herein. Actions occurring outside this footprint, or actions not specifically described within the HCP, IA, and ITP, with potential for take of listed species, would need to be addressed by separate formal consultation or HCP permitting process under the Act.

Action Area

The action area for this Biological and Conference Opinion, per 50 ***CFR*** § 402.02, includes "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." In this case, the proposed Federal action is issuing the ITP for the action described in the final HCP and IA. The (direct) project footprint is the Assessment Area; it includes the Plan Area of approximately 261,575 acres, plus an additional 640,000 acres (roughly) that could potentially be added to the proposed ITP (per Provision 10 of the IA), for a total of approximately 900,000 acres.

The Assessment Area (termed "Lands Eligible for Inclusion" within the HCP) includes and surrounds the Plan Area on four sides; it consists of the approximately 261,575-acre Plan Area, plus approximately 640,000 acres of lands not currently owned by Simpson that could potentially be added to the proposed ITP for coverage per Provision 10 of the Implementing Agreement (see Figure 2 in the HCP or Exhibit A in the IA). Thus, the Assessment Area is approximately 900,000 acres or 1400 square miles. Only a small portion (and possibly none) of the "non-Plan Area" of the Assessment Area would likely be acquired by Simpson and ultimately added to the proposed ITP. Only private lands within the Assessment Area could be acquired and potentially added to the proposed ITP (more than 100,000 acres of the Assessment Area is State or Federal land).

The action area for the subject HCP includes the Assessment Area, and surrounding lands potentially indirectly affected by the proposed action. The action area consists of most of the Olympic Peninsula.

The lands and waters of the proposed Assessment Area are likely to be directly and/or indirectly affected with issuance of any ITP. Surrounding lands and waters would likely be indirectly affected. The Assessment Area stretches across most of the southern end of the Olympic Peninsula from near Aberdeen and the Quinault Indian Reservation off the Pacific Ocean to the west, to Puget Sound near Olympia and Shelton to the east, north to Hood Canal, Lake Cushman, and Wynochee Lake bordering the Olympic National Forest, and south to just beyond the State Highway 8 and Capitol State Forest. Because of potential erosion, sedimentation, siltation, water temperature, and hydro-geomorphic effects, the action area includes whole watersheds/drainages which contact the Assessment Area. Since indirect effects include instream flows in various large rivers and streams (see Figure 3.1 in the EIS, and Figure 1 in the HCP), the action area includes these contacted drainages downstream to the Pacific Ocean, Hood Canal, and South Puget Sound.

The proposed action could affect mobile species such as elk, deer, coyote, bear, beaver, wolverine, lynx, bobcat, mountain lion, and spotted owl on most of the Olympic Peninsula, by affecting movement, migration, extirpation rescue, and regional population and ecosystem dynamics. This is largely due to the important position of the Assessment Area across the southern portion of the peninsula; the peninsula is isolated by water to the west, north, and east, and the Assessment Area covers most of the potential ingress and egress lands of the Peninsula.

The proposed action could influence fish passage through the Assessment Area, which could affect movement of fish and nutrients throughout watersheds, affecting species that may utilize those watersheds. The proposed action could easily facilitate exotic plant and animal species invasion, propagation, and migration into and across most of the Olympic Peninsula. Due to the large acreage of the Assessment Area and its position across the southern Olympic Peninsula, the proposed action could affect re-establishment of gray wolf (extirpated on the peninsula) and Pacific fisher (likely extirpated) on the peninsula, by affecting the size and distribution of potential core habitat areas for this species and prey densities, as well as affecting migration and dispersal potential.

Because of its heavy reliance on public lands for core conservation of sensitive species and listed species, implementation of the proposed HCP will require continued implementation of the Northwest Forest Plan for at least the life of the proposed ITP, including maintenance of significant portions of public lands on the Olympic Peninsula for conservation values; this would likely affect future actions across the peninsula.

Total Maximum Daily Load Agreement

As an additional measure, Simpson and the Services collaborated with the Environmental Protection Agency and the Washington Department of Ecology in the preparation of a Total Maximum Daily Load (TMDL) Technical Assessment. The TMDL was developed to address fisheries concerns on several tributaries and streams located on Simpson lands within the action area. The TMDL addresses two pollutants: heat and sediment. These two pollutants are major determinants of water quality that affect aquatic life, including salmon and other native fish. Although neither the HCP or TMDL are legally dependant on the other, much of the information and analysis developed for the preparation of the HCP was used in developing the TMDL. The primary link between the HCP and TMDL is that if the sediment or heat load allocations identified in the TMDL are not achieved, the management prescriptions of the HCP may be subject to modification. The TMDL Technical Assessment Report is included as an appendix to the HCP.

Components of the Proposed Action

Proposed Covered Activities

Proposed covered activities are described in the HCP and IA, and in summary are specified as operations within the Assessment Area in conjunction with the applicant's proposed mechanized timber harvest, log transportation, road construction/maintenance/decommissioning, site preparation and slash abatement, tree planting, fertilization, silvicultural thinning, experimental thinning and management, wildfire suppression, vertebrate control, stream restoration, research and monitoring, electrofishing, and harvest and management of minor forest products including firewood, floral brush, mushrooms and ferns.

Note: Activities that typically occur on commercial timber harvest operations, that are not

specifically addressed in the Simpson Plan and/or are not covered by the proposed ITP include, but are not limited to: mining of gravel, construction and existence of microwave and cell phone towers, and application of pesticides and herbicides.

Mechanized Timber Harvest

As proposed, approximately 219,000 acres of the the Plan Area would be managed for commercial timber production, primarily using clearcut harvest methods with an average rotation of 40-50 years. Approximately 42,000 acres of the remaining area would be managed under one of three conservation strategies (riverine riparian areas, wetland riparian areas, and unstable slopes not within riverine riparian areas) as noted below in Table 2. Specific activities expected to occur include stream typing and classification (including electrofishing) unit layout, felling of timber, bucking of timber and yarding of timber with ground, tower, or aerial logging systems.

The HCP does not contain any restrictions on timber harvest unit size. Rather, current and future State rules regulating harvest unit size would continue to apply. Under the current State Forest Practices Act regulations, harvest units may be up to 240 acres in size, but average 60 acres.

Electrofishing would only be conducted in accordance with guidelines and methodologies approved by the Services. The Services anticipate revising these guidelines over time to minimize adverse effects to proposed Permit Species.

Table 2. Approximate acreage of riparian, wetland and unstable slope protection provided under the proposed action.

Conservation Area Type	Acres
Riverine Riparian Areas	
Type 1, 2 and 3 stream buffer (including unstable slopes)	16,606
Type 4 and 5 stream buffer [a] (including unstable slopes)	3,013
Riverine channel bed	2,572
Subtotal	***22,191***
Wetlands Not Within Riverine Riparian Areas	
Non-forested wetlands	6,059
Non-forested wetland buffer *with no harvest*	1,946
Non-forested wetland buffer *with potential thinning*	2,635
Forested wetlands (75 percent of those not connected to riparian areas)	2,793
Subtotal	***13,433***
Unstable Slopes Not Within Riverine Riparian Areas	
Unstable slopes	**6,019**
Total	**41,643**

[a] *Type 9 streams (unclassified according to the DNR Forest Practices Rules) would be classified before timber management occurs adjacent to those streams. For the purposes of this analysis, those streams were classified as either Type 3, 4 or 5 streams based on best available information using geographical information system (GIS) data bases.*

Riverine Riparian Conservation Area Assumptions:

DNR Stream Types 1, 2 and 3 are perennial fishbearing streams
DNR Stream Types 4 and 5 are non-fishbearing
Riparian protection would be based on conservation buffers defined in Appendix B of the HCP.

Log Transportation

The HCP does not contain any restrictions on log transportation. Simpson would transport logs to mills in the Shelton, Washington area via road and railroad. Approximately 2,000 miles of roads currently exist (3.7 percent of the land base, or 4.9 miles/square mile) in the Plan Area.

Road Construction, Maintenance, and Decommissioning

The HCP contains specific commitments regarding the surfacing of roads, the clearing and maintenance of culverts, the decommissioning of certain roads, and closing roads to motor vehicle access.

In the first year of the proposed ITP, Simpson would develop a road inventory database, and within the first six months of issuance of the proposed ITP, Simpson would compile a list of known problems associated with any active, inactive, or orphaned road. Within five years of proposed ITP issuance, Simpson would systematically collect data on each road segment which would include a list of road maintenance and improvement projects on the approximately 2,000 miles of active roads in the Plan Area. As part of this process, the applicant would systematically collect data for all road segments in the Plan Area, prioritize road projects according to the greatest need for resource protection and implement those projects. Additionally, roads would also be monitored during each year of the HCP for sediment contributions to streams.

Through the road inventory process, the applicant would identify a permanent road system which is necessary for forestry operations. Roads that would be candidates for decommissioning are: (1) those not needed for current and anticipated future operations; (2) roads that have a high risk of failure and/or delivery of sediment to streams; and (3) roads located in riparian areas. The applicant would implement a program for road decommissioning. Decommissioned roads would have all fills, drainage structures and side cast removed. Cut banks would be stabilized. Dormant roads would be cross ditched to block motor vehicle access.

Improvements would be made to road management with the overall goal of reducing sediment input into streams. These improvements would be made through a variety of methods, including: (1) temporary cessation of log hauling during periods with the greatest amounts of rainfall when road surfaces could become rutted; (2) better road surfacing; (3) improved road drainage; and (4) sediment trapping techniques. These measures should also lead to improved stream crossings, culvert size and placement, cross ditching and road outsloping. The focus of these road maintenance activities would be on fixing the underlying problems, not merely addressing the symptoms.

Roads would be remediated according to the priorities identified in the road inventory. At least 25 percent of the remedial work would be completed within the first five years of the proposed ITP period, a total of 75 percent of the road remediation would be completed by year 10, and 100 percent would be completed by year 15. There would be no money expenditure limit for this

road work during the first 15 years of the proposed ITP period. Thereafter, roads would be treated at a rate commensurate with the identified needs of the program but not to exceed $250,000 per year above current road management expenditures, as adjusted for inflation. The applicant has three years of experience decommissioning roads and has finished 20 miles in the Plan Area since 1995. The applicant expects to continue road decommissioning as an ongoing aspect of its road management program subject only to the limitation of resource commitments identified above. Assuming 10 percent of the road system, or about 200 miles, of roads need significant remediation (based on information provided by the applicant), the worst of the road problems could be completed within 6-7 years.
The following summarizes some primary road management prescriptions that the applicant would follow.

1. Simpson would retain a qualified geo-technical expert for analysis of any new road construction or road reconstruction in areas where there is a high risk of hillside failures that would damage aquatic resources.
2. Simpson would reduce stream sediment input and other water quality issues in areas of active log hauling by implementing a variety of methods.
3. Storm patrols would keep culverts open and prevent road prism erosion.
4. Simpson would avoid placing new roads on hillsides with greater than 60 percent slope.
5. The following guidelines also would be implemented:

    - All crossings of fishbearing streams would provide for a natural stream bed and upstream migration of juvenile fish.
    - All channel crossings would accommodate 100 year flood flows.
    - Driveable dips, crowning, and outsloping of roads would be used.
    - Flumes and/or energy dissipaters would be installed and maintained to prevent erosion from culverts.
    - Relief culverts and ditches would be installed and maintained to prevent transfer of water between small catchments, and excessive water run-off onto unstable slopes.

Where Simpson chooses to retain existing road segments, or build new road segments that lie tangential to the stream and are within the proposed Riparian Conservation Reserve (RCR) area (explained below), the area covered by the "footprint" of the road and the cleared road right of ways would be added to the RCR in nearby areas and would be composed of trees similar in size and species characteristics as those that would normally be found at the site.

Adaptive management may be used to adjust priorities and methods for effecting road management activities as specified in Section 5.2.5 of the Plan. However, Simpson has limited these adjustments so that no more than $250,000 expressed in constant 1999 dollars (i.e. the amount would annually be adjusted for inflation) would be spent for road-related work in any one year after the fifteenth year post ITP issuance. Routine maintenance of active roads and construction of new roads would be expensed out of Simpson's normal road maintenance and construction budget and would not count towards the $250,000 limit.

Site Preparation and Slash Abatement

The HCP does not contain any restrictions on site preparation and slash abatement. No HCP prescriptions are proposed for this covered activity. Scarification and burning of slash would be conducted in accordance with current and future laws for the State of Washington in management units harvested by clear cutting. Excessive amounts of slash and unwanted shrub and tree species on clear cuts would be removed through broadcast burning or mechanical methods, to ensure uniform planting of trees throughout the harvest unit and to reduce wildfire potential.

Tree Planting

The HCP does not contain any restrictions on tree planting. No HCP prescriptions are proposed for this covered activity. Simpson typically plants 250-400 trees per acre within 18 months following harvest.

Fertilization

The HCP contains significant proposed minimization and mitigation measures, coupled with an proposed adaptive management program, for fertilization application. Simpson proposes application of nitrogenous fertilizers up to once every 7 years, for approximately three applications during each stand rotation. Simpson has stated that they would typically fertilize select timber stands two times between ages 15 and 40, and would typically apply approximately 440 pounds of nitrogenous pellets per acre. As stated in the HCP, Simpson would apply the fertilizer according to guidelines contained in WAC 222-38-030(b)(c). However Simpson would actually be providing more protection than recommended in WAC-222-38-030, because of the proposed riparian and wetland conservation area prescriptions.

As proposed, Simpson would take extra steps to ensure that amphibians would not be adversely affected by this activity through a focused research and adaptive management program.
Simpson has developed a research and monitoring program to answer the fundamental question: *Are amphibians adversely affected by operational application of nitrogenous fertilizers?* Simspon has been conducting amphibian surveys for two years . They would continue with this survey work and expand it to include water sampling and surveys for larval abnormalities of pond breeding amphibians. Simpson would report their findings on an annual basis to a Scientific Advisory Team that would evaluate the result. Should adverse effects be occurring, adaptive management discussions would be initiated pursuant to Section 10 of the HCP. The Science Advisory Team ("SAT") would be composed of individuals from the NMFS, Service, EPA, the Squaxin and Skokomish Indian Tribes, the Quinault Indian Nation, the Washington Departments of Fish and Wildlife, Ecology, and Natural Resources, and a wildlife and fisheries scientist representing Simpson. Other scientists from academia or private industry may be invited to join as needed. The SAT team would provide peer review and recommendations on study design, methods and analysis and associated adaptive management. They would meet, at a minimum, on an annual basis and would be responsible for making decision related to the proposed Plan.

According to Simpson, fertilizer would not applied to riparian or wetland areas (Phil Peterson

pers. comm. 10/5/00 statements by Simpson demonstrate clarification of intent where the Plan language is unclear or ambiguous). We expect that little fertilizer would be applied in most riparian and wetland areas because there would be no timber harvest in the RCR and Wetland Conservation Areas and, although some riparian areas may be experimentally thinned, Simpson has stated that there would be no need to fertilize these stands in riparian or wetland areas. Therefore, the RCR buffers and wetland conservation areas buffer would be the default buffers used to apply fertilizer (Phil Peterson pers.comm 10/5/00). These proposed buffers are at least twice as wide as the buffers recommended in the WAC 222-38-0030 for Type 1-3 streams. In the event that there is concern that fertilizer application as proposed is being deposited during aerial application into the riparian areas, Simpson has stated willingness to conduct monitoring by placing 36 square-foot Visqueen® frames in the RCR and wetland buffers to catch prill (fertilizer pellets) (Phil Peterson pers. comm 10/5/00).

Although Type 4 and 5 streams are not afforded the same proposed application protection as Type 1 - 3 streams, we anticipate that the application of fertilizers as proposed would be significantly less intensive in these areas due to the proposed Unstable Slope Management Plan. It is assumed, and was verified by Simpson, that since Simpson is not proposing harvest on unstable slopes that there would be no need to fertilize trees in these areas (Phil Peterson pers. comm. 10/5/00).

As proposed, RCR buffers extend to the perennial stream channel network up into type 4 and 5 streams. We assume that if fertilizers are applied in these areas, Simpson would conduct water sampling to determine whether amphibian exposure is occurring and whether adverse effects to amphibians are taking place. Finally, Simpson has proposed avoiding spreading fertilizer on roads and ditch lines due to the potential for accumulation (particurlarly in ditches) resulting in a flush of fertilizer during storm events in fall (a period when fertilizer is applied) (Phil Peterson pers. comm).

We have included coverage of proposed fertilizer application within our proposed ITP because of the following features of the proposed Plan:

1. The research program that Simpson has committed to for the protection of amphibians
2. The SAT involvement both at the initial project development stage as well as the data analysis and adaptive management stage
3. Use of the adaptive management program to change operations to minimize adverse effects
4. No fertilizer application in riparian or wetland conservation areas
5. Use of RCR and wetland buffers which are more protective then those identified in WAC 222-38-303)
6. Extra steps Simpson would take to avoid accumulation of fertilizer in road and ditch lines to avoid fertilizer pulses

Silvicultural Thinning

The HCP does not contain any proposed restrictions for silvicultural thinning of approximately 219,000 acres of the Plan Area. No HCP prescriptions are proposed for this covered activity. Simpson proposes to conduct thinning in some or all of the timber stands in the Assessment Area subject to clearcut harvest as proposed herein, including commercial thinning and pre-commercial thinning in stands younger than 30 years old. No clearcutting would be allowed in the conservation areas noted in Table 2, therefore, silvicultural thinning would not occur there, except as noted below in experimental thinning.

Experimental Thinning and Management

The Plan contains proposed prescriptions for conducting experimental silvicultural practices such as implementing alternative forest management methods, practicing uneven aged management, engaging in partial cutting and seed tree management, feathering mature leave trees along outer edges of riparian forest buffers, manipulating various stands to speed conversion of hardwood riparian stands to conifer and creating snags via blasting or cutting methods.

During the first 10 years after issuance of the proposed ITP, experimental thinning would be limited to only 1,000 acres of the total 6,160 RCR acres that would be potentially available for experimental thinning (see Table 7 in HCP, Footnote 13). The stated purpose of this thinning would be to accelerate the development of late seral forest characteristics (typical ecological characteristics of forests more than 120 years of age). The results of this management would be reviewed at the end of the 10 year period by the Services and the applicant to determine whether the management is expected to reach the intended goal. Adaptive management changes may be made at that time for managing a portion or all of the remaining 5,160 RCR acres. Other provisions of this management include: (1) thinned areas would be well distributed among channel classes to gain a broad sample of vegetation responses from different riparian areas; and (2) thinning treatments would vary according to the different plant associations studied and the treatments would be replicated.

Wildfire Suppression

The HCP does not contain any restrictions on wildfire suppression. No HCP prescriptions are proposed for this covered activity. This activity would be regulated by the Washington Department of Natural Resources fire suppression plans.

Vertebrate Control

Proposed vertebrate control under the HCP consists, and is limited to, control of flat-tailed beavers *(Castor canadensis)* associated with roads, where activities of such beavers pose a reasonably foreseeable risk to the integrity of one or more roads, including, but not limited to, erosion of the road surfaces, plugging of culverts, and failure of road fills. Control would be by

lethal or live-trapping trapping means.

Stream Restoration

The HCP does not contain any restrictions on stream restoration activities. No HCP prescriptions are proposed for this covered activity.

Research and Monitoring

Section 9 of the Plan contains a detailed description of the proposed resource assessment, monitoring, and research program to assess progress toward achieving the resource objectives of the Plan.

As proposed, modifications of conservation strategies and management practices may be implemented as a result of new information obtained from monitoring, research, or other sources during the term of this proposed ITP. Several areas that would be the focus of specific monitoring and for which adaptive management is likely are enumerated in Section 9 of the HCP. Current and future monitoring program elements Simpson would carry forward or create under the Plan include:

1. Amphibian distribution and relative abundance
2. Riparian forest conditions (including snag inventories)
3. In-channel habitat conditions
4. Stream temperature.

Simpson has developed a number of monitoring and research questions directed at specific management issues that relate to the watershed input and processes necessary for improving function of aquatic and riparian systems (HCP Section 9.4). A work plan would be developed from each monitoring question that would have multiple objectives and testable hypotheses. Developing the hypotheses and work plans would be complete by year 2 after which time the Resource Monitoring Program would be adapted to meet the requirements of the Plan. A science Advisory Team would be established to provide outside peer review of the resource assessment, monitoring and research and the adaptive management aspects of the Plan. Information obtained through the monitoring program may trigger a change in the management strategy to more effectively minimize or mitigate effects of timber management activities. Those changes may result in additional mitigation.

As proposed, Simpson would not spend more than $275,000 per year for direct monitoring expenses. Section 9.6 of the Plan provides additional details on this monetary cap.

Minor Forest Products Management and Harvest

Under the proposed Plan, Simpson would allow the collection of minor forest products by non-Simpson personnel, such as firewood, salal, ferns, and mushrooms on the Plan Area. The

anticipated affected acreage is below.

Type of Forest Product	Acres of Area Affected in 1997	Estimated Potential Range of Acres Permitted Each Year during Proposed Plan Implementation
Firewood	4,200 acres	4,000 to 5,000 acres per year
Floral brush (salal)	61,000 acres	50,000 to 60,000 acres per year
Mushrooms	3,000 acres per year	2,000 to 7,000 acres per year
Ferns	400 acres	unknown

Land Exchanges

Addition of Land

Simpson may elect to include in the HCP and the ITP any lands that at the time of the proposed inclusion are within the outer boundaries of the planning area; do not contain any litho-topo features or stream types not analyzed in connection with the original HCP; and have been managed by Simpson in accordance with the prescriptions in the HCP. Simpson would provide the Services with baseline characteristics for the lands to be added; a map showing the lands to be added and the location of all roads on such lands; number of acres by litho-topo unit; number of stream miles by HCP channel class; number of Riparian Conservation Reserve (RCR) acres; RCR timber stand age(s) and composition; number of wetland, lake, and forested wetland acres; number of road miles; a general description of the condition of the roads; a general description of the unstable slopes; leave tree density (for snag distribution purposes); the location of any known cultural resources; and the distribution of proposed Permit Species across the landscape. Simpson would also provide written analyses demonstrating that the net effect on the environment and on the proposed Permit Species (on the lands proposed for addition), that would result from the management of such lands in accordance with the IA and the Incorporated HCP Sections, would not be significantly different from the net effect on the environment and the proposed Permit Species on the lands initially included (Plan Area) that has resulted and would thereafter result from the management of such lands. These factors would ensure that the ratio between the minimization and mitigation measures which occur on those lands and the level of impact which occurs to proposed Permit Species, would be equivalent or better than the ratio without those lands. This would ensure that the mitigation would remain commensurate with the impacts even with the addition of these lands.

Deletion of Land

As proposed, Simpson may remove up to 39,200 acres of land from the Plan Area over the 50-year proposed ITP term. However, Simpson may not remove land from the "core" areas: Seven

sub-basins in the Crescent Uplands (CUP) lithotopographic unit, (explained below) identified in Table 6 of the Plan, "Late Successional Forest Reserves" (LFRs) identified in Figure 8 of the Plan (explained below), Stillwater wetland emphasis area shown on Figure 13 of the Plan, and Mainstem corridors of the Wynoochee, West Fork and Middle Fork Satsop, and Canyon Rivers not included in the LFRs.

Note: Within their HCP, Simpson has divided the Plan Area into five regions with similar lithology and topography, referred to as "lithotopographic units" (LTUs). Some proposed RCRs include acreage reaching into the uplands away from the streams within the Plan Area. These (nine) areas are called Late-Seral Forest Reserves (LFRs).

Changed and Unforeseen Circumstances

In accordance with 50 ***CFR*** 17.32, Appendix F of the Plan includes a detailed discussion of reasonably foreseeable events that could occur during the proposed ITP term and adversely affect the proposed Permit Species. These "changed circumstances" include fire, wind, landslides, insect infestations, Swiss needle cast, ice and severely cold weather, earthquakes, and the outcome of the current litigation between Simpson and the U.S. Forest Service regarding the "Sustained Yield Unit of the Olympic National Forest".

Appendix F of the HCP contains the supplemental prescriptions for six of the eight identified changed circumstances (Fire, Wind, Landslides, Insect Infestations, Swiss Needle Cast, and Ice and Severely Cold Weather). The supplemental prescriptions only address earthquakes to the extent that earthquake-caused landslides would be addressed by supplemental prescriptions for landslides. Floods that are less than 100-year occurrences in magnitude are addressed by the existing prescriptions in the Plan. Floods that are larger in magnitude are not reasonably foreseeable within the proposed ITP term, and are not considered changed circumstances.

With respect to the changed circumstance on the current litigation between Simpson and the U.S. Forest Service, Simpson and the Services would confer to establish mutually agreeable supplemental prescriptions should Simpson prevail in its litigation against the U.S. Forest Service and habitat in the Olympic National Forest be modified as a result.

The definition of changed circumstance in 50 ***CFR*** Part 17 specifically identifies the listing of a new species as an example of a changed circumstance. Section 9.3 of the IA for the Simpson Plan states that Simpson would not take any listed species that is not a Covered Species (Permit Species) unless and until the ITP is amended to add such a species or Simpson is otherwise not precluded by applicable law from taking such species.

In contrast to changed circumstances, unforeseen circumstances are by definition circumstances that affect a species or the geographic area covered by the Plan that could not have reasonably been anticipated by the Service and Simpson at the time the Plan was developed. Consistent with 50 ***CFR*** Part 17, the Service may not require Simpson to commit additional land, water, or financial compensation or additional restrictions on the use of land, water or other natural resources in response to an unforeseen circumstance without Simpson's consent. However,

because the Plan incorporates adaptive management provisions, the likelihood of unforeseen circumstance occurring is low.

Operating Conservation Program

Riparian Strategies

In the Simpson Plan, five lithotopographic units were defined for the Plan area based on geomorphic characteristics. Streams were classified according to 49 channel types based on physical and ecological characteristics. Proposed boundaries of Riparian Conservation Reserves (RCR) would be determined by functional widths or by the extent of unstable slopes, whichever is greater. Details are provided in Appendix B of the HCP. A summary of the riparian management is provided below.

Riparian Management Summary

- For Type 1-3 Streams, no harvest in inner core of the CMZ and at least 70% of the outer zone. Riparian widths vary depending on stream classification:
  - Canyon: 50-116 feet
  - Channel Migration: 83-215 feet
  - Break in slope: 33-99 feet (plus the area below the break in slope)
  - Inner Gorge: 99-132 feet
  - Reverse Break in slope: 66-99 feet
  - Temperature Sensitive: 50-83 feet
  - Alluvial Bedrock Transitional: 50-83 feet
  - Unstable Slope/ Intermittent flow: 3 acres of no harvest leave area per every 1,000 feet of channel
- For Type 4 streams: 66 feet of continuous no-harvest buffer on each side
- For Type 5 streams: 80 trees (0.5 acres patches) per 1,000 feet of channel

In the Plan, proposed riparian conservation area widths would be measured from the edge of either the "channel migration zone" (CMZ) or the "break-in-slope" (BIS) (see Figure 1 below). Measurements would be taken from the channel disturbance zone (CDZ) in instances where the channel migration zone is not well defined. The CMZ and CDZ typically includes a majority of the stream valley bottom which is susceptible to stream meandering. For most Type 1-3 streams the CMZ and CDZ are significantly wider than the OHW. The BIS is the point on the hillside above the stream where the slope gradient substantially decreases or levels out (i.e., edge of a ravine). The measures defined for the proposed action would ensure all channel migration zones would be protected and hillside slopes adjoining those streams (below the BIS) would not be harvested.

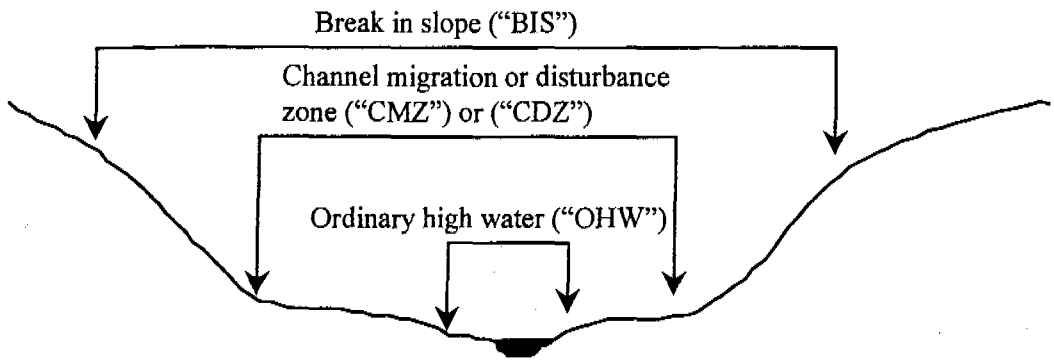

Figure 1. Hypothetical valley cross section showing the various topographic breaks and surfaces that serve as measurement benchmarks in Simpson's riparian approach.

For detailed description of the riparian management area widths and associated guidelines by channel class, see Table 26 of Appendix B in the HCP. The specific riparian strategies for each of the riparian species associations are described in the section, Effects of the Proposed Action by Species Association, later in this Opinion.

Wetland Conservation

The proposed wetland management prescriptions combine a Hydro-geomorphic Model (HGM) classification system (as it is being applied to forest practice regulation) with an approach to functional protection. Approximately 6,059 acres of non-forested wetlands, and an additional 4,581 acres of their conservation areas would be conserved.

In addition to the non-forested wetland conservation, at least 50 percent of the forested wetland tree stem density would be conserved for forested wetlands greater than one acre. This conservation would occur through either protecting all tree stems within particular forested wetlands or by leaving some of the tree stems standing after partial harvest. In other cases, entire forested wetlands would be harvested, however, the total tree stem count would still apply for all forested wetlands.

A total of approximately 3,724 acres of forested wetlands exist in the Plan Area, and this proposed conservation provision would eventually maintain an estimated 65 to 85 percent of those wetland acres. This total acreage of conserved forested wetlands would include areas that were partially harvested yet still maintain portions of the wetland vegetative cover, as compared with clearcutting, which would remove all cover. This analysis assumed a median point (75 percent) of the estimated range of forested wetland acreage that would be maintained in either full protection or partially thinned condition. This 2,793 acres represents the applicant's best estimate of forested wetland conservation (with either no-timber harvest or thinned condition) given the current knowledge of their locations and timber harvest options and needs.

The proposed Wetland Conservation Program would be complemented by an assessment and

monitoring approach to wetland function stratified by wetland class and sub-class. Road management around wetlands in the Plan Area would be directed at minimizing sediment delivery to wetlands and maintaining natural flow patterns which would stabilize water levels. The occurrence and spread of exotic plants in wetlands near roads would be monitored.

Table 3 (below) identifies the Wetland Conservation Program proposed as part of the subject action. Definitions of wetlands and the associated three management prescriptions for conservation areas (no-harvest, 50 percent stem-removal and compensating cut) are provided in Section 5.2.3 of the HCP.

Table 3. Wetland management prescriptions for the Plan Area by hydro-geomorphic model (HGM) classification.

HGM Class	HGM Sub-class	Vegetation Class	Size [a]	Timber Harvest/Conservation area Prescriptions [b]
Riverine	Flow-through impoundments	Forested Scrub/shrub Emergent Aquatic bed	Any	No harvest would occur in forested riverine wetlands of either HGM sub-class; conservation areas on riverine wetlands would be established consistent with management prescriptions for the establishment of RCRs.
Depressional	Outflow Closed	Forested	> 1.0 acre	If associated with a permanent or seasonal hydro-period, protection would be provided either by a no-harvest or a 50 percent stem removal management prescription. If associated with an occasional or saturated hydro-period, protection would be provided by either a no-harvest, 50 percent stem removal or a compensating cut management prescription.
	Outflow Closed	Emergent	> 0.5 acre	Inner 10 m (33 ft) conservation area with a no-harvest management prescription and an outer 10 m (33 ft) conservation area with a 50 percent stem removal management prescription.
	Outflow Closed	Scrub shrub	> 0.5 acres	Inner 10 m (33 ft) conservation area with a no-harvest management prescription and an outer 10 m (33 ft) conservation area with a 50 percent stem removal management prescription.
	Outflow Closed	Aquatic bed [c]	0.25 acres	Inner 10 m (33 ft) with a no-harvest management prescription and an outer 30 m (99 ft) conservation area with a 50 percent stem removal management prescription.
Slope		Forested	Any	If associated with unstable slopes, no harvest is permitted.
		Forested	> 1.0 acre	If associated with stable slopes, area may receive a compensating cut or 50 percent stem removal management prescription.
Flats		Forested	> 1.0 acre	Protection provided by either a no-harvest, 50 percent stem removal or a compensating cut management prescription.
		All others	> 0.5 acre	Inner 10 m (33 ft) conservation area with a no-harvest management prescription and an outer 10 meter conservation area with a 50 percent stem removal prescription.

[a] **Bogs:** All bogs > 0.25 acres in size would be protected. Conservation area widths would be those identified for the type of wetland where the bog is located.
[b] **Permanent hydro-period:** Standing water year-round.
Seasonal hydro-period: Standing water at least one continuous month during the growing season.
Occasional hydro-period: Standing water less than one continuous month during the growing season.
Saturated hydro-period: Water table within one foot of the surface at least one continuous month during the growing season.
[c] **Aquatic bed:** Must have 0.25 acres of open water with characteristic floating or submergent wetland vegetation of this class.

Unstable Slope Management and Watershed Analyses

As proposed, the applicant would not harvest timber on unstable slopes, and new roads would not be constructed on unstable slopes unless no other option exists that is operationally feasible. Unstable slopes would be identified through the following process.

Within five years after the issuance of the proposed ITP, the applicant would complete an analysis of slope stability throughout the Plan Area that delineates unstable slopes and provides specific guidance for delineating unstable slopes where formal Watershed Analysis has not been conducted. The methods used for these analyses would be at least as rigorous and detailed as those required for a Level II Watershed Analysis under the Washington State methodology. The personnel performing these analyses would have qualifications that exceed those required for certification to perform Level II Watershed Analysis under the Washington State methodology. Prior to the time when the complete analysis of slope stability is completed, the applicant would use all existing information associated with mass wasting reports, causal mechanism reports and prescriptions currently set forth in the existing three Watershed Analyses completed for the Plan Area. This information would be used to delineate analogous unstable slopes in unanalyzed portions of the Plan Area until the slope stability analysis is completed for the entire Plan Area.

Hydrologic Maturity Management

The applicant proposes to manage seven sub-basins in the rain-on-snow zone for hydrologic maturity (total of approximately 7,936 acres). At least 50 percent of this area would be maintained in hydrologically mature forest canopy cover, and no more than 25 percent would be in hydrologically immature cover. Forest cover for this prescription would follow the definitions within the Washington State Forest Practices Board Manual: Standard Metholodogy for Conducting Watershed Analysis, Version 3.0, November 1995. That manual defines hydrologically mature forest cover as stands with greater than 70 percent total crown closure that are less than 75 percent deciduous.

Wildlife Conservation

Wildlife Tree Conservation Program:

The overall goal of the HCP is to leave a minimum average of eight trees (>7 inches DBH) per acre for each section of land (approximately 640 acres) in the Plan Area. A majority of those trees would be left by implementing the RCR Program, Wetlands Conservation Programs, and within Unstable Slope Conservation Areas. Sections of land which do not meet that threshold with those programs would be managed with the Supplemental Wildlife Tree Conservation Program to reach the threshold of eight trees per acre. This supplemental program would be implemented only within those sections of land identified in Figure 9 of the HCP, and consist of the following criteria:

- a minimum average of eight trees (a minimum of 30 feet in height) would be left per acre

for each section of land, and a minimum of four of the eight trees would be selected from the dominant trees within the forest harvest units in which they are located (dominant trees in 50-70 year old forests average 14-20 inches DBH);

- the other four trees could be any one or a combination of the following:
- Cedar, hemlock or other conifer with a live crown (7 inch minimum DBH)
- Residual old growth
- Safe snags
- trees may be dead, dying or green leave trees;
- trees left in wetlands, riparian areas, or unstable slope conservation areas would count towards the eight trees per acre; and
- trees could be clumped or dispersed within harvest units, and would not be further than 800 feet from trees conserved with the RCR Program, Supplemental Wildlife Tree Program, Wetland Conservation Program, and Unstable Slopes Management Program.
- The salvage of any residual "old-growth" downed wood or stumps would be prohibited throughout the entire Plan Area. Old-growth downed wood in this context is defined as any portion of a tree bole remaining from forest stands that existed prior to mechanized timber harvest (i.e. tree boles from the forest originally present in the Plan Area prior to about 1900 are considered old-growth tree boles).
- Leave at least 2 downed logs with a small end diameter greater than or equal to 12 inches and greater than 20 feet long, or equivalent volume, for each acre harvested throughout the entire Plan Area. Old-growth downed logs referenced above would not count towards this requirement.

Marbled Murrelet

The following steps would be implemented:

- Establish and implement the RCR program.
- Prohibit harvest in all murrelet nesting habitat currently existing or hereafter developed within the RCRs.
- Prohibit harvest in all occupied murrelet habitat outside the RCRs. For the purposes of this conservation measure, occupied murrelet habitat shall mean those areas of murrelet habitat identified by the 1995 Simpson surveys that are determined to be occupied using the latest survey protocols approved by both the Service and the WDFW (Appendix A of the HCP contains a description of the murrelet habitat assessment technique).
- Limit timber harvest within a conservation area 200-400 feetwide surrounding any occupied murrelet habitat located outside of the RCR, so that such harvest would not reduce the residual stand stem density within such buffer to less than 75 trees per acre with 12 inches DBH or greater, including 5 trees greater than 20 inches in DBH, where they exist.
- Refrain from timber harvest and road construction within 300 feet of occupied murrelet habitat where such habitat is within an RCR and where such buffer is located within in the RCR.
- Limit timber harvest or road construction within 300 feet of occupied murrelet habitat where such habitat is within the RCR and where such buffer is located outside of the

RCR so that such harvest would not reduce the residual stand stem density within such 300 foot buffer to less than 75 trees per acre with 12 inches DBH or greater, including 5 trees greater than 20 inches in DBH, where they exist. Over the Plan Area, the Simpson would not protect more than 150 acres of such buffers outside of an RCR.

- Refrain from road construction, felling, bucking, cable yarding, helicopter yarding, tractor and wheeled skidding and slash disposal/prescribed burning within 0.25 mile of an occupied marbled murrelet site during the two hours after sunrise and the two hours before sunset from April 1 to August 31.
- Refrain from blasting at any time from April 1 to August 31 within 1.0 mile of an occupied murrelet site.

Bald Eagle

The applicant would establish and implement the RCR Program and Wetlands Conservation Program. Simpson would comply with all current Washington Department of Fish and Wildlife ("WDFW") rules regarding the conservation of eagle nest and roost sites. Simpson would continue following these rules, even if the Eagle is delisted under the Act.

Band-tailed Pigeon

The following step would be implemented:

- Conserve all mineral springs found in the Plan Area with a minimum two-acre no-harvest conservation buffer.

Harlequin Duck

The following steps would be implemented:

- Establish and implement the RCR Program and the Wetlands Conservation Program.
- Refrain from timber harvesting, road construction and blasting within 0.25 miles of known harlequin duck nests during the nesting season (April 1 through August 31), unless an acceptable alternate distance and operation plan is agreed to by the Services and Simpson.

Roosevelt Elk

The following steps would be implemented:

- Establish and implement the RCR Program.
- Keep road closure areas 1, 2, 3, 7, 9 and 12 (as shown in Figure 9 and Table 16 of the HCP) closed year-round to all motor vehicle traffic other than motor vehicles used by Simpson personnel, contractors, Simpson authorized permit holders, or others associated with Simpson land management. These road closures would be implemented provided that Simpson is able to enter into an appropriate Memorandum of Understanding with the Washington Department of Fish and Wildlife pursuant to which the Department would provide gate signs and

appropriate law enforcement measures to enforce road closures.

- At least 50 percent of the road surfaces that are "decommissioned" during each calendar year (within the road closure areas identified above) would be seeded with a wildlife forage mix from certified mixes containing no noxious weeds such as tansy ragwort, reed canary grass or Canadian thistle.
- Limit logging truck traffic on the road adjacent to the Wynoochee elk pastures to June 1 through October 31, with the condition that Simpson would be able to use the road for logging trucks during the month of November if unusual weather conditions prevent the completion of hauling before then. If November hauling is necessary, Simpson would agree to open and close gates, or otherwise staff the gates, so that they are closed except to allow log trucks through. This restriction would not apply to other motor vehicles used by Simpson personnel, contractors, Simpson authorized permit holders, and others associated with Simpson land management.

Snag Dependent Species

The following steps would be implemented:

- Establish and implement the: (1) RCR Program; (2) Supplemental Wildlife Tree Conservation Program; and (3) Wetlands Conservation Program so that there would be a minimum average of eight trees per acre greater than 7 inches DBH for each section of land in the Plan Area.
- Maintain and/or develop at least 2 snags per acre 12-24 inches DBH and 2 snags per acre greater than 24 inches DBH averaged per acre of the RCR within each LTU by year 20 and 40 of the proposed HCP period. If this goal is not reached, then adaptive management discussions would be initiated. Only snags greater than 20 feet in height would be counted towards this goal.
- For purple martins, construct and install at least four multi-unit artificial nest boxes within 10 feet of portions of Lake Nahwatzel that are adjacent to Simpson owned lands. Also, annually record the number of pairs using the boxes and maintain the nest boxes.

Adaptive Management:

Under the proposed action, the applicant would be directly responsible for conducting surveys and studies to monitor the results of their management and this information would be used by the applicant and the Services to assess how well the results meet the requirements of the HCP and ITP (HCP Chapters 8 and 9). Some studies would address the effectiveness of the HCP to conserve the proposed Permit Species. Adaptive management that results from such action could result in changes to Simpson management practices (HCP Chapter 10).

For example, stream breeding amphibians (Olympic torrent salamander, tailed frog, and Cope's giant salamander), as well as Van Dyke's salamander and western toad populations would be monitored for effects of harvest and effects resulting from fertilizer application. Simpson would survey annually for these species, (in accordance with Section 9 HCP) compiling and analyzing data on an ongoing basis. If at any time during the proposed ITP term a significant decline or reduction in range (as defined in

the HCP, Section 4.5) is indicated, adaptive management discussions would be initiated and management prescriptions adjusted subject to the limitations described below, to the satisfaction of the Services and Simpson to reduce adverse effects to proposed Permit Species (Section 10.4 HCP).

Bull trout would also be surveyed using methods endorsed by the Services to complete baseline distribution by year five of the Plan (in accordance with Section 9). Simpson would provide additional inventories to assess distribution in years 10, 20, 30, and 40 and would use the data to evaluate deviations from the baseline. If the baseline distribution has been reduced at these check points, adaptive management discussions would be initiated and management prescriptions adjusted subject to the limitations described below, to the satisfaction of the Services and Simpson to reduce adverse effects to proposed Permit Species (Section 10.4 HCP).

Adaptive management would be applied to Covered snag dependent bird species as well if snag densities are lower than targets established in the Plan. Simpson would survey for snags in the RCRs and at year 20 and 40 to establish densities.

Adaptive management would be applied to all other proposed Permit Species via use of the Resource monitoring questions described in Section 9.4. of the HCP. Monitoring questions are categorized as Plan Area wide, LTU specific, or species specific Each monitoring or research question would be the basis for a workplan that would have multiple objectives and test hypotheses derived from the objectives. As the monitoring program matures, questions may be modified or replaced with new ones derived in consultation and coordination with a Scientific Advisory Team (SAT). The SAT has been established to provide outside peer review of the resource assessment, monitoring, and research and the adaptive management aspects of the Plan. The SAT shall provide peer review and recommendations on study design, methods and analysis and associated adaptive management. The SAT is an advisory group, with the responsibility for making decisions in respect to the Plan remaining with the Services and Simpson. The SAT shall be composed of one person from each of the following agencies and tribes: the NMFS, Service, EPA, the Squaxin and Skokomish Indian Tribes, the Quinault Indian Naiton, the Washington Departments of Fish and Wildlfie, Ecology, and Natural Resources, and an wildlife and fisheries scientist representing Simpson. On an ad hoc basis, other scientist from academia or private industry with special expertise may be invited by Simpson or the Services to participate in a SAT meeting. The SAT team provides additional assurances that proposed Permit Species needs are being met under the Plan through the adaptive management program.

As proposed, Simpson would establish an Adaptive Management Acreage Account (AMAA). Simpson would be deemed to have "deposited" an initial credit of 920 acres to the AMAA. The AMAA would then be either drawn down (an "AMAA debit") or increased (an "AMAA credit") based in each case on changes in the total acres in the Plan Area, on changes made through adaptive management in the number of acres subject to timber harvest restrictions or on changes in wildlife leave tree restrictions. Specifically, and as described in 10.5.2.3, an AMAA debit would be made to the account: (a) on a one for one basis for each additional Restricted Acre added through adaptive management; (b) on a basis of one acre for 160 stems for additional wildlife leave trees required to be left; and (c) on a basis of 0.0035 acres to one for each acre deleted from the Plan Area. An AMAA

credit would be made to the account: (a) on a one for one basis for each Restricted Acre removed through adaptive management; (b) on a basis of one acre for each 160 stems of wildlife leave trees no longer required to be left; and (c) on a basis of 0.0035 acres to one for each acre added to the Plan Area. A "Restricted Acre" is any acre in the Plan Area that at the time of harvest is subject to complete or partial restrictions on harvest (e.g., acres contained within a riparian management zone and a harvest unit).

STATUS OF THE SPECIES (rangewide)

See Appendix A for Status of the Species for each individual proposed Permit Species

Old-Growth Forests

Old-growth forest once covered most of the lower-elevation Pacific Northwest. Old-growth forests contain large older trees (at least 120 years old), big fallen logs, and large standing snags (dead trees). With a mixed and multi-layered canopy broken by occasional light-filled gaps, trees may grow up to 300 feet high and over 6 feet in diameter. It is undetermined how extensive old-growth forests were before European occupation of the west, but it is estimated to be between 15 and 19 million acres blanketed unsettled Oregon and Washington (World Resources Institute 2000). U.S. Forest Service researcher Greene (1988) estimated total old-growth in the two states in the mid 1980's at 4.4 million acres. More recent analyses have produced lower estimates (World Resources Institute 2000).

Morrison (1988) examined six national forests in Oregon and Washington and identified 1,127,000 acres of old-growth. This estimate was substantially less than 2,474,660 acres of old-growth estimated in draft U.S.Forest Service environmental impact assessments for the same national forests (World Resources Institute 2000). Extending Morrison's (1988) analysis, Norse (1990) estimated that the total area of old-growth forest in the two states now amounts to slightly over 2.5 million acres, or 13 percent of the historic total acreage in Washington and Oregon. Of this, approximately 1,162,000 acres are currently protected in national parks, wilderness areas, or research natural areas (World Resources Institute 2000).

Stream Ecosystem Processes

It is important to recognize the dominant role of riparian plants in stream ecosystems. Terrestrial plants provide shade, regulate microclimates, and contribute both large wood pieces that add habitat complexity and small organic materials that serve as food for aquatic organisms. They also stabilize stream banks, control sediment inputs from surface erosion, and regulate nutrient and pollutant inputs (Naiman and Decamps 1997; Spence *et al.* 1996; Naiman *et al.* 1992; and Gregory *et al.* 1991). Large trees by virtue of their size, age, and resistance to fire, floods, and decomposition play a central role in shaping the physical and chemical conditions within the aquatic zone and, thereby, strongly affect the aquatic community. Tall trees cast long shadows and shade even wide streams. Large trees that enter streams due to blowdown, bank undercutting, or mass wasting can remain for decades or even centuries (trees such as cedar or redwood), functioning as stream features that rival bedrock sills or outcrops in regulating channel processes.

Historical harvesting of old-growth forest throughout most of the region, with much of the early harvest taking place along streams, has significantly altered stream ecosystems. Current harvesting has often occurred near streams, except where forest practice rules have require stream buffers. Stream habitats are created and modified by changes in the delivery and routing of five major watershed elements: water, sediments, nutrients, heat, and woody debris (Naiman *et al.* 1992). Pristine watersheds have stream channels with a complex array of hydraulic conditions (pools, riffles, alcoves, side channels, single and multiple channel sections), substrate sizes, and accumulations of wood and other organic matter. Large woody debris (LWD) consists of large logs that fall into stream channels, either from natural tree death, wind throw, or bank failure, which then plays an important role in structuring stream habitats. In the Pacific Northwest, large logs can play a dominant role in stream processes and channel complexity. Keller *et al.* (1995) stated that in headwater streams flowing through old-growth redwoods, nearly all the pools may be either directly formed by, or significantly influenced by large organic debris (i.e. logs). In coastal Oregon streams, Andrus (1988) found that 70 percent of pools greater than 27 cubic feet in volume were formed by wood. He also noted that conifers are markedly more decay resistant than hardwoods and that redwood and cedar outlast Douglas-fir and hemlock in streams. Neapolitan (1998) compared present day log volumes in an historically (1864 to1904) clearcut and splash dam logged second-growth coastal stream with nine similar streams in old-growth, and noted that the difference in the abundance of large logs between second-growth stream and the old-growth streams resulted in lasting channel changes, including channel incision, simplification of form, and reduction in sediment storage capability. In a natural system with intact riparian forests a large proportion of these logs would enter streams from the highest channels in the stream network during large storm events (Sedell *et al.* 1988). In fact, because of the role they play in providing LWD and a variety of sediment types, headwater stream channels mainly determine the type and function of downstream fish habitat (Sedell *et al.* 1988). Research fisheries biologist G. Reeves stated: "reaches that are themselves inhospitable to salmonids may contribute to the maintenance of salmonid populations downstream." (Reid 1998).

The River Continuum Concept

The river continuum concept (Vannote *et al.* 1980; Minshall *et al.* 1983; Minshall *et al.* 1985, Minshall *et al.* 1992) indicates that natural stream communities undergo predictable changes from headwater areas to lower elevations in response to fluvial processes; changes in the relative contributions of riparian versus aquatic primary producers (plants); and the size and type of organic material being transported from upstream areas. Small, headwater streams have steep gradients, confined channels and cool temperatures when adequately shaded by riparian vegetation. Consequently, they obtain most of their organic material in the form of leaves, needles, branches and other plant parts from the riparian zone rather than from primary producers within the stream. Farther down the river continuum, stream channels are less confined and have more extensive flood plains. Instream primary production increases in response to greater light penetration. Daily temperature fluctuations in these lower stream sections also are more pronounced because of increased exposure to solar warming (Beschta *et al.* 1987).

Historically, old-growth forests in the riparian zone of intermediate-sized streams extensively shaded streams, and limited both temperature gains and primary production. Large woody debris input also

changes along the stream continuum, with smaller channels contributing more LWD to the stream network than larger channels (Sedell *et al.* 1988). Biological communities in streams are highly complex and dynamic entities comprised of hundreds of plant and animal species structured and organized in response to physical, chemical, and biological interactions. Interactions between the major abiotic factors (solar energy, climate, geology, geomorphology, and hydrology) provide the physical environment that influences the species composition of the community (Bencala 1984; Boulton and Lake 1991). Biological interactions between organisms include food web linkages (i.e., herbivory, predator-prey), competition, mutualism, and disease- or parasite-host relationships (Spence *et al.* 1996). Stream communities are by nature highly dynamic, responding continually to changes in environmental conditions both temporally and spatially. The river continuum concept (Vannote *et al.* 1980) predicts a systematic change in consumer functional groups from headwater areas downstream. Small streams are dominated by invertebrates that process riparian litter and its residues (shredders and collectors). Intermediate sized streams have more "scrapers" in response to increased periphyton growth due to greater light availability. Further downstream, "collectors" (filter feeders) predominate using the fine particulate organics that upstream communities produce and fail to retain. Predators, of course, are present all along the continuum. The carcasses of spawned out anadromous fish are an important component of the nutrient cycle in stream ecosystems (Cederholm *et al.* 1989).

Upon their return from the sea, anadromous salmonids provide marine-derived nutrients to freshwater ecosystems and environs through their excretion, gametes, and carcasses. Anadromous fish were responsible for massive quantities of nutrients moving upstream in Pacific Northwest rivers until relatively recently. These nutrients are important to the productivity of the lakes and streams in which they spawn. Since low levels of primary and secondary productivity are typical of many coastal streams in the Pacific Northwest, Larkin and Slaney (1997) concluded that even modest inputs of nutrients and carbon from relatively few anadromous fish may be important in stimulating primary production and maintaining trophic productivity.

Energy flow within stream communities is often represented by the feeding relationships of various functional groups. The base of the food web is provided by plants, either from the riparian zone (allochthonous material) or instream primary producers (autochthonous material) such as algae, mosses, and rooted aquatic vascular plants. The allochthonous material is broken down biologically by bacteria and fungi, and physically by abrasion (Cummins 1974). Leaves and needles are degraded more quickly (days to weeks) than larger materials such as branches and tree boles (years to centuries) and provide most of the useable organic matter in woodland streams (Murphy and Meehan 1991). The functional group termed "shredders" consume pieces of this organic material, derive most of their energy from digesting the associated bacteria and fungi, and produce fecal pellets. This feeding behavior converts coarse particulate organic matter (plant material > 0.04 inch diameter) to fine particulate organic matter (0.02-0.04 inch diameter). These fine particles are again colonized by bacteria and fungi and serve as the energy source for a functional group termed "collectors" (filter feeders). The functional group "scrapers" rasp algae or microbes from mineral or wood substrates, again producing fine particulate organic material that is consumed by collectors. The last functional group, "predators," feed on the other three groups, plus terrestrial organisms entering from the riparian zone (i.e. insects and spiders) and each other.

Most aquatic and semi-aquatic vertebrates are predators, although some fish (i.e., suckers) eat significant amounts of plant material (Moyle 1976). Most of these small stream organisms live in the interstices of the streambed substrate during part or all of their life cycle. This complex stream food web, vital to all stream organisms, has a distinct longitudinal component that is disturbed and disrupted by logging impacts, especially at the upper ends of the channel network.

Disturbance

Pacific Northwest forests have been and continue to be subject to a variety of disturbances including wildfire and flooding, and tree defoliation and death as a result of wind-throw, disease, drought and grazing by native herbivores. Prior to European contact, the forests of the Pacific Northwest were largely regulated by natural processes, except for human cause fire. Lightning caused fires periodically blackened large areas. Insects, disease, and storms all caused disturbance. The results were a matrix of community types: areas cleared by wildfire, grass-forb and shrub-seedling successional stages, sapling and pole stands, mature stands, and extensive old-growth areas with large old trees, standing snags, and dead and downed trees on the forest floor. Human-related disturbances such as timber harvesting, fuel-reduction burning, grazing by introduced livestock and feral animals, and changes in local climate and hydrology due to forest fragmentation often further modify the disturbance regime experienced by a forest.

The role of disturbance in structuring stream communities has been a primary focus of aquatic ecology for the past decade (Spence *et al.* 1996; Wootton *et al.* 1996; Reeves *et al.* 1995; Townsend 1989; Resh *et al.* 1988; Stanford and Ward 1992). Some changes are cyclic such as seasonal changes in solar radiation, temperature, discharge, and leaf fall. Less predictable but longer-lasting disturbance events like major floods, fires, mass-wasting events, and extreme winds that lead to windfall in the riparian zone, can influence the physical environment, and thus the biological community, for decades to centuries. Both natural disturbances (i.e., floods, fires, mass wasting caused by previous events and earthquakes) and anthropogenic activities (i.e., timber harvest, agriculture, mining, urban development, dams, and bank channelization) change the riparian communities associated with stream systems (Gregory *et al.* 1989; Schlosser 1991; Sedell *et al.* 1997; Frissell *et al.* 1997). Reeves *et al.* (1993) found that in coastal Oregon, the species diversity of salmonid fish assemblages was reduced in those watersheds with greater than 25 percent of the old-growth forest of the basin harvested. While natural disturbance events tend to be infrequent and cause large, localized changes to stream systems (pulse or stochastic events), the human-caused changes are often more frequent and span larger regions of the landscape (press or deterministic events) (Yount and Niemi 1990). In almost all of the Pacific Northwest, stream communities are shaped both by past natural disturbance events and a pervasive legacy of past and present human activities.

Timber harvesting represents an extreme disturbance to natural ecosystem processes, and is occurring on a scale in the Pacific Northwest to the extent that it has altered much of the landscape beyond any natural disturbance it has experienced before (Reeves *et al.* 1995). This level of disturbance is now of

such magnitiude and on such a scale that it is unique in history. As indicated by the extensive loss of native biota, especially aquatic and riparian forms like the many unique salmonid fish stocks in decline in Pacific Northwest, it will be difficult to repair for many of these species (Stouder *et al.* 1997).

Fire

The structure of most virgin forests in the western United States reflects a past disturbance history that includes forest fire. Fire played an ecological role in the creation and maintenance of most natural western forests, including forest stand development patterns. The landscape structure of forests subjected to wildfires fluctuates through time as a result of the episodic nature of these disturbances and long-term variation in the climatic conditions that influence the fire regime. These landscape dynamics influence a variety of important ecosystem processes. Before European settlement, landscape dynamics in Pacific Northwest forests were driven primarily by the patterns of wildfire.

Wildfire resets or modifies seral stage succession within the forest in a number of ways, and takes on various forms, from ground-fires that kill only the brush to large clearing fires that kill some or all of the standing trees. Most fires burn off some or all of the organic layer, allow sunlight to penetrate the site, return nutrients to the soil quickly and increase soil temperatures. Many plant species require this kind of disturbance for recruitment.

As a result of this relatively random disturbance, a dynamic landscape matrix of vegetation associations, successional stages and patch sizes and shapes developed. Historically, large portions of the Pacific Northwest burned at one time or another, leaving islands of mature vegetation. This resulted in the temporary localized displacement of various species that re-established themselves over time. At the same time, significant islands of vegetation missed by fire over extended periods of time. The species of flora and fauna that are found in the Pacific Northwest evolved with and adapted themselves to this disturbance pattern.

Since the early 1900's, much of the Pacific Northwest has practiced an aggressive fire suppression policy. This has resulted in the extension of the current fire-return cycle, such that it is now once every 345 years, or as much as once in many thousands of years, depending on the species in much of the Pacific Northwest (Day, 1990). The fire suppression policy, in addition to the harvesting patterns of the past century, have combined to alter the forest of the Pacific Northwest considerably.

The 1995 Washington State Data Book indicates that generally between 4,000 and 100,000 acres of forest land might burn each year in the State (statistics from 1981 to 1994 reported). Nearly 300,000 acres burned in 1994, a relatively severe fire year. Some researchers opine that a fire year such as seen in 1994 was inevitable based on past forest management practices which have limited the role of natural fires in ecosystem maintenance. Post burn areas generally exhibit greater habitat structure compared to traditional clearcut harvest areas. Fires ranging from intense burns to light burns also tend to result in a mosaic of post burn habitat conditions. Historic "natural" fire patterns also vary from fires patterns within the last 100 years or so of forest management and fire suppression.

Superimposed on wildfire events is the use of fire as a management tool by indigenous peoples. Indigenous Americans have been in Pacific Northwest for 12,000 years. Their use of fire appears to have had a considerable impact on the biota (Kirkpatrick (1994). In the absence of humans, fire regimes may be determined by a number of factors such as fuel dynamics, climate and vegetation type. In the Pacific Northwest, an understanding of the pre-European landscape patterns resulting from wildfires is reasonably advanced (Agee 1993; Wallin *et al.* 1996). For example, Wallin *et al.* (1996) compared pre-European landscape patterns resulting from wildfires with those resulting from forest cutting. They concluded that the pattern resulting from short harvesting rotations was outside the range of wildfire occurrence prior to settlement, and would have important ecological consequences. They suggested that longer harvest rotation lengths would bring these landscapes closer to the range of pre-settlement forest conditions.

Timber harvesting

Forest vegetation covers approximately 46 percent of the combined land surface of Washington, Oregon, and Idaho, including 34 percent of non-Federal lands and 58 percent of Federal lands (Pease 1993)1. Most commercial harvesting of timber is for softwoods, primarily Douglas-fir, ponderosa pine, hemlock, Sitka spruce, and lodgepole pine. Industry-owned lands, despite constituting only 18 percent of the softwood growing stock, accounted for 44 percent of the total softwood harvest in the region in 1986. In contrast, national and State forests constitute 70 percent of the growing stock, but provided only 46 percent of the softwood harvest (Jensen 1993). Intense production from non-Federal lands is likely to continue or increase as Federal timber supplies diminish.

Logging in the Pacific Northwest began in the mid 1800s, and by the 1860s the timber industry was well established. By 1880, forests along Puget Sound, as well as many rivers and streams, had been cleared for three or more kilometers inland (Sedell and Luchessa 1982). Throughout the 1900s forest harvest has continued, and the effects of logging have become pervasive across the region. Early forest practices were particularly damaging to stream environments. Splash damming was commonly used to float logs down to the sawmills, a practice that has had long-lasting effects on channel morphology and the abundance of LWD. Clear-cuts often included riparian forests, which yielded large quantities of wood that were easily transported downstream. Debris jams were routinely removed at the behest of some biologists, who believed they hindered migration of anadromous fishes. Today the functional importance of LWD to salmonids is well documented (Bisson *et al.* 1987; Hicks *et al.* 1991a; Naiman *et al.* 1992) and State forest practice rules have been modified to reflect this knowledge. But despite recent improvements in forest practices, a legacy of past practices hinders the ability to forest ecosystems to quickly reverse habitat changes accrued from logging practices.

Harrvest is one of the most profound impacts people have on natural communities (Anderson 1995). Modern forestry practices add to the losses in forests started by early settlers (Anderson 1995). Accounts of early European settlement of the North Pacific Rim territories (including what is now Washington) provides a history of heavy extractions of forest resources. Logging of the forests has the obvious effect of short circuiting the prior physical cycles that supplied woody debris to freshwater, estuarine, and marine ecosystems. In recent decades, mechanized logging equipment

combined with highly efficient ("clean") logging practices and slash burning to prevent wild fires and accelerate re-growth of planted conifers, has further resulted in very little debris left on the site or entering streams. The store of vast quantities of nutrients in the form of decayed wood debris and trapped detritus that serves as substrate for long-term nitrogen fixation and retention no longer exists (Cedarhom *et. al* 2000). Large woody debris may continue to enter stream corridors, but not necessarily in the amount, size, and function that it did in the past, thereby decreasing potential for provide stream structure and organic matter to food-webs. Timber harvesting is a significant deterministic process in many temperate and boreal forest ecosystems.

At a landscape scale, the issues of scale and patch sizes in forest management have received considerable attention over the past decade, particularly in North America (Harris 1984; Pickett & White 1985; Franklin & Forman 1987). Until recently, a checkerboard cutting system was used in the Pacific Northwest, largely for operational convenience (Franklin & Forman 1987). The use of smaller patch sizes had been advocated in order to increase the frequency of forest edges. This was considered important for the maintenance of specialised species of forest edges, to assist species with limited dispersal abilities and to generally increase spatial heterogeneity (Chistensen & Emborg 1996). The model was, however, criticised for fragmenting interior habitat, particularly when the original forest matrix is affected by 30 to 50 percent of its area being harvested (Franklin & Forman 1987). An alternative to this approach is to establish scattered nuclei from which progressive or clustered cutting can occur, in association with large reservations of unlogged forest. These examples demonstrate the long-term implications of decisions on the spatial pattern of timber harvesting at the landscape scale should be carefully considered.

Forest practices over the last century in the Pacific Northwest have accelerated the occurrence of some types of disturbance. The acceleration in disturbance has led to the establishment of early successional communities in the majority of riparian areas on commercial forest land the Pacific Northwest. Practices such splash damming of rivers to float logs to market, and removing all trees to the channels edge modify the riparian successional process. Timber harvest or roads dramatically increase the incidence of landslides. Many hillslope failures enter stream channels and may move considerable distances downstream, removing streamline vegetation and soil. On the positive side, however, localized landslides also can input massive amounts of spawnable sized gravels and LWD into stream channels. These disturbance events have affected a large portion of the riparian areas bordering streams in the region over the last century, and have played a key role in determining functioning of ecosystems. Disturbances associated with logging-related increased sediment loads have been documented to require decades to pass the sediment through a watershed (Madej 1978, 1982 in Montgomery and Buffington 1993).

In the Pacific Northwest, logging during the 1800's and 1900's greatly reduced the amount of old-growth forests. In the mid-1930's (the time of the first comprehensive surveys), old-growth Douglas-fir, Sitka spruce, and western hemlock covered 1,136,000 acres in the Oregon Coast Range, and 3,248,500 acres on the Olympic Peninsula and the Puget Sound region of Washington. Two billion board-feet, two-thirds of which was old growth, were harvested from private lands in Western Washington in 1958; by 1970, annual harvest from private lands had nearly doubled to 3.8 billion board-feet, 80 percent of which was old-growth. Harvest from public lands in Western Washington

accelerated from about 0.5 billion board-feet in 1949 to 2 billion board-feet in 1970. Most or all of this harvest was probably old-growth.

Forest practices directly influence vegetation within a watershed through the removal of trees during harvest, thinning, and road construction, and through manipulations of understory and ground vegetation designed to increase the vigor of desired species and inhibit growth of understory vegetation (e.g., burning or mechanical and chemical treatments). In addition, forest vegetation is indirectly affected by changes in site conditions following harvest. Removal of overstory vegetation can change local microclimate, soil moisture and stability, ground cover, and susceptibility to erosion, all of which influence the re-establishment of vegetation in the harvested area (Beschta *et al.* 1995). Soil compaction by ground-based equipment can reduce infiltration of water, thereby hindering the re-establishment of seedlings or the growth of established vegetation. In addition, as tree roots die after logging, subsurface spaces (macropores) become compacted or filled with sediment, reducing infiltration of water and reducing aeration in the soils. When porosity is reduced below 20-25 percent, root growth is retarded. Mixing of mineral and organic soil layers also strongly influences the revegetation process (Beschta *et al.* 1995).

The magnitude of vegetation change and the succession of vegetation following logging depend on the type and degree of disturbance. For highly disturbed sites, early succession is dominated by colonizing annual and herbaceous species, followed by dominance/codominance of perennial species, and finally by dominance of overstory species. Where disturbance is less severe, residual species may dominate the early successional stages. Beschta *et al.* (1995) provide a more thorough review of the effects of forest practices on regeneration of vegetation.

At the landscape level, forest practices have resulted in substantial modification of species and age composition of western forests. Natural forests typically exhibit a mosaic of patches in different states of ecological succession. These mixed-age, multi-species plant assemblages have been replaced with even-aged forest plantations dominated by a single species. Riparian forests have been especially affected in areas where rapid growth of hardwood species (e.g., alder and maple) and shrubs (e.g., salmonberry) has precluded re-establishment of coniferous species (Bisson *et al.* 1987). In coastal streams, riparian areas outside of wilderness areas are dominated by alder and big leaf maple (FEMAT 1993). Certain conifers, such as western hemlock and Sitka spruce, frequently regenerate on partially decomposed nurse logs that are elevated above the forest floor (reviewed in Harmon *et al.* 1986). Removal of downed trees from the riparian zone may affect re-establishment of these species.

Floodplain Activities

The long-term loss of the function of LWD as a primary component of the floodplain waterways, resulting from land and channel clearing, may well be more significant than the loss of wood material itself. The resistance of the abundant woody material slowed the flows of water, sediment, and smaller debris, resulting in very complex valley floor stream-ways composed of multiple highly sinuous channels that were generally well connected to off-channel wetland systems by sloughs and high water channels. Management of in-channel woody debris after wildfire is controversial.

Post-fire increases in stream discharges can cause downstream flooding. The resulting heightened transport and accumulation of debris can wash out bridges and cause other damage to human structures in the floodplain.(Berg *et al.* 1999). In-channel debris is often removed or cut into smaller pieces to expedite flushing through the system and to avoid debris jam formation. Biotic uses of debris for fish cover, triggering pool formation, storing sediment, and as food sources for invertebrates and micro-organisms are lost or reduced when debris is removed or cut up (Berg *et al.* 1999).

A combination of floodplain associated development activities have diverted water, shortened, straightened, cleared, dammed, diked, drained, filled, and polluted many of the aquatic and riparian communities of the Western United States. Early in settlement, logging and slash damming, land clearing for agriculture, and channel clearing for navigation appear to have had the most pronounced effects in the Pacific Northwest. The development and consumptive utilization of natural resources was highly dependent on water-borne transportation and patterns of impacts are reflective of navigation-centered commerce. Continuing development for agriculture, industry, and urban growth has resulted in further floodplain losses through conversions to other uses. Ecosystems continue to be degraded by ongoing land uses.

Other Human Disturbance

European settlement and commercial development of the Pacific Northwest brought significant physical, chemical, hydrological, and biological changes to the landscape. Some of the more harmful losses have been caused by: river channel clearing and channelization, extensive land clearing, major water diversions, livestock grazing, mining runoff pollution, filling and diking of wetlands and estuaries hydroelectric dam development, urban runoff, water and sediment contamination with toxicants, and human induced oligotrophication (reduced nutrient concentrations and the resulting reduced productivity) of waterways.

Proposed Permit Species Habitat Features

Aquatic Associations

Each aquatic associated proposed Permit Species under the HCP has been categorized into a stream association, representing the habitat features where the species spends most of its life history. A description of these aquatic species associations can be found in Section 7 of the HCP.

Large Woody Debris

Large woody debris is an important structural and functional component of stream ecosystems (Ramquist 1995, Richmond and Fausch 1995). LWD can consist of a wide range of types and sizes including logs, coarse roots, and smaller branches (Ramquist 1995). Research over the past two decades has shown that LWD improves fish habitat by increasing types and sizes of pools, sediment storage, and scour (Skaugset *et al.* 1996). Wallace *et al.* (1995) explained that LWD also causes the "formation of stair-step profiles that result in the rapid dissipation of stream energy in high gradient systems." Prior to 1970, LWD was widely thought to have negative effects on fisheries by blocking upstream migration of some species (i.e. anadromous salmonids) and by depleting oxygen in streams. Thus, clearing and snagging of woody debris in streams occurred in U.S. streams

and rivers, especially in the late 1800's and early 1900's when timber harvesting was most intense. Partially as a result, there is much less LWD in streams and rivers than what occurred historically. Lare woody debris also provides colonization areas for different types of invertebrate organisms in streams, and high densities of invertebrates on logs attract fish that feed on these invertebrates (Ramquist 1995).

Over the years, some streams have been affected by human development, especially in areas of the United States where the surrounding forests have been harvested. Streams have been straightened, shortened, diverted, encroached upon, cleaned out, and altered for different reasons. For example, in the late 1800's to the early 1900's, many streams were cleared of LWD for logging, navigational, and aesthetic purposes (Ramquist 1995). Consequences of these alterations included increased erosion and sedimentation, decreased abundance of aquatic organisms.

Dead wood in streams affects the structural, functional and biological attributes of these stream systems (Bilby 1999). Larger wood influences channel form by creating pools and waterfalls, altering channel width and depth and creating conditions conducive to the deposition of sediment and organic matter. Organic matter accumulated by large woody debris is an important food source for many invertebrates. The pools formed by wood in streams provide habitat for fish and the invertebrate production associated with wood increases food for fish. Wood and the sediment it accumulates provides preferred germination sites for many common riparian plants (Bilby 1999). The habitat function of LWD in streams flowing through many forested regions of the world has greatly decreased over the last century time as a result of practices that removed wood from channels or eliminated the future source of wood by removing trees from riparian areas.

In a study of headwater streams, May (1999) determined factors influencing large wood recruitment and redistribution in an unharvested watershed in the southern Oregon Coast Range. Stream size and topographic setting strongly influenced processes by which wood entered the stream and was subsequently redistributed. In low-order streams draining steep hillslopes, May (1999) found processes associated with slope instability dominated large wood recruitment. In the low gradient valley floors of mid-order streams, windthrow was the dominant recruitment process, but debris flows played an important, yet temporally variable role in wood redistribution from the headwaters. May (1999) determined that headwater streams received wood from further upslope than mid-order streams, suggesting that the adjacent forest exerts a wider zone of influence on the channel in headwater basins. Input and redistribution processes also influenced piece location relative to the direction of flow and thus, affected the functional role of wood. Wood recruited directly from local hillslopes and riparian areas was more abundant throughout the network, was typically positioned along side or spanned the full width of the channel, and provided a unique framework that functioned to trap sediment and wood in transport. In contrast, May (1999) found fluvially redistributed wood had a patchy spatial distribution, pieces were commonly located in mid-channel positions, and were closely associated with scouring of the stream bed and banks rather than deposition.

Large woody debris provide important habitat for fish and amphibian communities, as well as other communities such as invertebrates. Ramquist (1995) described LWD's role in a stream ecosystem explaining that even though LWD may occupy only a small percentage of total area of habitat in some streams, it provides very important structural and functional benefits to fish.

Snags and Downed Wood

The habitat structure and ecological processes for our western coniferous forests have changed dramatically in the past century primarily because of extensive logging and fire suppression; the forests of today often are denser, have a larger component of shade tolerant species, and have fewer large, older trees, snags, and logs. As a result, the density of large snag trees and their generation has been greatly altered (Zack *et al.* 1999). Dead trees are an important element of productive and biologically diverse forests in the Pacific Northwest (Ohmann and Waddelle 1999). Snags, standing dead trees, help protect many species from humidity and temperature extremes, and provide foraging and nesting habitat. Snags are the most important habitat feature for many forest taxa. Among vertebrates in the Pacific Northwest, 69 species commonly use cavities, while others make opportunistic use of cavities, and 47 species are strongly associated with downed wood (Bunnel *et al* 1999). Snags of large size are currently very rare in private commercial forests, and relatively scarce in public forests outside of National Parks and designated wilderness areas.

Cavity-nesting birds require standing dead or diseased trees for nesting and roosting, and these trees are often targeted for removal during harvesting (Machmer 1999). Primary cavity excavator birds, such as pileasted woodpeckers, were found by Aubry and Raley (1999) to select larger diameter snags with advanced decay for feeding and nesting. Bevis (1999) found that primary cavity excavator species populations were best predicted by densities of large diameter snags. Among primary cavity nesters in the Pacific Northwest, the same bird species select smaller trees when nesting in hardwoods than when nesting in conifers (Bunnel *et al.* 1999). Bunnel *et al* (1999) found that frequency distributions of nest tree diameters for primary cavity nesters reveal the importance of management targets well above the minimum diameter of nest trees. Aubry and Raley (1999) suggest that pileated woodpeckers are keystone habitat modifiers; they suggest that pileated woodpeckers effects on ecosystems are disproportionately large relative to their abundance, and that their activities create habitat for many other species and strongly influence key ecological processes.

Many species of birds, mammals, amphibians, and reptiles utilize standing and downed dead wood. Woodpeckers depend on decayed wood for the excavation of nest and roost cavities in standing trees. Both avian and mammalian secondary cavity nesters then claim the abandoned cavities for their nesting or roosting (Bull 1999). Many of the woodpeckers and secondary cavity nesters forage on forest insect pests. Factors that affect the type and extent of vertebrate use of dead wood include the physical orientation, size, decay state, tree species, and overall abundance (Bull 1999). Some types of heartwood decay organisms create hollow chambers in living trees which eventually die to become hollow dead trees. Hollow standing trees are used by Vaux's swifts for nesting and roosting, pileated woodpeckers for roosting, black bears for overwintering, American martens for denning and resting, and many other species of small mammals for shelter (Bull 1999). Once the trees fall, many of the same species continue to use the hollow structures except the avian species (Bull 1999).

Most organisms relying on dead wood are not vertebrates, and dead wood contributes to biological richness in four broad ways: substrate, cavity sites, foraging sites, and shelter or cover (logs) (Bunnel *et al* 1999). Among vertebrates in the Pacific Northwest, 69 species commonly use cavities, while others make opportunistic use of cavities, and 47 species are strongly associated with downed wood. Solid logs provide cover or travel lanes for small mammals (Bull 1999). Large-diameter logs are used extensively by pileated woodpeckers and black bears for foraging on carpenter ants (Bull 1999).

Extensively decayed logs provide habitat for amphibians and reptiles (Bull 1999). Among weak excavators, about 70 percent of reported nest sites are in dead trees; strong excavators make greater use of live trees (Bunnel 1999). Among mammals, most bat roosts are found in dead trees, whereas carnivores tend to use living and dead trees about equally (Bunnel *et al.* 1999). Woodpeckers tend to select similar trees for foraging as for nesting, reflecting the influences of decay (Bunnel *et al* 1999). Foraging sites for woodpeckers, however, are often of smaller diameter and more advanced decay than are nesting sites.

Substantial coarse woody debris in various stages of decay is characteristic of the forest floor in natural forests. Contributed by breakage, windthrow, fire or standing death of large trees, it carries over into young forests as a legacy from the preceding old forests (Cazares and Trappe 1999). In the Douglas-fir region, large fallen trees may persist for centuries, slowly decaying and changing in form until incorporated into the soil (Cazares and Trappe 1999). Coast woody debris can absorb up to six times its own weight of water to serve as a reservoir into the summer dry season, thereby during drought providing a refugium for organisms such as amphibians and a medium for active functioning of roots, biological nitrogen fixation and nutrient cycling (Cazares and Trappe 1999). Coast woody debris harbors specialized fungi, arthropods and amphibians,and it provides topographic diversity to the forest floor and essential cover and habitat for small mammals (Cazares and Trappe 1999).

Ohmann and Waddelle (1999) compiled data on snags and fallen trees from 15,000 field plots across 49 million acres of forest in Oregon and Washington and found that current patterns of snags and logs are highly variable and associated with environmental gradients, forest composition, and successional stage. They determined that moist maritime forests contain more dead wood than drier interior environments, and that large snags and downed wood was most abundant in young natural forests and in late-successional forests on Federal lands. In young managed forests on private lands, Ohmann and Waddelle (1999) determined that most large snags and logs are remnants from previously harvested forests, which will not likely be replaced in the foreseeable future.

Northwest Forest Plan

An interagency, interdisciplinary team of experts, the Forest Ecosystem Management Assessment Team, produced a report assessing ten options for management of Federal forests within the range of the spotted owl. This report served as the basis for President Clinton's proposed Forest Plan which was announced on July 1, 1993, and analyzed in a Draft Supplemental Environmental Impact Statement (Draft SEIS). The Final SEIS was made available to the public in February 1994 (USDA and USDI 1994a). The Record of Decision and standards and guidelines for habitat management for late successional old growth species issued in April 1994, provide for an integrated reserve system based largely on the protection of habitat within multiple-purpose watersheds. Concepts such as Late-Successional Reserves and Riparian Reserves were incorporated to assure the viability of threatened and at-risk species, as determined by "viability panels" tasked to predict the likelihood of persistence under each option. Adaptive Management Areas were created to test technical and social objectives associated with the overall strategy of ecosystem management. Further, the Northwest Forest Plan allocated more than 24 million acres of Federal lands into six designated categories (Congressionally Reserved Areas, Late-Successional Reserves, Adaptive Management Areas, Managed Late-Successional Areas, Administratively Withdrawn Areas, and Riparian Reserves) and

one non-designated category referred to as Matrix.

The Northwest Forest Plan was developed to address the conservation of the spotted owl and other species on Federal lands. The basic conservation strategy in the Northwest Forest Plan improves upon the measures developed by the ISC (Thomas *et al.* 1990). The Northwest Forest Plan provides for the protection of extensive Federal forest reserves which are intended to support large, reproductively viable spotted owl population clusters throughout the range of the species on Federal lands. The system of Late-Successional Reserves (7,430,800 acres) will not only protect habitat currently suitable for spotted owls, which is also habitat for marbled murrelet, and pileated woodpecker, but also provide for the successional development of future habitat in large blocks.

Through implementation of the Northwest Forest Plan, Federal lands are expected to carry the major burden of conservation and recovery of late-successional habitats and associated species, including spotted owls and marbled murrelets. Federal reserves are not expected to be fully restored, at 80 percent suitable habitat for these species, for approximately 100 years (USDA and USDI 1994a).

The Interagency Scientific Committee (ISC) Plan and Northwest Forest Plan noted that non-Federal lands including portions of Department of Natural Resources (DNR) managed lands have a role to play in contributing to the conservation lands of the spotted owl (Thomas *et al.* 1990; USDA and USDI 1994a).

ENVIRONMENTAL BASELINE

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.

The action area for the proposed ITP includes most of the Olympic Peninsula. The Olympic Peninsula is a 6,500 square mile land area located in the extreme northwestern part of the contiguous United States. Within this area is marine and estuarine communities, temperate old-growth rain forest, riparian and aquatic communities, montane forest, Arctic-alpine communities, and glacier-covered mountains. It has been partially isolated for eons by glacial ice, the Pacific Ocean and waters of Puget Sound and the Strait of Juan de Fuca. The Olympic Peninsula is unique, in part, because of this isolation.

Few known species have been extirpated from Olympic Peninsula ecosystems. The Pacific fisher, which lives in forested areas is presumed to be extirpated from the peninsula (National Park Service 2000). The gray wolf was hunted and trapped until the last confirmed siting was in the area in the 1920's. Eight plants and 16 animals are endemic to the peninsula, including the Olympic torrent salamander. Because of Olympic Peninsula's isolation, it is theorized that some mammals never successfully migrated to (or established on) the peninsula. The National Park Service (2000) has indicated that the several mammals native to Washington were absent from the Olympic Peninsula

prior to European human contact, including grizzly bear, porcupine, and coyote.

Vertebrate communities of riparian and aquatic ecosystems of the Olympic Peninsula are poorly known (with the possible exception of certain taxa). To date, there have been no widespread surveys completed on the peninsula, although the Biological Resources Division of the U.S. Geological Service (in the Olympic National Park) and two private timber organizations are surveying for streamside amphibian faunas (on private lands in the southern portion of the peninsula) (Raphael *et al.* 1996). Amphibians are the primary vertebrates of high-gradient streams on the Olympic Peninsula, particularly areas without fish, while fish were typically found in low-gradient streams and those without physical barriers.

Factors Affecting Species Environment in the Action Area

Tribal Actions

The Olympic Peninsula is inhabited by 10 tribes. Olympic National Park is adjacent to the reservations of several tribes, among them the Chehalis, Hoh, Klallam, Makah, Skokomish, Quileute, and Quinault. The largest reservation on the peninsula is the Quinault Reservation. Historically, salmon and steelhead fishing was the major economic activity of the Quinault people, and timber harvest and hunting has been important on the Quinalt Reservation (Northwest Portland Area Indian Health Board 2000). The Quinault Reservation of 76702 hectares (189,621 acres) is located in northwestern Grays Harbor County and southwest Jefferson County. The reservation is a wedge of land including the Pacific coast below Lake Quinault on both sides of Quinault river. Extensive areas of the Quinault reservation have been logged. The Skokomish and Squaxin Indian Reservations are located close to the Plan Area. Please see section 3 of the HCP for more information.

Forest Service Actions

The 632,324-acre Olympic National Forest, managed by the U.S. Forest Service, surrounds most of the Olympic National Park. Five designated wilderness areas in the Olympic National Forest cover nearly 93,000 acres. Most of the non-wilderness area on the Olympic National Forest have been logged at least once in the last 100-years. Areas of critical habitat for northern spotted owl and marbled murrelet has been designated within "late successional reserves" on the Olympic National Forest, including some area immediately north of the Plan Area. The forest lands immediately to the north of much of the Plan Area are largely owned by and managed the U.S. Forest Service in accordance with the 1994 Northwest Forest Plan. More information is available in Section 3 of the HCP.

National Park Service

The largest ownership on the Olympic Peninsula is the U.S. National Park Service, controlling the Olympic National Park, making up about a quarter of the peninsula. The Olympic Forest Reserve was established in 1897 and included about 2 million acres including the mountain range and the land between them and the Pacific Ocean. Due to commercial interests the Reserve shrank to 615,000 acres and the name was changed to Olympic National Forest in 1907. President Woodrow Wilson then cut that it in half during World War I. President Theodore Roosevelt designated much of the area that was to become Olympic National Park "Mount Olympus National Monument" in 1909, expanding the area. Over time three reductions left the area half its original size. Controversy over

the fate of Olympic National Monument continued between timber, mining, and hunting advocates, and environmental groups during the period of 1909 and 1938. In 1933 the monument was transferred to the National Park Service. In 1938, President Franklin D. Roosevelt signed a bill designating 898,000 acres as Olympic National Park. Most of the coastal wilderness areas were added to the park in 1953. The establishment of Olympic National Park was fundamental to preserving old-growth forest on the Olympic Peninsula that has otherwise been heavily harvested (U.S. Fish and Wildlife Service 1997).

The park now covers 1,442 square miles or 922,651 acres. In recent years, Olympic National Park has received about 4 million visits annually (one of the most visited of the U.S. National Parks). Most visitors come to the park from July through September, with December and January the months with the fewest visitors. Olympic National Park occupies the central portion of the Olympic Peninsula, as well as a narrow 63-mile strip of land along the peninsula's Pacific Coast.

Nearly 600 miles of trails traverse the park. Approximately 168 miles of roads (69 miles of which are gravel) provide vehicle access to various points around the park. The park has 16 campgrounds with a total of 910 sites. Ninety-five percent of the park's area is designated wilderness. Olympic National Park visitors typically utilize the park for hiking, exploring, kayaking, canoeing, fishing, and wildlife watching. Over 300 species of birds and 70 species of mammals are found in the park. The park contains at least 20 native species of fish. Olympic National Park protects most trees through their entire life cycle from seedling to mature adult, and from snag to rotting downed log, which is otherwise rare on the Olympic Peninsula.

In Olympic National Park nearly 20 percent of the 1,480 species of plants are non-native. The National Park Service is working to control outbreaks of some of these exotic species, including Canada thistle and Scot's broom (American Park Network 1999).

Poaching is a growing problem within Olympic National Park (American Park Network 1999). As logging roads are built into areas bordering the national park, access into once-remote parts of the park improves, making it easier for poachers to enter and exit the park undetected. Poachers kill elk, deer, black bear, and other animals, and take red cedar trees (American Park Network 1999). Please see Section 3 of the HCP for more information about the Olympic National Park.

State Actions

Washington State has adopted Forest Practice Rules identifying "best management practices" (BMPs) required for logging related activities within the State. These BMPs are generally applicable to most forestry activity on the Olympic Peninsula. The Washington Department of Natural Resources has prepared an approved HCP governing logging related activity on 2.1 million acres of forested State-owned land throughout Washington, and undetermined amount of which is on the peninsula. Please see section 3 of the HCP for more information.

Private Actions

Port Blakely Tree Farms has prepared an approved HCP for logging related activity on 7,500 acres of forested lands north of the Plan Area. A large portion of the lands adjacent to the Plan Area to the west and south are owned and managed by three large timber companies: Port Blakely Tree Farms, Weyerhaeuser, and Rayonier Timberlands Operating Company. Weyerhaeuser and Rayonier manage

a majority of their forested lands with a 40-60 year clearcut logging rotations and even- aged reforestation. Port Blakely manages their land in much the same manner; however they have longer harvest rotations of 70-80 years for some of their stands. Please see section 3 of the HCP for more information.

Factors Affecting Species Environment within the Project Site

The Assessment Area includes Plan Area and surrounding lands on four sides; it consists of the approximately 261,575-acre Plan Area, plus approximately 640,000 acres of parcels not currently owned by Simpson, a portion of which could potentially be added to the proposed ITP (see Exhibit A in the IA). The Assessment Area is approximately 900,000 acres. Only private lands within the Assessment Area could be acquired and potentially added to the proposed ITP.

The Assessment Area can be characterized by the boundaries of the Plan Area. The northern boundary of the Plan Area is 95 percent owned by Olympic National Forest, 3 percent by the City of Tacoma, and 2 percent by small landowners. The western boundary of the Plan Area is 32 percent owned by Weyerhaeuser, 30 percent by Rayoneir, 15 by percent John Hancock Mutual Life Insurance, 10 percent by Olympic National Forest, 5 percent by City of Aberdeen, 3 percent by Port Blakely Tree Farms, 2 percent by Mason County, 2 percent by small landowners, and 1 percent by Washington State Department of Fish and Wildlife. The southern boundary is 35 percent owned by Weyerhaeuser, 25 percent by Washington State Department of Natural Resources, 20 percent by Port Blakely Tree Farms, and 20 percent by small landowners. The eastern boundary is 95 percent small landowners, and 5 percent Skokomish tribe.

The Plan Area consists of approximately 261,575 acres of predominately forested area. The Assessment Area and Plan Area cover portions of Thurston, Mason and Grays Harbor Counties, Washington (Figure 1-1 in the HCP). The Assessment Area is located in the southern foothills vicinity of the Olympic Mountains of the Olympic Peninsula, and lies in the Olympic Peninsula Province (Franklin and Dyrness 1973). Average annual precipitation ranges from approximately 100 inches in the Wynoochee River Valley to 75 inches in the southern portion of the Plan Area (USDA 1965). Significant specific information pertaining to the Plan Area is provided within the subject HCP.

Within their HCP, Simpson has divided the Plan Area into five regions or LTUs (explained above). Soils of these LTU's are derived from their parent geologic material, weathering, and flora and fauna inhabiting the regions. Soils in the five LTUs of the Plan Area are described in the HCP (see section 2 of the HCP); they consist of: Alpine Glacial -- This LTU is located in the western most portion of the Plan Area; Sedimentary Inner Gorges – This LTU is located in the western part of the Plan Area, including the West Fork Satsop and Canyon River drainages; Crescent Islands – This LTU is located in the southeastern portion of the Plan Area; Crescent Uplands – This LTU is located in the northern portion of the Plan Area, which is the southern foothills of the Olympic Mountains; Recessional Outwash Plain – This LTU is located in the central and eastern regions of the Plan Area, and it is the largest LTU.

The Plan Area lies within three major watersheds. The western portion of the Plan Area occurs within the Chehalis watershed, which flows west into Grays Harbor and the Pacific Ocean. This part

of the Plan Area contains the Wynoochee River and the three forks of the Satsop River (West, Middle, and East Fork). The northeastern portion of the Plan Area is in the Skokomish River Watershed and it is primarily drained by the North and South Forks of the Skokomish River that flow east into Hood Canal. The third primary watershed in the southeastern portion of the Plan Area contains many small stream systems that flow east into Hood Canal. These streams include Goldsborough Creek, Mill Creek, Skookum Creek, and Kennedy Creek.

The Plan Area has six sub-watersheds (6,100 total acres) that are within an rain-on-snow elevation zone. These areas are in the Crescent Uplands (CUP) LTU between approximately 1,200 and 4,000 feet elevation (Figure 3.1). Rain-on-snow (ROS) events result from large amounts of precipitation falling on a snow-pack, creating exceptionally high quantities of surface run-off and stream flows. These flows can potentially cause severe surface erosion, slope failures, debris torrents, and stream scouring. These ROS events typically occur in areas with low amounts of forest cover or immature forest. Approximately half of the area within the six sub-watersheds is currently rated as hydrologically mature (hydrologically mature stands are stands with less than 75 percent deciduous cover and total canopy closure greater than 70 percent).
The Northwest Forest Plan (NWFP) identified four Tier 1 Key Watersheds in the southeastern portion of Olympic National Forest, adjacent to the Plan Area. They include portions of the Wynoochee River, West Fork Satsop, Canyon River, and South Fork Skokomish River watersheds. Portions of the lower Wynoochee and South Fork Skokomish Key Watersheds extend into the Plan Area. These watersheds have been identified by Federal agencies as areas of special concern for water quality and fish stocks, although the NWFP has no regulatory authority on private lands.

Within their HCP, Simpson has identified 1,394 miles of streams in the Plan Area, including fishbearing, non-fishbearing, perennial, and intermittent streams (see Figure 5 of the HCP). This network consists of approximately 428 miles of fish-bearing streams (DNR Types 1, 2 and 3) and 966 miles of non-fish-bearing streams (DNR Types 4, 5 and 9). Many of these streams and their adjoining riparian areas are subject to Federal and State management regulations. These regulatory standards include the: (1) Federal Clean Water Act; (2) Washington State DOE surface water standards; and (3) Washington State Forest Practices Rules.

Within their HCP, Simpson has created a classification system for all streams in the Plan Area. These criteria include channel width, channel confinement, and channel substrate (e.g., "small channel, highly confined, cascade/bedrock"). Field surveys and Geographic Information System (GIS) mapping were used to document locations and attributes of each stream channel class. A total of 49 channel classes were identified, and they are described further in Appendix B of the HCP. Table 3 of the HCP lists stream length for each channel class.

The Plan Area has a variety of wetland types ranging from sag ponds on ancient, deep seated landslides in the Sedimentary Inner Gorge (SIG) LTU, to sphagnum bogs in the Recessional Outwash Plain (ROP) LTU, to riverine off-channel systems on the Wynoochee River floodplain in the Alpine Glacial (AGL) LTU.

The National Wetlands Inventory ("NWI"), documents a total of 6,059 acres of non-forested wetlands and an additional 1,506 hectares 3,724 acres of forested wetlands in the Plan Area. It is likely that the NWI has underestimated the amount of forested wetlands due to the lack of field

checking associated with the NWI effort. Nevertheless, Simpson's mapping analysis indicates some (up to half) of these forested wetland areas are currently mapped within their HCP in the Plan Area. The Stillwater River area of the Recessional Outwash Plain (ROP) has an unusually high density of wetlands with numerous small channels connecting with other wetlands and streams. Although this area only encompasses about 6 percent of the Plan Area, it is estimated to have about 30 and 35 percent of the non-forested and forested wetlands respectively. The Plan Area is located within the western hemlock zone of the Olympic Peninsula Province (Franklin and Dyrness 1973). Predominant tree species in this zone are western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), and western red cedar (*Thuja plicata*). Left undisturbed, these forests develop old-growth characteristics, including large diameter trees, multiple age and size classes, large standing dead trees (snags), and heavy accumulations of fallen trees on the forest floor (Franklin and Spies 1991). Trees may grow to be several hundred years old. The primary natural stand disturbances are catastrophic and small scale fires and windstorms.

Approximately 11 percent (29,262 acres) of the 261,575-acre Plan Area currently consists of what Simpson terms "conservation areas" (an undetermined level of protection/conservation based ostensibly on State forest practice rules), including streams and open water wetlands. The remaining portion (231,738 acres) of the Plan Area consists of "commercial timberland", which includes 3,927 acres of non-forest vegetation, such as shrublands and roads. The approximate acreage of forest age classes in the Plan Area are shown in Table 3.1 of the HCP. A majority (78 percent) of the area currently available to timber management per State forest practice rules consists of coniferous forest, with the remaining consisting of mixed forest or deciduous forest. About 30 percent of the forests available for timber harvest are more than 50 years old, and a small portion (1,138 acres) of that forest is older than 120 years (5 acre minimum mapping size). The age of these forests (besides the old-growth) is of almost solely based on past logging and management (versus fire or windstorm). The old-growth forest remaining is primarily distributed along the northern tier of the Plan Area, and these areas are shown as marbled murrelet habitat in Figure 8 of the HCP.

Approximately 79 percent of the riparian areas within the Plan Area are forested and 21 percent are non-forest. "Non-forest" includes non-forested floodplains, open water, non-forested wetlands, and shrublands. The forested area of the RCR consists of approximately 63 percent coniferous and 37 percent deciduous tree species. Age of RCR forests were estimated from stand data from similar aged forests adjacent to the RCR, and in some cases, stand data was available from within the RCR. That analysis showed approximately 78 percent (32,251 acres) of the coniferous and deciduous forests within the RCR are currently greater than 30 years old (minimum average of at least 13 inches DBH, see Table 9 in the HCP). Furthermore, about 60 percent of all the existing forests are greater than 50 years old; and 23 percent of all forests are older than 70 years. A majority of the RCR forests are expected to reach 70 years-old or older by Year 25 of the proposed ITP and greater than 100 years old by the end of the proposed ITP term.

Of the total 20,598 acres (63 percent of total RCR) coniferous forest in the RCR, 65 percent were found to be greater than 30 years old; 42 percent were greater than 50 years old; and 25 percent were greater than 70 years old. A majority of the RCR coniferous forests are expected to be at least 70 years-old by Year 25 of the plan and greater than 100 years old by the end of the proposed ITP term.

The Plan Area has approximately 2,000 total active road miles (Table 14 in the HCP) which traverse a variety of landscapes and cover approximately 3.7 percent of the land base. Weighted road density for the entire Plan are today is 4.9 miles per square mile varying between 7.8 in the SIG to 4.1 in the AGL (see Table 14 in the HCP).

Habitat Feature Associations

Steep Tributary Species Association (STA)

Within the Plan Area, these types of streams are found in all lithotopo units; however, their principal occurrence is in the Crescent Uplands (CUP), the Alpine Glacial (AGL), and to a lesser extent the Crescent Islands (CIS). Similar streams occur in most of the Assessment Area. These stream types also are present in the Sedimentary Inner Gorge (SIG) and the Recessional Outwash Plain (ROP) but occur less frequently in the SIG and the ROP and consequently are less important for maintaining this species association.

Habitat and fish surveys performed by Simpson indicate that many of the channel segments that support the STA were affected by historical logging and road building in the Plan Area. These activities sometimes triggered landslides that initiated debris flows. In most cases, multiple year classes of STA fish species are currently present, likely indicating that these populations are reproducing in the Plan Area. Mature second growth riparian forests along some STA channels in the Plan Area are increasingly contributing conifer LWD to the channel.

Historical debris torrents have adversely affected many Type 3, 4 , and 5 stream channels in the Assessment Area. The amount of STA stream miles (primarily Type 3 streams) affected by debris torrents in the Assessment Area is undetermined; however, general field reconnaissance indicates debris torrents may have affected as much as seven percent of the Type 4 and 5 stream mileage in the Plan Area (West Fork Satsop River Watershed Analysis 1995).

Within the Assessment Area, debris torrents that occured within the headwater tributaries, and to a lesser extent within Type 4 and 5 streams, have moved downstream and picked up new material from within the channel and riparian areas. Within the steeper channel segments of the STA streams, some channels have be stripped to bedrock leaving little if any habitat structure to support fish. However, in segments with deep alluvial cover, and less steep gradients, the post debris torrent channel bed is often composed of large cobbles that arrange themselves into a step-pool channel morphology.

In the past, riparian forests were harvested from most STA stream corridors in the Assessment Area. That harvest has a long-term effect on stream functions; it now is beginning to be reversed with second growth trees recruiting to the channel. Fish populations have likely been adversely affected by undersized culverts under logging roads that stop natural movement patterns and limit movements of resident fish populations in the Assessment Area.

Lands surrounding the Plan Area (partially within the Assessment Area) that support the STA lie principally within the U.S. Forest Service (USFS) boundaries to the north. Most of these lands are managed under the Northwest Forest Plan, and few commercial timber harvest or road-building

activities will occur in the future on these Federal lands. Conservation practices on these Federal properties will provide protection for the STA habitat within the region. Since these species are principally resident in their behavior, only a small amount of exchange of breeding individuals between the Plan Area populations and those persisting on the surrounding lands will likely occur.

Flat Tributary Species Association (FTA)

Within the Plan Area, these types of streams are found within all LTUs, although they are more common in the ROP, CIS and the AGL. Similar streams are found in the Assessment Area.

The FTA streams of the Assessment Area have been substantially affected by the loss of in-channel wood supplies due to riparian forest harvesting, "stream cleaning" activities and cedar salvage in the past. These adverse effects are common on similar landscapes on other private commercial forest lands in the region.

The accumulation of coarse and fine sediments, the loss of in-channel wood, the limited log contributions over the past few decades, and the loss of future LWD recruitment have all combined to create structurally simple FTA stream habitats in the Assessment Area. This situation is beginning to reverse and to recover in many areas, as conifer trees from maturing second growth forests (that has recently been retained due to forest practice rules) begin to recruit to the channel network. In the case of some streams, in-channel ecological function remains degraded because functional LWD recruitment is minimal due to lack of larger/older trees.

Lands downstream from the Plan Area (a large portion of which are in the Assessment Area) that support the FTA are virtually all held in private ownership. These properties have been managed under a variety of land uses and management practices including commercial timber, agricultural and rural residential. The level of protection for FTA streams and species on these lands has been highly variable. Ownership is fragmented and various standards associated with different land have affected management.

Mainstem Species Association (MA)

Within the Plan Area, these streams are found in the AGL, ROP and the SIG lithotopogrpahic units. Similar streams are found in most of the Assessment Area. Although their valleys differ in the degree of confinement, and their floodplains differ in width, they all are large, meandering rivers (e.g., Wynoochee River, the East, West and Middle Forks of the Satsop River, the Canyon River, and the North and South Forks of the Skokomish River). The floodplain in some reaches of the Canyon, West and Middle Forks Satsop Rivers are severely constrained, but the channel width and bed morphology remain reasonably consistent with the other reaches.

Some large changes have taken place in the past on mainstem rivers of the Assessment Area that are not favorable to fish. Many of the more permanent changes, such as, channelization, diking, and water withdrawals, are not associated with forest land management. Industrial scale logging of riparian areas throughout these watersheds has caused a reduction in the function and changed the character (significantly reduced size) of logs recruited to the entire channel network.

The initial logging activities in the Assessment Area may have more damaging to the main rivers than to any other portion of the aquatic system. The use of splash dams was particularly damaging to this portion of the stream system. Systems that were treated in this manner lost their log jams, deep pools, and edge habitat. Many streams became disconnected from historic floodplains due to changes in streambed elevation. Some reaches of the Satsop River in the Assessment Area were likely splash dammed.

The main effect on the MA species and habitats from industrial scale logging operations has been: (1) the accumulation of coarse sediment originating from upstream sources; (2) the loss of mature riparian forests during the initial logging in the region; and (3) the cumulative losses of large quantities of logs and woody debris from the upper watershed.

The accumulation of coarse and fine sediments, the loss of log jams, the lack of large log recruitment sources from the immediate riparian forest and the loss of off site or upstream sites for large log recruitment have combined to create structurally simple MA river habitats, with little potential for passive restoration in the short-term.

Log jams in MA rivers of the Assessment Area typically anchored by large "key piece" logs. The substantial current lack of these large logs has affected channel and flood plain morphology. This decline in log jams (from pre-logged conditions) has resulted in less frequent side channels and less complex stream edge habitat in the Assessment Area. These changes have detrimentally affected species such as juvenile chinook and native char that prefer complex stream edge habitat and side channel habitat. While these simpler channels may be sufficient for species such as the torrent sculpin and the longnose dace that utilize swift waters and cobble substrates, that simple habitat does not favor pink salmon, which require the finer textured streambed of lower energy side channels for spawning.

It is undetermined how much of the MA habitat in the Assessment Area has been substantially affected by the effects described above. Given that streams transmit the effects of changes in sediment supply and wood loading downstream, it should be assumed that the entire MA habitat base in the Assessment Area has been substantially altered over the course of the last century.

Lentic Species Associaiton (LA)

Fish within the Lentic Species Association (LA) inhabit a variety of wetland habitats within the Assessment Area. Open water wetlands are concentrated in the ROP in the Plan Area but may occur in all LTUs except the CUP (with the exception of Dry Bed and Haven Lakes). Similar concentrations likely occur in the Assessment Area. Simpson has commonly found the Olympic mudminnow and the threespine stickleback together in shallow wetlands of the ROP, where there is dense aquatic vegetation in the Plan Area. Simpson determined that prickly sculpin in the Plan Area are usually associated with more open water habitat frequently in the same wetland feature.

Snag Habitat

Most uplands in the Plan Area currently consist of coniferous forests stands one to sixty years old (Simpson 1999). The Assessment Area is similar. Stands less than approximately 30 years-old

typically have snags only in the smallest size class (less than twelve inches DBH). For stands 40 to 60 years old in the Plan Are, the snag size and density increases dramatically (Simpson 1999). The Dry Creek study area (within the Plan Area) showed two non-commercially thinned units with 60-year old coniferous forest had a total of 10 snags per acre distributed among the following snag density: approximately 8 snags per acre, 6-12 inches DBH; 1.4 snags per acre 12-22 inches DBH; 0.8 snags per acre, 22-32 inches DBH; and 0.3 snags per acre greater than 32 inches DBH (Simpson 1999). Coniferous species made up a majority of the three largest size snag classes in this study (Simpson 1999). Sixty-year old (with the snag class diversity as above) and older forests have typically been somewhat rare in the recent past, and have likely remained on the Plan Area landscape for only a short time before they have been harvested. Many snag dependent species, such as northern flickers, wood ducks, and pileated woodpeckers, require larger snags for nesting or roosting.

Older Forest

A proportionately small amount (approximately 1,138 acres) of old-growth forest stands currently exist in the Plan Area (minimum stand size of five acres). A similarly small proportion of older forest exists on the private lands of the Assessment Area. Approximately 200 to 400 additional acres of old-growth trees exist in small patches or stringers of old-growth less than five acres in size, primarily within proposed riparian conservation zones of the Plan Area (Simpson 1999).

Prior to intensive timber harvesting on the Assessment Area lands, most of the riparian areas consisted of mature or old-age coniferous and deciduous forests. Timber harvesting prior to the 1970's removed most riparian forests within both the Plan Area, Assessment Area, and on most other private lands in the vicinity.

Water Quality

Historic timber management within the Plan Area, and on private, State and Forest Service lands in the watersheds of the southern Olympic Peninsula Province has resulted in a general decline in water quality. This decline generally has been due to historic riparian timber harvesting, road management, lower LWD recruitment and higher levels of stream sedimentation. However, the current forest management, particularly since the 1970's, has begun to reverse that trend due to measures that protect riparian areas, unstable slopes and improve road management.

Large Woody Debris

Currently within the Plan Area, and Assessment Area, the number and size of LWD is substantially less than what was present prior to logging of riparian areas earlier in the 1900's. This decrease in LWD from historical levels has had detrimental affects on aquatic habitats, hydrogeomorphic function and aquatic species populations. State imposed riparian protection measures implemented since the 1970's have led to some degree of riparian forest restoration, although most of these forests are currently younger than 70 years old.

Detritus

The historical decrease (prior to the 1970's) of riparian forests in the Plan Area, and the corresponding decrease in the amount of LWD, has most likely reduced the amount of historical detritus input and detritus retention in many streams of the Plan Area.

EFFECTS OF THE PROPOSED ACTION

Effects of the proposed action as presented in this section are those that are somewhat general to the species proposed for coverage, and to the systems they are part of. The most substantial effects of various proposed activities are outlined in this section, as are effects to similar habitats associations utilized by different species. Please see Appendix A for a more detailed analysis of the effects on each individual species.

Effects of the Proposed Action: by Proposed Permit Activity

Timber Harvest

Direct Effects

As proposed, timber harvest or logging in riparian areas would result in removal of riparian canopy and disturbance of natural riparian vegetation (Spence *et al.* 1996). No proposed harvest would occur within the channel migration zone (CMZ) or channel disturbance zone (CDZ) along perennial streams within the Assessment Area

Timber harvest would result in removal of forest habitat in the short- to long-term, including snags that provide habitat for sixteen species proposed for coverage. Harvest would also result in removal of nesting, perching, thermal cover and foraging habitat for many of these species, as well as for species proposed for coverage that do not nest in cavities, such as the bald eagle, harlequin duck, marbled murrelet, bandtail pigeon and Roosevelt elk.

Approximately 219,000 acres of the 261,575-acre Plan Area would be subject to clearcutting, except where roads and other natural or artificial features preclude tree growth. It is undetermined what parcels or proportion of the Assessment Area would be harvested.

Indirect Effects

Proposed timber harvest would remove moderate sized trees before they can become, through successional development, snags or downed logs in the short- or long-term. Species that utilize larger downed wood, such as pileated woodpeckers, would be adversely affected by harvest rotations that prevent the development of larger trees that otherwise would develop into large downed logs. Timber harvest would also cause removal of existing snags for safety or liability reasons. This reduction in potential and existing snags, and potential downed logs, degrades or eliminates habitat for proposed Permit Species that are dependent upon snags or downed logs (particularly larger snags or logs), such as pileated woodpeckers, purple martins, and Van Dyke's and northwestern salamanders.

As proposed, some snags would be conserved within RCR conservation areas (see Description of Proposed Action above), including maintaining and/or developing at least 2 snags per acre 12-24 inches DBH, and 2 snags per acre greater than 24 inches DBH, averaged per acre of the RCR by year 20 and 40 of the HCP period. Thus, 22,191 acres of RCR conservation areas would have 4 snags per

acre at years 20 and 40 of the ITP term, or at least 88,764 snags across the Plan Area at years 20 and 40. It is undetermined to what extent snags would be retained across the landscape outside of years 20 and 40 of the proposed term, but snags once established would likely be retained until the next thinning or harvest cycle in the immediate area around the snag (during which harvest, access, or liability and safety considerations may caused them to be felled). Additionally, the proposed action includes retention of at least 2 downed logs, at least 12-inch diameter (small end) and 20-foot long (see Description of Proposed Action above), or equivalent volume, per each acre harvested. No salvage of dead or downed trees would be permitted within the proposed RCR conservation areas.

Timber harvest could result in introduction of artificially high sediment levels into riparian and aquatic systems resulting from ground disturbance and removed cover associated with timber harvest activities up slope. No harvest of timber (besides potentially some experimental thinning in RCRs) is proposed directly adjacent to aquatic systems. Harvest of timber is proposed in uplands areas outside of conservation areas, and some thinning is proposed in some RCRs. As proposed, timber harvest could cause increased peak flows and channel disturbance downstream. Timber harvest and associated activities would likely lead to adverse impacts to aquatic species and their habitat, including reduction in stream shading and channel stability, elevation of fine sediments in spawning gravels and filling of substrate interstices, reduction in pool habitats, alteration of the nutrient balance and physical character of streams, reducing cover and overall stream community complexity, and restriction of natural movements of juvenile and adult aquatic species (Spence *et al.* 1996). As proposed, timber harvest in riparian areas would likely cause increased delivery of sediment to streams from increased surface erosion (over natural levels), the reduction in leaf litter delivery and large wood recruitment to streams (Spence *et al.* 1996).

In the steep and high-rainfall forests of Oregon, Washington, and British Columbia, mass movements of soil are the dominant erosional process (Chamberlin *et al.* 1991). Chamberlin *et al.* (1991) found that many of these mass movements originated on open areas after logging, with increases in frequency ranging from two to 31 times.

Disturbances associated with logging-related increased sediment loads have been documented to require decades to pass the sediment through a watershed (Madej 1978, Montgomery and Buffington 1993). Coarse sediment is expected to be deposited relatively closely downstream to a clear-cut stand. Sand and silt are expected to regularly travel in high flows and to be deposited in the mid-term within one to two miles after reaching the confluence with the next equal or higher order stream. Fine silt and clay would eventually be carried all the way to estuaries downstream. For aquatic species, the main effects of artificially high sediment levels is sedimentation of spawning habitat and loss of pool habitat. Corn and Bury (1989) found that the abundance, density, and biomass of four aquatic amphibian species studied were lower in streams flowing through logged forest than unlogged forest streams.

Nutrients are directly lost to the ecosystem through the removal of trees. Sudden removal of large quantities of vegetation through harvesting can increase leaching of nutrients from the soil system into surface waters and ground waters by disrupting the nitrogen cycle (Likens *et al.*, 1970). Harvest intensity (i.e., proportion of forest canopy removed), type of harvest (logs or whole tree) and cutting

frequency all affect the rate of nutrient removal from the system (Beschta *et al.* 1995). Despite the loss of nutrients stored in removed biomass, nutrients are generally more available to stream organisms in the years immediately following harvest. This results in part from the addition of slash to the forest floor (Frazer *et al.* 1990), accelerated decomposition of organic litter resulting from increased sunlight reaching the ground (Beschta *et al.* 1995), increased water availability for leaching of materials, and increased overland runoff and erosion that contributes unbound (nitrate and ammonium) and bound(orthophosphate) nutrients to the stream (Gregory *et al.* 1987). Where logging reduces riparian vegetation, nutrient supply to the stream (e.g., leaf litter and woody debris) may be reduced. As soils stabilize and revegetation occurs, the nutrient flux declines, though nutrients from herbaceous plants in the riparian zone add high unction materials that easily decompose. Over time herbs, shrubs, deciduous trees, and conifers provide allochthonous inputs for nutrient uptake.

Because of vegetation removal, logging can also changed evapotranspiration rates and soil water content, with resulting increases in annual runoff (Chamberlin *et al.* 1991). Soil compaction from harvest activities can change infiltration rates and therefore runoff and erosion rates (Chamberlin *et al.* 1991). Stream channel structures are typically altered after logging, with a corresponding loss of the habitat diversity required by fish populations.

Timber harvest and associated activities often lead to adverse impacts to aquatic species and their habitat, including reduction in stream shading through loss of tree canopy (Spence *et al.* 1996). Timber harvest in the proposed action would likely result in increased temperature levels within fish-bearing streams, including those potentially or actually occupied by coastal cutthroat trout and bull trout. Stream temperature has been shown to affect the time required for fish eggs to develop and hatch (Chamberlin *et al.* 1991). Temperatures within aquatic systems utilized by stream temperature-sensitive amphibians, such as tailed frogs, would also likely be raised, resulting in degraded habitat or even eliminated habitat in reaches. This would result from removed or thinned canopy and shade, with increased sunlight penetrating to aquatic systems, ultimately raising stream temperatures in waters important for aquatic species proposed for coverage.

Timber harvest would likely affect covered wildlife species when harvest occurs adjacent to habitat occupied by nesting or foraging proposed Permit Species. Taxa would likely be temporarily displaced from foraging due to disturbance, or could abandon nests.

Timber harvest would likely continue or perpetuate habitat fragmentation in the Assessment Area. Habitat fragmentation likely affects native wildlife species richness, diversity, turnover, and abundance. In a short-term study of breeding bird communities in old, boreal mixed-wood forest in British Columbia, Schmiegelow *et al.* (1997) evaluated fragmentation by creating isolated and connected forest fragments of 2, 25, 99, and 247 acres. Connected fragments were linked by 300-foot wide riparian buffer strips. The passerine bird community was sampled before, and two years after forest harvesting. No significant change in species richness was detected as a result of the harvesting, except in the 2-acre connected fragments, where the number of species increased two years after isolation. This increase was accounted for by transient species, suggesting that the adjacent buffer strips were being used as movement corridors. Bird species diversity was dependent on the area size

of the isolated fragments, only after cutting, having decreased in the smaller areas. Bird species turnover rates in the isolated fragments were significantly higher than in similar connected or control areas, due to species replacement. Crowding occurred in the isolated fragments immediately after cutting, but two years after fragmentation, the responses in abundance of species varied with the migratory strategy of each species. The numbers of neotropical migrants declined in both connected and isolated fragments, and resident species declined in isolated fragments. Most species in these groups require older forest habitat, and many favor interior forest areas. The abundance of short-distance migrants, most of which are habitat generalists, did not change. Overall, although there was no decrease in species richness from the recently fragmented areas, community structure was altered. Maintaining connections between habitat fragments was found to help mitigate these effects.

Edge habitats have been well-documented to differ from core habitats in several ecological systems. In a comprehensive review, Paton (1994) concluded that "strong evidence exists that avian nest success declines near edges." Ratti and Reese (1988) did not find the edge relationship documented by Rudnicky and Hunter (1993), Vander Haegen and DeGraaf (in pres), and others (see Paton 1994). However, Ratti and Reese (1988) did observe lower rates of predation near "feathered edges" compared to "abrupt" edges (e.e., clear-cut or field edges), and suggested that the vegetative complexity of the feathered edge may better simulate natural edge conditions than do abrupt edges. These authors also concluded that their observations were consistent with Gates and Gysel's (1978) hypothesis that birds are poory adapted to predator pressure near abrupt artificial edge zones. Edge effects have been implicated in increased forest bird nest predation rates for other species of birds (Chasko and Gates 1982, Yahner and Scott 1988). Wilcove (1985) speculated that relatively small increases in nest predation combined with other impacts of habitat fragmentation, such as loss of habitat heterogeneity and disp Among all Pacific Northwest birds, the marbled murrelet is considered to be one of the most sensitive to forest fragmentation (Hansen and Urban 1992).

Riparian buffers and conservation areas, as proposed, would significantly reduce some of the potential effects of harvest noted above. Buffers and conservation areas, as proposed (see Description of the Proposed Action), would help protect identified unstable slopes most susceptible to landsliding and would help capture surface erosion caused sediment before it reaches aquatic systems. Proposed buffers and conservation areas would help shade aquatic systems from abnormal stream warming, help reduce disturbance by buffering human activities, and help provide connectivity and small-size core habitat in a landscape that would continue to remain fragmented. Timber harvest unit size would be restricted to up to 240 acres in size. Approximately 22,191 acres of riverine riparian area would be conserved in the Plan Area, with conservation along all stream classes. It is undetermined what acreage of riparian areas would be conserved within the Assessment Area if additional lands are added. 42,574 acres out of the 261,575-acre Plan Area would receive partial or full conservation/protection (see Table 7 of the HCP); this would provide partial or full conservation/protection of at least 16.3 percent of the Plan Area, much of which is forested (other portions are made up of active stream/river channel or are otherwise non-forested). Most of the remaining 219,000 acres of the Plan Area would be subject to clearcutting.

Road Construction, Maintenance, and Decommissioning

Direct Effects

Road building and other road management activities would likely result in loss of habitat for proposed Permit Species where vegetation (particularly larger trees and snags) or other habitat features (such as rock outcrops or burrows) are removed or damaged for clearing of road rights-of-ways. Nesting, foraging or perching habitat for bird species covered under the HCP would likely be eliminated or degraded, including loss of nests.

Indirect Effects

Road building would likely result in disturbance to proposed Permit Species when trees or other habitat features are removed or disturbed adjacent to occupied habitat. Taxa would likely be temporarily displaced from the area during the activity, including abandonment of eggs or nestlings and vacating foraging areas (such as pileated woodpeckers and Roosevelt elk). Long-term displacement, due to modification of habitat function, such as opening of a stand to wind effects, would also likely occur.

Road construction and maintenance would likely cause long-term increased sedimentation effects to local and downstream waters. Stream buffers, as proposed, would not likely capture artificially high sediment loads expected to result from the significant road network in place proposed to be maintained and to the new roads proposed to be constructed. The increased sediment delivered to these buffered streams and the concomitant effects (i.e., sedimentation, reduction in water quantity, and elevation in water temperature) would likely be translated downstream to larger waters as well.

Logging road densities and designs are particularly important factors affecting surface erosion and subsequent stream sedimentation. Surface drainage concentrated within roadside ditches, that is not dissipated or directed to reduce its effects can lead to erosive cuts (resulting in soil erosion and stream sedimentation) and concentrated water flow onto slopes that may exceed a slope's capacity to hold the weight (resulting in mass soil movements or landslides). Surface erosion on gravel roads also can lead to high levels of suspended sediment moved into streams. Inadequate road designs, such as inappropriate placement of backfill, undersized culverts and other factors, can lead to mass wasting events such as land slides or debris torrents. Roads and ditches can become temporary stream systems, speeding water runoff and reducing water absorption into forest soils

Everest *et al.* (1987) found that logging roads, not the tree harvesting practices themselves (unless both sides of a stream bank were clear-cut), were responsible for a majority of the sediment that enters an aquatic system. Road construction causes the stream channel network to increase, because the roads act as tributaries, creating a more efficient sediment delivery system (Castro and Reckendorf 1995). McCashion and Rice (1983) found that logging roads were responsible for 61 percent of the soil volume displaced by erosion in northwestern California.

Recent studies have linked recent flood damage to clearcutting of timber (particularly on steep slopes) and to the extensive network of logging roads constructed in forested regions throughout the Northwest (Eugene Free Community Network 2000). One study (performed by Gordon Grant, a hydrologist with the US Forest Service's Pacific Research Station in Corvallis, Oregon) was based on 40 years of data from the Willamette National Forest in Oregon, and found that clear-cuts and logging roads increased peak flows in mountain streams by 20 to 50 percent (Eugene Free Community Network 2000). The study found that effects to streams diminished gradually, but were still apparent

25 years later. The Association of Forest Service Employees for Environmental Ethics (1996) did an aerial assessment of the Mapleton Ranger District in Oregon following the major rainstorms of 1996, and found the following results:

> A total of 185 landslides from the February 1996 storm were recorded. Of these, 114 were in-unit slides, 68 were road-related slides, and 3 were natural, in-forest slides. On average, road-related slides appeared substantially larger than in-unit slides, which is also consistent with previous studies. Road-related slides also appeared to cause more damage to streams; several large debris torrents were triggered by road failures.

Road construction and maintenance associated with timber harvest typically increases the amount of sediment delivered to streams through surface erosion, as compared to natural delivery rates. The disturbed areas of the road "prism" include the road subgrade, cut and fill slopes, ditches, berms, turnouts, stream crossings, and any other construction features that may be present (Fitzgerald *et al.* 1998). "Roads, which are the major source of management-related sedimentation in streams associated with logging regionally, continue to have adverse effects to stream communities even when not actively utilized"; they continue to contribute high sediment loads until they are stabilized and abandoned (Cederholm and Reid 1987). Roads can rarely be constructed that do have not cause adverse effects to streams (Furniss *et al.* 1991). Roads constructed within riparian areas and parallel to streams typically have pronounced adverse effects to aquatic systems, compared to roads built in other locations.

Reid and Dunne (1984) found that gravel forest roads generated up to 300 tons of sediment/mile/year from surface erosion in the Olympic Mountains of Washington. They found sediment loss was found to be related to traffic intensity and was highest on heavy-use gravel roads compared to unused roads or paved roads. Sediment yield from cutbanks and ditches alongside paved roads was less than 1 percent of that from gravel roads in their study. Heavily used roads were calculated to produce 300 tons of sediment/mile/year over the period of study, compared to lightly used roads with 2.6 tons/mile/year and paved roads with 1.4 tons/mile/year.

Roads accelerate soil erosion rates due to surface erosion and mass soil movement such as slumps and earthflows, debris avalanches, debris flows, and debris torrents. High rates of stream sedimentation result from this increased erosion. Furniss *et al.* (1991) found soil erosion rates were 30 to 300 times higher on forests with roads than undisturbed forest. Roads also altered streamflow rates and volumes, which along with increased sedimentation, resulted in altered stream channel geometry (Furniss *et al.* 1991). Acting as new flowpaths for water, roads increased the channel network over watersheds, increasing the drainage density. By increasing the frequency, magnitude, and altering the composition of debris flows, road caused erosion and delivery can affect the long-term potential for developing complex channel morphology and aquatic habitat.

Roads can also degrade fish habitat by creating migration barriers such as inadequate culverts and temporary dams caused by landslides. Erosion results in sedimentation of streams and causes declines in spawning habitat when too high a proportion of fine sediment is deposited. Hicks *et al.* (1991) found that salmonid survival rates decreased after logging and road construction as fine sediment levels in streams increased and as important habitat characteristics, including the number of

pools and winter cover, decreased. Macroinvertebrates, the primary food source of juvenile fish and some amphibians, also typically decline when large amounts of sediment are added to the stream system (Furniss *et al.* 1991). Welsh and Ollivier (1998) found the density of the three stream amphibian species studied was lower in streams affected by sediment due to road construction than in control streams. Two of three species had significantly lower numbers in all five stream micro habitats evaluated.

The introduction of sediment in excess of natural levels can have multiple adverse effects on channel conditions and processes resulting in effects on aquatic species survival, the food web, and water quality conditions, such as water temperature and dissolved oxygen (Rhodes *et al.* 1994). Fine sediments can influence incubation survival and emergence success (Weaver and White 1985) but may also limit access to substrate interstices that are important cover during rearing and overwintering (Goetz 1994; Jakober 1995). Emergence success of bull trout has been shown to be approximately 80 percent when no fine materials are present, and approximately 30 percent when 35 percent fine materials are present (Weaver and White 1985 in Montana bull Trout Scientific Group 1998). Bull trout and other fish species proposed for coverage occupy deep pools at all life stages, and few bull trout are found in streams where pools are lacking (Dambacher *et al.* 1992; Buckman *et al.* 1992 and Goetz 1989 in MBTSG 1998). Shifts in sediment loads set off a complex of channel responses including changes in pool volumes, depth and frequency, and changes channel morphology (including slope, sinuosity, shape, velocity, flooding regime, and sediment transport) (Rhodes *et al.* 1994; Castro and Reckendorf 1995).

Sedimentation from proposed road building and maintenance would likely be of moderate to long duration, depending on geology, slope, and use. Interstitial spaces for proposed covered aquatic species, including side-channel and backwater habitat for juvenile and adult fish, deep pools for overwintering and migrating adults, egg survival, prey base abundance, and aquatic species feeding activities would all likely be adversely affected by sediment transport and deposition. All life history stages of migratory species covered under the proposed action, including bull trout and cutthroat trout, would be adversely affected.

A recent aquatic assessment of the Interior Columbia Basin showed that bull trout strongholds have a strong negative correlation with road densities (Quigley and Arbelbide 1997). The average road density for bull trout strongholds in the Interior Columbia Basin was 0.45 mi/mi^2. Based on the road density information provided, road densities in the proposed Plan Area are much higher than this, averaging 4.9 miles per square mile varying between 7.8 in the SIG to 4.1 in the AGL (see Table 14, HCP). It is undetermined what the road densities are throughout the Assessment Area, but they are likely similar on assessment area to the proposed ITP. We recognize that annual precipitation and geology are significantly different between the Interior Columbia Basin and the Olympic Peninsula. However, this is the best available scientific information on the relationship between road densities and bull trout populations.

The Plan Area currently has approximately 2,000 total active road miles (see Table 14 in the HCP) which traverse a variety of landscapes and cover approximately 3.7 percent of the land base (road mileage across the Assessment Area is undetermined). The current active roads in the Assessment

Area undoubtedly represent a significant source of artificially high delivery of coarse and fine sediments into streams inhabited by aquatic species proposed for coverage. No road data is has been provided by the applicant for potentially added lands within the Assessment Area, but similar road densities likely exist or would be created.

Given the apparent sensitivity of bull trout and other aquatic species to increased sediments in critical life stages, proposed road construction or maintenance are likely to adversely affect proposed Permit Species with aquatic life stages. Depending on the location of proposed road construction (e.g., unstable slopes, riparian areas, etc.) and drainage network in the Assessment, riparian buffers would not likely sufficiently act to buffer these effects. Improperly sized and placed culverts would like continue to be passage barriers that restrict fish movement until they are replaced, as proposed.

Although proposed road use in the Assessment Area would primarily be associated with logging activity and tree farm management, roads would continue to deliver various amounts of sediment to these streams in excess of natural rates into the future, at least until these roads are permanently abandoned (i.e., stabilized and put to bed). Each affected creek and river contributes to the water quality of a spawning, rearing, migratory, and/or foraging corridor for aquatic dependent proposed Permit Species. These species would likely be adversely affected due to effects to spawning, rearing, migration and foraging behavior, habitat degradation, food supply disturbances, and decreased water quality and quantity.

Tree removal associated with road activities would likely result in increased temperature levels within fish-bearing streams, including those potentially or actually occupied by coastal cutthroat trout and bull trout. Temperatures within aquatic systems utilized by stream temperature-sensitive amphibians, such as tailed frogs, would also likely be raised resulting in degraded habitat or even eliminated habitat in reaches. Road rights-of-ways are generally kept free of larger vegetation for sight-distance and vehicle/structure clearance, providing long-term stream exposure to sunlight in many locations where roads cross or are near streams.

Log Transportation

Direct Effects

As a result of transportation activities as proposed, the more mobile but slow-moving terrestrial species proposed for coverage could be crushed or struck by moving vehicles. Many of the amphibians with terrestrial life stages, such as red-legged frogs, western toads, and northwestern salamanders, would likely be moving across the ground surface during very humid weather periods, and would likely be run over by logging trucks or other equipment associated with harvest. Roosevelt elk would likely be struck by vehicles during the proposed ITP term, although because of their aversion to human activities and agility this would be infrequent. Many of the proposed covered bird species, such as western bluebird and northern flicker, would likely be struck by vehicles, particularly juveniles. Proposed Rail transportation within the Assessment Area would have undetermined, but likely minor, effects on proposed Permit Species.

Indirect Effects

Log transportation would likely result in temporary indirect effects to many proposed Permit Species

in the form of disturbance to nesting, foraging or perching activities. Noise disturbance associated with log hauling would displace some proposed Permit Species from habitat in the short term. Roosevelt elk would likely be displaced from foraging, calving or thermal cover habitat in the mid-term once disturbed. Some nesting birds proposed for coverage would likely abandoned eggs or young due to disturbance of hauling.

Site Preparation and Slash Abatement

Direct Effects

Site preparation and slash abatement would result in loss of habitat for terrestrial amphibians and birds proposed for coverage that utilize downed wood components. In the worst case, logs not removed by hauling after harvest, the coarse woody debris by-product of harvest, as well as existing (pre-harvest) downed logs, would be essentially eliminated from stand areas in preparation for tree planting and/or to reduce slash. Slash piles would likely be burned. Scarification and burning of slash would likely kill terrestrial amphibians proposed for coverage that may be utilizing coarse woody debris or logs where proposed site preparation and slash abatement would occur.

Coarse woody debris is recognized as an important component of northwest forest ecosystems, and is linked to forest biodiversity and ecosystem processes (Arsenault 1999). Coarse woody debris features are high centers of forest biological interaction and energy exchange (Arsenault 1999). Downed logs are a very significant habitat component for many species; the loss of downed wood simplifies the ground structure of the stand and removes habitat for breeding, sheltering, and foraging of some proposed Permit Species such as pileated woodpeckers, western toads, and Van Dyke's salamanders. Because most of the Assessment Area has been cut previously and consists of stands less than 50 years old (and would be harvested, as proposed, during the proposed ITP period before large trees could develop), most slash and downed wood potentially left in site preparation and slash abatement areas (post-harvest) would be small to moderate sized (versus large logs). Thus, species that utilize small to moderate sized downed wood (such as western toads, long-toed salamanders), would be mainly affected (species that utilize larger downed wood would be more affected by harvest rotations that preclude the development of larger logs). In the relatively few areas with existing large downed logs, species that depend on this large material (such as pileated woodpeckers and northwestern salamanders) would lose breeding, sheltering, or feeding habitat when this larger woody material is eliminated.

As proposed, larger downed wood components are expected to be retained in significant portions of the Plan Area (and any added lands of the Assessment Area) in at least three ways (see Description of Proposed Action): the prohibited salvage of any residual old-growth downed wood or stumps; the retention of at least two larger downed logs, or equivalent volume, for each acre harvested (under the proposed ITP) throughout the Assessment Area; partial or full conservation/protection of at least 16.3 percent of the Plan Area, most of which is forested and would contribute woody debris and logs.

The proposed requirement for retention of two larger downed logs per acre harvested specifies retention of "at least 2 downed logs with a small end diameter greater than or equal to 12 inches and a length greater than or equal to 20 feet or equivalent volume for each acre harvested. Unfortunately,

the portion of the proposed prescription specifying "...or equivalent volume..." allows the applicant to substitute small logs of greater number to fulfill this requirement. Thus, the actual number of large logs to retained on the landscape as part of the proposed prescription is undetermined and likely considerably lower than 2 large logs per acre harvested. Nevertheless, the measures proposed would provide coarse woody debris for proposed Permit Species such as Van Dyke's salamander, and birds that forage on down wood such as pileated woodpecker and northern flicker.

Indirect Effects

Site preparation would likely result in short term effects to some proposed Permit Species, such as western bluebird, northern flicker, and violet-green and tree swallows that forage in openings, potentially nest, and perch along edge habitat due to disturbance associated with human and equipment presence; such activities could displace nesting, foraging or perching species adjacent to site preparation areas.

Tree Planting

Direct Effects

Direct effects to listed species should be minimal. Proposed tree planting activity would likely crush some burrows occupied by terrestrial amphibians such as western toad and northwestern salamander.

Indirect Effects

Proposed tree planting could result in short term indirect effects upon proposed Permit Species due to disturbance associated with human presence (such as Roosevelt elk) and could displace covered nesting, foraging or perching species that may be present in or adjacent to tree planting sites.

Fertilization

Simpson proposes application of nitrogenous pellet fertilizers to its forest plantations at the rate up to 440 pounds per acre. Proposed applications would be up to every 7 years for a total of approximately three applications during each stand rotation. As proposed, fertilizer would not be applied within the first 25 feet of Type 1-3 streams (WAC 222-38-030 (b)), and applications typically would not be made within wetland buffers and Type 1-3 stream riparian buffers (WAC 222-38-030 (c)). Simpson has proposed few limitations on fertilizer applications in and along Type 4 and 5 streams.

Direct Effects

Direct effects upon proposed Permit Species would likely occur as a result of amphibians and/or fish being exposed to nitrogenous fertilizer incidentally applied to surface waters. Amphibians would likely be exposed to nitrogenous fertilizers applied, as proposed, to small tributaries or Type 4 and 5 streams. Amphibians may also come into contact with undissolved fertilizer pellets deposited on the soil surface, potentially resulting in skin lesions or other contact effects. During terrestrial phases, the amphibians proposed for coverage spend most of time under cover (e.g., cobbles, boulders, logs, bark) or in subterranean burrows, reducing potential exposure to nitrogenous fertilizer pellets applied as proposed. The impacts of fertilizer applications on amphibians and fish are undetermined, but may

be highly significant.

Indirect Effects

Nutrients from forest fertilizers, such as nitrogen, either adsorbed to sediments, in solution, or transported by aerial deposition, can cause harmful effects in receiving waters (EPA 2000). Excessive amounts of nutrients may cause enrichment of water bodies, stimulating algal blooms. Large blooms limit light penetration into the water column, increase turbidity, and increase biological oxygen demand, resulting in reduced dissolved oxygen levels. This process, termed eutrophication, drastically affects aquatic organisms by depleting the dissolved oxygen these organisms need to survive.

Aquatic organisms may be exposed to fertilizer related effects through contact with contaminated water or sediments. No-spray buffers around streams (including ephemeral streams) and riparian areas can substantially reduce the risk of contamination (Norris *et al.* 1991); however, toxic levels of chemicals may reach streams from storm runoff even when best management practices are employed (e.g., Rashin and Graber 1993). Powell (1995) found that nitrogen runoff into streams is enhanced following clear cutting, slash burning and fertilizing, and this runoff can lead to degraded water chemistry and altered stream food webs. Aber *et al.* (2000) found that elevated nitrate levels in forest streams represent a threat to water quality because nutrient fouling can lead to a wide range of problems from algal blooms, loss of oxygen to fish kills. Fertilizers may be toxic to some organisms or may shift ecosystem energy dynamics (EPA 2000).

Fertilizers can pose a risk to the aquatic environment (Feller 1989, Neary 1985) and can directly enter surface waters through five major pathways: direct application, drift, mobilization in ephemeral streams, overland flow, and leaching. Fertilizer applications would likely degrade water quality of small streams and wetlands and result in nutrient enrichment of wetlands. The impacts of fertilizers to small stream water quality have received particular attention in the Pacific Northwest. Bisson *et al.* (1992) found that three types of nitrogen (N) were detected in surface water after fertilization. Urea-N (organic nitrogen) showed a short term spike that lasted for only a few days; ammonia-N was elevated for periods of weeks to months; and nitrate-N may be detected at above background levels for up to a year or more. Amphibians may experience adverse effects from exposure to nitrogenous fertilizers in surface water.

Fertilizers that reach surface waters can be toxic to fish or may alter primary and secondary production, influencing the amount and type of food available to fish (Spence *et al.* 1996). Nutrient levels should remain within their natural range for the area and season in order to sustain the normal level of primary production in streams (Spence *et al.* 1996). Various inorganic constituents of surface water are nutrients required for biological processes. Nitrogen and phosphorus are clearly the most important nutrients affecting productivity of aquatic systems (Spence *et al.* 1996).

Recent literature has shown that exposure to nitrate and nitrite concentrations can affect development, cause deformity, inhibit behavior and even cause significant levels of death to some Pacific Northwest amphibian species (Marco *et al.* 1999; Marco and Blaustein 1999; Hecnar 1995). Amphibians appear to be more sensitive than some fish species as some of the levels shown to cause effects in amphibians are at levels identified by US EPA as recommended limits of nitrite for warm-

water fishes (Marco, *et al.* 1999). While it is not clear how fertilizer treatments in managed forest lands in the Pacific Northwest affect amphibian or fish populations, recent studies have indicated that pond-breeding amphibians from the Pacific Northwest, including northwestern salamander and red-legged frog, experience high mortality at the Ambient Water Quality Criteria for nitrite for warm-water fishes and a significant larval mortality at the recommended limits of nitrite concentration for drinking water (Marco, *et al.* 1999).

Moore (1971), as cited in Norris *et al.* (1991), compared nitrogen loss from a watershed treated with 224 kg urea-N per hectare to nitrogen loss from an untreated watershed. The study demonstrated that the loss of nitrogen from the fertilized watershed was 28.02 kg per hectare while the loss of nitrogen from the unfertilized watershed was only 2.15 kg per hectare. Studies by Moore indicated that the concentrations of urea-N in runoff varied greatly, but that the greatest opportunity for water quality damage from fertilizer application occurred when the chemical directly entered the water body. The peak concentrations were directly proportional to the amount of open surface water within the treated areas, and increases resulted almost entirely from direct applications to surface water. Megahan (1980) summarized data from Moore (1975), who examined changes in water quality following the fertilization of various forest stands with urea. The major observations from this research are summarized as follows (Megahan, 1980):

- Increases in the concentration of urea-N ranged from very low to a maximum of 44 ppm, with the highest concentrations attributed to direct application to water surfaces.

- Higher concentrations occurred in areas where buffer strips were not left besides streambanks.

- Chemical concentrations of urea and its by-products tended to be relatively short-lived due to transport downstream, assimilation by aquatic organisms, or adsorption by stream sediments.

Based on his literature review, Megahan (1980) concluded that the impacts of fertilizer application in forested areas could be significantly reduced by avoiding application techniques that could result in direct deposition into the water body and by maintaining a buffer area along the stream banks. Malueg and others (1972) and Hetherington (1985) also presented information in support of Megahan's conclusions.

When applications, as proposed, are soon followed by significant precipitation events, the likelihood that chemicals would reach surface waters would increase. Contamination of surface waters would occur when fertilizer that has been applied to ephemeral channels is later mobilized during rainstorms. Amphibians and fish would likely be exposed to applied nitrogenous fertilizers that have been transported to surface water from overland runoff or Type 4 and 5 streams.

It is likely that all proposed Permit Species with aquatic life stages would be adversely affected by proposed fertilizer applications during the proposed ITP term. Fertilizer impacts to many species, such as northwestern and long-toed salamanders, would likely be substantially reduced due to the proposed riparian buffers and forested wetland protection (which would likely buffer fertilizer

applications).

In addition to monitoring abundance of the stream breeding amphibians and western toad in relation to HCP management prescriptions, Simpson has also committed to monitoring how amphibians are affected by operational application of nitrogenous fertilizers. Simpson would continue its ongoing research in this area and expand it to include water sampling and surveys for larval abnormalities of pond breeding amphibians. Wildlife monitoring questions for the Plan Area include how the relative abundance and distribution of stream breeding amphibians, and western toads would change under HCP management (HCP Section 9.4.3). Simpson has proposed using a "strong experimental design" that would utilize before and after, and control and impact, study sites to ascertain the trends in relative abundance of these animals as it may relate to implementation of HCP management prescriptions.

Silvicultural Thinning and Experimental Thinning

Direct Effects

As proposed, silvicultural thinning (commercial and pre-commercial) would occur in the uplands and some riparian and wetland areas of the Assessment Area. Proposed Permit Species utilizing forest in these areas, such as some of the cavity nesting birds or bandtail pigeons, would likely be adversely affected by loss of nests within actual trees to be thinned or by direct disturbance to nest from associated activity, such as the felling of adjacent snags for safety and liability reasons, or for access. Some proposed covered amphibian species would likely be directly affected by crushing or disturbance of downed wood /burrows associated with thinning activities, including access and removal of logs for commercial thinning.

Limited experimental thinning in RCRs is proposed on approximately 1000 acres over the Plan Area in the first ten years of the Plan. Selection of these areas would be weighted by the number of miles of each channel class. After the first ten years of the proposed ITP term, up to 5,160 acres of additional experimental thinning could occur throughout the RCRs for the duration of the proposed ITP term, subject to adaptive management discussions with the Services (see Table 7 in HCP, footnote 13). Proposed experimental thinning would likely remove or degrade occupied habitat for some proposed Permit Species in at least the short-term, but the stated goal of the experimental thinning is accelerate old-growth forest characteristics (on which many proposed permit species are somewhat dependent upon), so if performed correctly it should benefit many proposed Permit Species.

Indirect Effects

Silvicultural and experimental thinning would likely indirectly affect proposed Permit Species when harvest occurs adjacent to habitat occupied by nesting or foraging proposed Permit Species. Some species proposed for coverage, such as Roosevelt elk, band tailed pigeon, or northern flicker, would likely be temporarily displaced from foraging or cover due to disturbance, or could abandon nests which contain eggs or nestlings.

Thinning would result in introduction of sediment into riparian systems resulting from ground disturbance associated with timber harvest activities. As proposed, no harvest (including silvicultural thinning) of timber would be performed directly adjacent to riparian systems, but some experimental

thinning is proposed outside of buffers in RCRs, and well as harvest of timber in the uplands outside of conservation areas.

Fire Suppression

Direct Effects

Direct effects to proposed Permit Species would likely result from fire suppression or prevention include ground disturbance during activities associated with fighting actual fire, removal of snags for safety reasons, and placement of fire camps within or adjacent to proposed Permit Species occupied habitat. These activities would likely result in degradation or loss of habitat for some proposed Permit Species.

Indirect Effects

Indirect effects of fire suppression upon proposed Permit Species would likely include increased sediment delivery into aquatic systems resulting from ground disturbance/erosion associated with fire fighting or prevention, and disturbance to proposed Permit Species occupying habitat adjacent to suppression activities.

Stream Restoration

Direct Effects

Proposed stream restoration projects would likely lead to temporary disruption of covered aquatic species during project implementation, and possibly trampling of eggs of aquatic species. If performed properly, proposed stream restoration activities would likely benefit affected species proposed for coverage in the long-term.

Indirect Effects

Proposed Permit Species would likely be affected by proposed stream restoration projects, including adverse effects resulting from increased levels of sediment and silt delivered to, released into, or suspended within, aquatic systems. Some disturbance of proposed Permit Species would likely occur associated with human disturbance from actual stream restoration work and access to project locations.

Research and Monitoring (Including Electrofishing)

Direct Effects

Direct effects upon proposed Permit Species resulting from research and monitoring would likely be minimal, but include fatalities associated with sampling techniques such as proposed electrofishing in streams, or amphibian sampling techniques. In addition to mortality, reports in the literature of injuries to fish a due to electrofishing describe spinal hemorrhages, fractured vertebra, spinal misalignment, and separated spinal column (Dalbey *et al.* 1996; Thompson *et al.* 1997; Kocovsky *et al.* 1997). Differences in injury and mortality rates were reportedly due to size and/or age of the fish (Habera *et al.* 1996; Thompson *et al.* 1997a). Injury due to proposed electrofishing applies mostly to adult fish, and not juveniles for which stress, not injury, can be the main problem when electrofishing (Nielsen, Jennifer L., "Electrofishing California's Endangered Fish Populations," Fisheries, December 1998, Volume 23, Number 12). Fish injury rates vary due to voltage level used, experience and skill

of samplers, duration of capture sequence (i.e. the amount of time taken to complete electrofishing within a sample area), and frequency of sampling through time (years) (Kocovsky *et al.* 1997). Sublethal effects are not always externally evident in electrofished populations, and biologists appear to greatly underestimate spinal injuries from external examinations alone Dalbey *et al.* (1966) indicated that only 2 percent of the captive wild rainbow trout they surveyed had externally visible deformities, but X-ray analysis used to quantify sublethal injuries after nearly one year in captivity indicated 37 percent of the population that actually been injured.

Indirect Effects

Indirect effects on proposed Permit Species resulting from proposed research and monitoring would likely include temporary displacement of aquatic species as a result of monitoring techniques. Long-term effects from proposed electrofishing would likely include differences in growth rate and/or body condition in individual fish during variable periods of time after electrofishing (Gatz *et al.* 1986; Taube 1992; Dwyer and White 1995).

Minor Forest Products Management

Direct Effects

Minor forest products proposed to be harvested from the Assessment Area include, among others: firewood, salal, ferns, and mushrooms. The estimated range of acres proposed to affected each year of the ITP term are as follows: firewood (4,000 to 5,000 acres per year); floral brush (50,000 to 60,000 acres per year; mushrooms (2,000 to 7,000 acres per year) and an unknown acreage associated with ferns. The proposed specialized forest product activity which is most likely to affect the species covered under the HCP are firewood collection, and the effects from such activity include habitat modification and disturbance, particularly to coast woody debris and snag habitats. Salvaging standing dead trees or logs removes coarse woody debris and snag habitat utilized by cavity nesting birds and by terrestrial amphibians. Proposed Permit Species such as the pileated woodpecker, and northern flicker forage extensively upon logs and stumps, and the Van Dyke's salamander and western toad utilizes logs for hiding and thermal cover. The use of chainsaws to collect firewood would likely disturb nesting or foraging species adjacent to firewood collection sites, such as pileated woodpeckers or Roosevelt elk.. In the extreme case, any snag adjacent to firewood collection sites may contain nesting cavity nesting birds which could abandon eggs or nestlings if disturbed.

Indirect Effects

Human presence during special forest product collection would likely indirectly affect proposed Permit Species by crushing (such as amphibians) of log or burrow habitat, or through disturbance to proposed Permit Species adjacent to harvest activities (such as Roosevelt elk).

Vertebrate Control

Direct Effects

As proposed, vertebrate control under the HCP consists of control of flat-tailed beavers (*Castor canadensis*) to limit damage to roads, where activities of such beavers pose a reasonably foreseeable risk to the integrity of one or more roads, including, but not limited to, erosion of the road surfaces, plugging of culverts and failure of road fills. The proposed control would be in the form of either lethal or live-trapping trapping means; no direct effects upon proposed Permit Species is expected

with this activity, unless trapping incidentally injures or kills proposed Permit Species. Because none of the life history requirements (or animal size) for proposed Permit Species are similar to flat-tailed beaver, proper placement and setting of traps would likely prevent most or all non-target injury to proposed Permit Species.

Indirect Effects

Indirect effects to proposed Permit Species resulting from proposed mountain beaver trapping include an increase in cover and survival of plant species typically utilized by mountain beavers.

Effects of the Proposed Action: by Species Association

Thirty-five of the forty-six permitted species in the Plan can be categorized into Species Associations, which are similarly affected by the proposed activities in the Plan. The aquatic species associations include, (1) headwater species; (2) steep tributary species; (3) flat tributary species; (4) mainstem species, and (5) lentic species. The headwater species association has four amphibians and no fish in it. The only wildlife species association is the Snag Dependent Species Association, which includes all of the cavity nesting proposed Permit Species. The discussion that follows will address effects resulting from the proposed action for each species association. Appendix A addresses effects of the proposed action specific to each proposed Permit Species, in addition to status, environmental baseline, cumulative effects, and a conclusion for each species.

Potential impacts from the proposed activities upon snag dependent species primarily include habitat removal or degradation and disturbance resulting from timber harvest, road building and road remediation. Potential impacts from the proposed activities on fish, salamanders or their habitat primarily include timber harvest, road building and road remediation, silvicultural thining, experimental thinning, electrofishing, and fertilization. These activities affect the following stream features or processes: (1) temperature; (2) sedimentation; (3) large woody debris (LWD); and (4) detritus.

Effects on Headwater Species

Within the Plan Area, habitats for Headwater Association species (torrent salamander, Cope's giant salamander, western redback salamander, and tailed frog) are primarily found within Type 4 and 5 streams. The most important habitat in these streams for these species likely consists of large logs, cobbles and boulders.

Pertinent Mitigation and Minimization Measures

Proposed mitigation and minimization measures for headwater species are detailed in Section 5.2 of the HCP and summarized below: (1) implementation of the RCR (Riparian Conservation Reserve program); (2) implementation of the road management program; (3) implementation of the unstable slopes management program and (4) application of the TMDL standards, (5) hydrologic maturity prescriptions, (6) amphibian research/monitoring/adaptive management program.

Potential primary habitat for headwater species likely occurs in channel classes CUP-C1 (199.9 stream miles), C2 (22.9 miles) and C3 (24.5 miles); SIG-Qo1 (38.3 miles); AGL-Qo1 (61.3 miles)

(Table 26 Simpson HCP). These classes are in Type 4 and 5 streams, and are represented by a total of 347 miles of stream channel in the Plan Area. Type 4 streams are perennial or have fish, and Type 5 streams are intermittent.

The CUP C-1, AGL-Qo1 and SIG-Qo1 channel class streams fall under the proposed Unstable/Intermittent Riparian Strategy. In these channel classes, proposed buffers are continuous for Type 4 streams, (66 feet from the channel disturbance zone), or either continuous or discontinuous for Type 5 streams. Type 5 streams receive proposed protection in the form of 80 trees per 1,000 feet unless adjacent to unstable slopes that are upstream from perennial non-fish bearing streams (i.e., have continuous buffers). In these cases, proposed riparian protection would be increased on streams through designation of a continuous buffer adjacent to the channel. All discontinuous buffers would be placed to enhance recruitment of LWD and provide protection for stream breeding amphibians, by conserving key amphibian habitat components (i.e., seeps and springs) along Type 5 streams which are not associated with unstable slopes.

The Cup-C-2, and C-3 channel classes fall under the proposed Canyon Riparian Strategy, which would primarily function to provide LWD from off site, and to maintain on-site shade and detrital inputs. The purpose of this strategy is to maintain the sediment and organic matter storage capacity of the upper channel network, and supply detritus to the channel as its principle energy source. No harvest is proposed in the near future in these stands; most were logged for the first time only in the 50's and 60's (trees are young) and no streamside trees were retained at that time. Leave areas would not be uniform width, but concentrated in areas that have a high probability of contributing LWD to the channel network. Leave areas would be placed to maintain refugia for stream breeding amphibians (HCP Appendix B: Riparian Guidelines).

As proposed, no timber harvest would occur within the channel migration zone (CMZ) or channel disturbance zone (CDZ) along perennial streams within the Assessment Area under the HCP. Additional proposed protective measures described below along the CDZ on perennial streams and on intermittent streams would reduce sediment effects to headwater species habitat.

The proposed road management program (see Section 5.2.4 of the HCP) would reduce sedimentation and siltation entering streams used by headwaters species, but effects would still occur in the Assessment Area, depending on the location of proposed road building and drainage network. It is likley that some areas sensitive to mass wasting and delivery of sediments to headwaters species would be adversely affected by new road building as proposed. Riparian buffers and other measures as proposed, would likely help to buffer these effects. For example, to the extent operationally feasible, Simpson would avoid new road locations on steep (greater than 60 percent slope angle) slopes, and limit roads through riparian areas. Road construction would be limited in riparian areas and on unstable slopes, and Simpson would implementing best management practices in their road construction, as well as minimizing the number of channel crossings. Road remediation, as proposed, would likely substantially reduce sediment delivery from some existing roads in the Plan Area.

Roads would be prioritized for remediation based upon need, and roads in the worst condition (those roads delivering substantial sediment to aquatic habitats) would be remediated first during the proposed ITP term. It is anticipated that the majority of early road decommissioning would occur in the CUP and SIG LTUs, which contain the channel classes utilized by headwater species in the Plan

Area. Simpson would complete road remediation for these roads within the first 6 to 7 years of the proposed ITP term, 75 percent of roads needing remediation would be completed by year ten, and 100 percent of roads identified needing remediation would be completed by year fifteen of the Plan (see Section 5.2.4 of the HCP). Sediment impacts to headwater species streams from roads in the Plan Area would thus likely decline within the first 6 to 10 years of the Plan, and would be highly reduced by year fifteen of the Plan, benefitting headwater species.

Unstable slopes would be protected with undisturbed, no harvest, continuous leave areas, and any new roads would be constructed to high standards so that fills would not fail and cause debris flows within Headwater Association species habitat in the Plan Area (Sections 5.2.5 and 5.2.4.5 of the HCP).

Implementation and monitoring of the TMDL would help to ensure that sediment and water temperature water quality parameter objectives are being met. The management prescriptions for the proposed action have been evaluated for their likelihood of achieving water quality standards. This analysis is presented in Appendix G of the HCP, and it essentially finds that, subject to monitoring and adaptive management requirements, the management prescriptions contained in the proposed action should result in water quality levels sufficient to protect the beneficial uses of Plan Area waters. The TMDL specifically addresses the effectiveness of riparian prescriptions for protecting stream temperature, and it also addresses road and hill slope management prescriptions that can affect stream sedimentation.

In addition to these conservation programs, the proposed hydrologic maturity prescriptions should help ameliorate the impacts from increased water temperature through retention of older age trees. These prescriptions should also contribute to decreasing sedimentation from catastrophic debris torrents resulting from rain-on-snow (ROS) events. These proposed prescriptions would benefit the headwater species because allowing older age timber stands to develop would decrease the frequency of ROS storm flows capable of shifting structures that stabilize their breeding and rearing habitat

In addition to monitoring abundance of the stream breeding amphibians and western toad in relation to Plan prescriptions, Simpson has also committed to monitoring how amphibians are affected by operational application of nitrogenous fertilizers. Simpson would continue its ongoing research in this area, and expand it to include water sampling and surveys for larval abnormalities of pond breeding amphibians. Wildlife monitoring questions for the Plan Area include how the relative abundance and distribution of stream breeding amphibians, and riverine western toads would change under the Plan (HCP Section 9.4.3). Simpson proposes use of a "strong experimental design" that utilizes before and after, and control and impact, study sites to ascertain the trends in relative abundance of these animals as it may relate to implementation of the Plan prescriptions. The study design that Simpson has offered to implement in their monitoring program is likely to detect any statistically significant differences between treated and control sites due to management treatments (Simpson pers. com). As proposed, adaptive management would be applied to modify the prescriptions relative to results of the research monitoring program.

Habitat and Disturbance Effects

Corn and Bury (1989) compared the occurrence and abundance of amphibians in streams flowing through unlogged forest versus streams flowing through forests with prior logging in Oregon's Coast Range. Results of their study for frogs and salamanders showed all four species studied occurred more frequently and had higher density and biomass in the streams flowing through unlogged as opposed to logged forest stands.

Outside of proposed buffers to be established along headwater stream habitat, proposed upland harvest would occur adjacent to headwater stream habitat and within associated riparian habitat for these species. This proposed harvest of riparian habitat would in only occur headwaters association habitat that does not have unstable slopes, per the proposed Unstable Slopes Management Program. Harvest and closely associated activities often lead to adverse impacts to aquatic associated species and their habitat, including reduction in stream shading through loss of tree canopy (Spence *et al.* 1996). Timber harvest could result in increased temperature levels within headwater streams, including those suitable or occupied by headwater species. Temperatures within aquatic systems used by stream temperature-sensitive amphibians, such as headwater species, would likely be raised, resulting in degraded habitat or even eliminated habitat. This would result from removing or thinning canopy and shade so that increased sunlight penetrates to aquatic systems, ultimately raising stream temperatures. This situation would potentially only occur in the areas where unstable slopes do not exist in headwater species habitat in the Plan Area where timber harvest could occur outside of conservation buffers.

One-hundred-foot buffer strips on each side of a stream's channel migration zone are typically stated as the minimal size needed to buffer most adverse effects of logging on streams (Hall and Lantz 1969; Moring 1975; Erman *et al.* 1977), and may not be adequate for adverse effects due to roads. Everest *et al.* (1987) found that logging roads, not the harvesting practice itself (unless both sides of a stream bank were clear-cut), were responsible for a large percentage of the sediment that enters an aquatic system. The channel network is increased by roads because the roads act as tributaries, creating a more efficient sediment delivery system (Castro and Reckendorf 1995).

The Plan Area has approximately 2,000 total active road miles (see Table 14 of the HCP) that traverse a variety of landscapes and cover approximately 3.7 percent of the land base. Weighted road density for the entire Plan Area currently is 4.9 miles per square mile varying between 7.8 miles, in the Sedimentary (SIG) to 4.1 miles in the Alpine Glacial lithotopographic units (AGL) (see Table 14 of the HCP). Proposed maintenance and use of active roads represent a potential source of delivery of coarse and fine sediments into streams inhabited by headwater species in the Plan Area.

Although proposed road use in most of the Plan area would be limited to the logging activity (which is generally concentrated in place and time), even little or unused roads could continue to deliver sediments to potentially occupied streams in excess of natural rates in the long-term, at least until these roads are permanently abandoned (i.e., stabilized and put to bed).

Direct Injury/Mortality

Direct injury or death could occur to headwater speciess due to instream activities which includes

electrofishing. Electrofishing activities would be used as part of research and monitoring in the proposed Plan. Electrofishing would be used for last-fish distribution monitoring only, which does not entail multiple passes through the same stream reach. In addition, all electrofishing would be done according to Service approved protocols, which minimizes risk to fish and may or may not reduce risks to amphibians as well. The approved protocols minimize risk to fish by limiting voltages, amperages, sampling period and season. Instream activities, including electrofishing, could also result in trampling of adult headwater speciess, juveniles or eggs, however, since only one pass would be made in each stream being monitored, effects to headwater species is expected to be limited.

Amphibians may experience direct harm from exposure to nitrogenous fertilizers in surface water. While it is not clear how fertilizer treatments in managed forest lands in the Pacific Northwest affect amphibian populations, recent studies have indicated that pond-breeding amphibians from the Pacific Northwest, including Northwestern salamander and red-legged frog, experience high mortality at the Ambient Water Quality Criteria level for nitrite for warm-water fishes and a significant larval mortality at the recommended limits of nitrite concentration for drinking water (Marco, *et al.* 1999). Recent studies have shown that high levels of nitrate and nitrite can significantly deform amphibians, inhibit their behavior and even cause significant levels of death to some Pacific Northwest pond-breeding amphibian populations (Marco *et al.* 1999).

Steep Tributary Species (STA)

Proposed Permit Species that fall in the STA are cutthroat trout, shorthead sculpin, and Van Dyke's salamander. Effects to Van Dyke's salamander are fully described in Appendix A.

Pertinent Mitigation and Minimization Measures

Proposed mitigation and minimization measures for steep tributary species are detailed in Section 5.2 of the HCP and summarized below: 1) implementation of the RCR (Riparian Conservation Reserve program); 2) implementation of the wetland conservation program and wetlands protection program; 3) implementation of the road management program; 4) implementation of the unstable slopes management program; 5) application of the TMDL standards, 6) hydrologic maturity prescriptions, and 7) amphibian research/monitoring/adaptive management program.

As proposed, no timber harvest would occur within the channel migration zone (CMZ) or channel disturbance zone (CDZ) along perennial streams within the Plan Area under the HCP. Additional proposed protective measures described below along the CDZ on perennial streams and on intermittent streams would reduce sediment effects to steep tributary species habitat.

Steep tributary species are mainly distributed within two LTUs in the Plan Area; the Alpine Glacial (AGL) and the Crescent Upland (CUP) LTUs, and four channel classes within these; the AGL-Qo1, CUP C-2, CUP C-3 and the CUP C-4 in the steep tributary association (Table 13 HCP).

In addition to no harvest within the CDZ, the Plan Area prescriptions for these four channel classifications include buffering beyond the CDZ as follows: AGL-Qo1 has a 66-foot continuous

buffer, 10 meters on the leeward side no harvest, 20 meters wide on the windward side no harvest, CUP C-2, C-3, and C-4 have a 25 meter wide buffer on both sides of the streams no harvest beyond the CDZ (Table 26 HCP).

The AGL-Qo1 streams fall under the Unstable/Intermittent Riparian Strategy, which emphasizes maintaining important functional linkages between channel segments and their riparian areas for channel classes that typically have low average fish resource value. This strategy recognizes that physical processes may transmit significant impacts from these channel classes, downstream to other channel segments of the same class or those of other classes that are longitudinally connected, and for which on-site biological resource value is high (HCP Appendix B: Riparian Guidelines).

The CUP C-2, C-3, and C-4 streams fall under the Canyon Riparian Strategy, which primarily functions to provide LWD from off site, and maintenance of on site shade and detrital inputs. The purpose of this strategy is to maintain the sediment and organic matter storage capacity of the upper channel network, and supply detritus to the channel as its principle energy source. No current harvest is taking place in these stands (most were logged for the first time only in the 50's and 60's) and no streamside trees were retained at that time. Leave areas would not be uniform in width, but concentrated in areas that have a high probability of contributing LWD to the channel network. Leave areas would be placed to maintain refugia for stream breeding amphibians (HCP Appendix B: Riparian Guidelines).

The RCR program, as proposed, would limit harvest in riparian zones (see Section 5.2.1 of the HCP). No salvage of standing dead or downed trees would be permitted in the proposed RCR, although some snags and downed wood (potential large woody debris in streams) would likely be removed for non-salvage reasons, such as liability and safety, yarding access, or riparian road crossing access.

The proposed road management program (see Section 5.2.4 of the HCP) would reduce sedimentation and siltation entering streams used by STA species, but effects could still occur in the Plan Area depending on the location of proposed road building and drainage network in the proposed Plan Area. It is possible that some areas sensitive to mass wasting and delivery of sediments to STA species could be adversely affected by new road building as proposed. Riparian buffers and other measures as proposed, would likely help to buffer these effects. For example, to the extent operationally feasible, Simpson would avoid new road locations on steep (greater than 60 percent slope angle) slopes and limit roads through riparian areas. Road construction would be limited in riparian areas and on unstable slopes, and Simpson is implementing best management practices in their road construction as well as minimizing the number of channel crossings. Road remediation, as proposed, would likely substantially reduce sediment delivery from some existing roads in the Plan Area over time, however, there would be short-term impacts from sediment delivery to streams from such projects.

Roads would be prioritized for remediation based upon need, and roads in the worst condition (those roads delivering sediment to aquatic habitats) would be remediated first in the proposed ITP term. It is anticipated that the majority of early road decommissioning would occur in the CUP and SIG LTUs, which contain the channel classes utilized by steep tributary species in the Plan Area.

Simpson would complete road remediation for these roads within the first six to seven years of the proposed ITP term, 75 percent of roads needing remediation would be completed by year 10, and 100 percent of roads identified needing remediation would be completed by year 15 of the Plan (see Section 5.2.4 of the HCP). Sediment impacts to steep tributary species streams from roads in the Plan Area would thus decline within the first 6 to 10 years of the Plan, and would be highly reduced by year15 of the Plan, benefitting steep tributary species.

To address the adverse impacts to steep tributary species trout resulting from water quality degradation (sediment input and elevation of stream temperature), the proposed action includes a Total Maximum Daily Load (TMDL) agreement that the applicant would implement to fulfill their obligations under the Clean Water Act. The analytical approach described in the TMDL (Appendix G of the HCP) for protecting stream temperatures and reducing sediment input provides additional assurance that the proposed action would satisfy water quality needs for aquatic dependent species covered by the Plan. The TMDL is not a component of the Plan but is linked through the adaptive management; it offers a direct measurement of instream conditions, which would provide a means of directly measuring the effectiveness of the riparian prescriptions. All other management prescriptions are designed to manipulate the riparian environment, the TMDL provides a direct measure of in-stream conditions as a result of implementing the riparian prescriptions and would significantly contribute to the knowledge necessary

The unstable slopes management program, as proposed, would prevent harvest on slopes Simpson designates as unstable (see Section 5.2.5 of the HCP), reducing the chance for sediment delivery from these slopes into STA habitats.

The Plan is expected to result in a high recruitment rate and total number of coniferous trees into stream LWD. This increase is anticipated to occur as a result of: 1) large acreage of riparian buffers along all streams; and, (2) wide no-harvest buffers, including all areas below the break-in-slope. Buffers should lead to greater levels of LWD recruitment, detritus recruitment, stream shading, and protection of hillsides immediately adjacent to streamsides.

The proposed Plan includes provisions to manage forest cover in the rain-on-snow (ROS) sub-basins so that hydrologically mature forests cover at least 50 percent of the area in each sub-basin, and no more than 25 percent of the area in each sub-basin would be covered by hydrologically immature forests. This management would reduce the frequency of major storm flows that are capable of shifting instream habitat structure, and it also is expected to substantially reduce the amount of coarse and fine sediments transported downstream.

Habitat and Disturbance Effects

Forest management in the Plan Area could affect the habitat of the STA by altering the character, amount and timing of wood recruitment, water flows, and sediment contributions. These changes can result from activities in headwater streams and from management adjacent to the STA channels.
In the STA segments, debris flows and landslides can lead to channel scouring which may remove or reduce wood and rock cover needed for juvenile rearing and adults. These same channel effects can

substantially reduce the storage of organic materials in the channel, which in turn affects the food base for a number of macro-invertebrate species that are needed by fish in the STA.

Harvest/thinning and road building/maintenance activities in upland areas, as proposed, could result in artificially high sediment loads in some of the streams utilized by STA species in the Plan Area. This sedimentation could result in filling of some deeper stream pools required by older and larger steep tributary species. Additionally, fine gravels necessary for resident steep tributary species spawning could be degraded by artificially high inputs of silt and sediment resulting from logging activities.

Road building/maintenance and harvest through experimental thinning, as proposed in some riparian areas, could result in some removal of riparian canopy and disturbance of natural riparian vegetation and the reduction in leaf litter delivery and large wood recruitment to streams, degrading the components of steep tributary species habitat. This could reduce stream shading and channel stability, elevate fine sediments in spawning gravels and filling of substrate interstices, reduce pool habitats, alter nutrient balance and physical character of the stream, reduce cover and overall stream habitat complexity, and restrict natural movements of juvenile and adult steep tributary species.

The Plan Area has approximately 2,000 total active road miles (see Table 14 of the HCP) which traverse a variety of landscapes and cover approximately 3.7 percent of the land base. Weighted road density for the entire Plan Area currently is 4.9 miles per square mile varying between 7.8 in the Sedimentary (SIG) to 4.1 in the Alpine Glacial lithotopographic units (AGL) (see Table 14 of the HCP). Proposed maintenance and utilization of active roads represent a potential source of delivery of coarse and fine sediments into streams inhabited by steep tributary species in the Plan Area.

New road building activity in steep tributary species watersheds could affect the STA species, depending on the location of proposed road building (e.g., steep slopes, unstable slopes, riparian areas, etc.) and drainage network in the proposed Plan Area. Riparian buffers and other measures as proposed, would likely help to buffer these effects. Improperly-sized or -placed culverts at stream crossings could be passage barriers that restrict movement of steep tributary species or their prey. Although proposed road use in most of the Plan area would be limited to the logging activity (which is generally concentrated in place and time), even little or unused roads could continue to deliver sediments to potentially occupied streams in excess of natural rates in the long-term, at least until these roads are permanently abandoned (i.e., stabilized and put to bed). Each affected creek and river contributes to the water quality of a spawning, rearing, and/or foraging corridor for steep tributary species where present (or potentially present) in a stream system.

One-hundred-foot buffer strips on each side of a stream's channel migration zone are typically stated as the minimal size needed to buffer most adverse effects of logging on streams (Hall and Lantz 1969; Moring 1975; Erman *et al.* 1977), and may not be adequate for adverse effects due to roads. Everest *et al.* (1987) found that logging roads, not the harvesting practice itself (unless both sides of a stream bank were clear-cut), were responsible for a large percentage of the sediment that enters an aquatic system. The channel network is increased by roads, because the roads act as tributaries, creating a more efficient sediment delivery system (Castro and Reckendorf 1995).

The introduction of sediment in excess of natural amounts can have multiple adverse effects on channel conditions and processes resulting in effects on steep tributary species survival, the food web, and water quality conditions, such as water temperature and dissolved oxygen (Rhodes *et al.* 1994). Fine sediments can influence incubation survival and emergence success of steep tributary species young (Weaver and White 1985), and can also limit access to substrate interstices that are important cover during rearing and overwintering (Goetz 1994; Jakober 1995). Shifts in sediment loads set off a complex of channel responses including changes in pool volumes, depth and frequency, and changes in channel morphology (including slope, sinuosity, shape, velocity, flooding regime, and sediment transport) (Rhodes *et al.* 1994; Castro and Reckendorf 1995).

Direct Injury/Mortality

Direct injury or death could occur to steep tributary species due to instream activities which includes electrofishing. Electrofishing activities would be used as part of research and monitoring in the proposed Plan. Electrofishing would be used for last fish distribution monitoring only, which does not entail multiple passes through the same stream reach. In addition, all electrofishing would be done according to Service approved protocols, which minimize risk to fish by limiting voltages, amperages, sampling period and season. Instream activities, including electrofishing, could also result in trampling of steep tributary species juveniles or eggs, however, since only one pass would be made to each stream being monitored, effects to steep tributary species are expected to be minimal and infrequent.

These may be adverse impacts to STA fish species from exposure to nitrogenous fertilizers in surface water (see general effects section). Although Simpson is not directly assessing these impacts, they are collecting surface water data to measure these compounds in water on the Plan Area. U.S. EPA has developed water quality criteria for nitrates for warm water fishes. In an attempt to determine whether fish are being adversely affected, the surface water data collected by Simpson should be compared to these criteria to determine if the surface water concentration exceed the criteria would provide an indication as to the level of exceedence and hence adverse effects. According to recent literature amphibian are likely more sensitive than fish to nitrgenous substances.

Flat Tributary Species

Proposed Permit Species that fall into the Flat Tributary Species Association are the riffle sculpin, coast range sculpin, reticulate sculpin, speckled dace, and brook lamprey.

Pertinent Mitigation and Minimization Measures

Proposed mitigation and minimization measures for FTA species are detailed in Section 5.2 of the Plan and summarized below: 1) implementation of the RCR (Riparian Conservation Reserve program); 2) implementation of the wetland conservation program and wetlands protection program; 3) implementation of the road management program; 4) implementation of the unstable slopes management program; 4) application of the TMDL standards, and 5) hydrologic maturity prescriptions.

As proposed, no harvest would occur within the channel migration zone (CMZ), break in slope (BIS), or channel disturbance zone (CDZ) along perennial streams within the Plan Area, reducing sediment effects to FTA species habitat. The stream channel buffers are measured from the channel migration zone (CMZ), break in slope (BIS) or channel disturbance zone (CDZ). The CMZ is defined as the flood plain and lower terraces of streams and rivers that may be occupied by the channel at some future time. This extends to the 100 year flood plain and in cases of highly erodible soils may extend beyond to include low terraces. The toes of such valley slopes abut the CMZ. BIS is defined as an identifiable position on valley walls of streams that is characterized by a slope deflection which separates the valley wall from more general upland terrain. This break is often greater than 40 percent and is typically characterized by subtle changes in understory vegetation toward a drier community in the upslope direction. CDZ is defined as the zone adjacent to small streams that has a close linkage to several riparian forest function. In most cases it essentially constitutes the valley floor (Simpson 1999).

FTA proposed Permit Species are mainly distributed within four LTUs in the Plan Area; the Alpine Glacial (AGL), the Recessional Outwash Plain (ROP), Crescent Islands (CIS), and the Sedimentary Inner Gorge (SIG) LTUs, and eighteen channel classes within these; the AGL–Qo4 (2.6 stream miles), Qo5 (8.8 miles), Qo7 (3.7 miles), the ROP–Qc2 (103.4 miles), Qc3 (44.2 miles), Qc4 (9.1 miles), Qc5 (12.1 miles), Qc6 (9.5 miles), the CIS–Qc2 (28.0 miles), Qc3 (16.8 miles), the SIG–Qa6 (11.3 miles), Qo2 (19.0 miles), L2 (38.5 miles), M2 (18.5 miles), M3 (9.6 miles), M4 (6.0 miles), and M6 (2.3 miles) (Table 26, HCP). Riparian buffers for these channel classifications (total of 343.4 miles) range from a minimum (average) of 66 to 131 feet, and all are identified as no harvest with the exception of some limited (up to 632 acres of FTA RCR areas) experimental thinning in the first ten years of the proposed ITP term in areas that are not mature, and where thinning would accelerate mature (typically 120 years and older) forest development, increasing the rate at which potential future large woody debris (LWD) would develop. After the first ten years of the proposed ITP term, an additional 5,160 acres (across the Plan Area of all stream types, not just FTA RCR) would potentially be available for more thinning, provided the ecological goals have been attained by the experimental thinning in the first ten years. For all channel classes, prescribed buffers would lead to LWD recruitment, detritus recruitment, stream shading and protection of hillsides immediately adjacent to streams.

The channel classes defining FTA species habitat in the Plan Area fall under most of the Riparian Strategies described in the HCP, and include Break in Slope, Reverse Break in Slope, Channel Migration, Unstable Slopes/Intermittent Flow, and Temperature Sensitive strategies (please see Appendix B of the HCP for detailed description of each strategy). Management in the Break in Slope and Reverse Break in Slope strategies primarily focuses on provision of large woody debris that would encourage deep pool formation which is favored by flat tributary species for overwintering habitat.

As proposed, the Plan would protect approximately 19,619 acres of riverine riparian areas in the Plan Area.

The road management measures proposed under the Plan should lead to: (1) no net loss of RCR as a

result of new road construction; (2) an increase in road decommissioning and other remediation during the first 10 - 15 years of the plan; (3) increased capacity of stream crossing structures to withstand 100 year flood events; and (4) overall less erosion from road surfaces due to increase emphasis placed on improved road management practices. Road closures to public motor vehicle access for Roosevelt elk management would reduce sediment delivery into flat tributary streams.

The proposed road management program (see Section 5.2.4 of the HCP) would reduce sedimentation and siltation entering streams used by FTA species, but effects could still occur in the Plan Area depending on the location of proposed road building and drainage network in the proposed Plan Area. It is possible that some areas sensitive to mass wasting and delivery of sediments to FTA species could be adversely affected by new road building as proposed. Riparian buffers and other measures as proposed, would likely help to buffer these effects. For example, to the extent operationally feasible, Simpson would avoid new road locations on steep (greater than 60 percent slope angle) slopes and limit roads through riparian areas. Road construction would be limited in riparian areas and on unstable slopes, and Simpson is implementing best management practices in their road construction as well as minimizing the number of channel crossings. Road remediation, as proposed, would likely substantially reduce sediment delivery from some existing roads in the Plan Area over time, however, there would be short-term impacts from sediment delivery to streams from such projects.

Roads would be prioritized for remediation based upon need, and roads in the worst condition (those roads delivering sediment to aquatic habitats) would be remediated first in the proposed ITP term. It is anticipated that the majority of early road decommissioning would occur in the SIG LTUs, which contain some of the channel classes utilized by flat tributary species in the Plan Area. Simpson would complete road remediation for these roads within the first six to seven years of the proposed ITP term, 75 percent of roads needing remediation would be completed by year 10, and 100 percent of roads identified needing remediation would be completed by year 15 of the Plan (see Section 5.2.4 of the HCP). Sediment impacts to FTA species streams from roads in the Plan Area would thus decline within the first six to 10 years of the Plan, and would be highly reduced by year 15 of the Plan, benefitting flat tributary species.

The unstable slopes management program, as proposed, would prevent harvest on slopes Simpson designates as unstable (see Section 5.2.5 of the HCP), reducing the likelihood of sediment delivery into FTA species streams.

Management under the Plan would provide for deeper pools than under current management. For resident species like the FTA species, the stability provided by persistent pool features is likely beneficial.

To address the adverse impacts to FTA species resulting from water quality degradation (sediment input and elevation of stream temperature), the proposed action includes a Total Maximum Daily Load (TMDL) agreement that the applicant would implement to fulfill their obligations under the Clean Water Act. The analytical approach described in the TMDL (Appendix G of the HCP) for protecting stream temperatures and reducing sediment input provides additional assurance that the

proposed action would satisfy water quality needs for aquatic dependent species covered by the Plan. The TMDL is not a component of the Plan but is linked through the adaptive management; it offers a direct measurement of instream conditions, which would provide a means of directly measuring the effectiveness of the riparian prescriptions. All other management prescriptions are designed to manipulate the riparian environment, the TMDL provides a direct measure of in-stream conditions as a result of implementing the riparian prescriptions.

The unstable slopes management program, as proposed, would prevent harvest on slopes Simpson designates as unstable (see Section 5.2.5 of the HCP), reducing the likelihood of sediment delivery into FTA species streams.

The Plan includes provisions to manage forest cover in the rain-on-snow (ROS) sub-basins so that hydrologically mature forests cover at least 50 percent of the area in each sub-basin, and no more than 25 percent of the area in each sub-basin would be covered by hydrologically immature forests. This management would reduce the frequency of major storm flows that are capable of shifting instream habitat structure, and it also is expected to substantially reduce the amount of coarse and fine sediments transported downstream.

The Plan is expected to result in a high recruitment rate and total number of coniferous trees into stream LWD. This is expected due to: 1) large amount of riparian buffers along all streams; and (2) wide no-harvest buffers, including all areas below the break-in-slope. Buffers should lead to high levels of LWD recruitment, detritus recruitment, stream shading, and protection of hillsides immediately adjacent to streamsides

Habitat and Disturbance Effects

Adverse effects on the Flat Tributary Species Association may occur through: (1) deposits of coarse sediment; (2) the accumulation of fine sediment in spawning gravels; (3) elevated water temperatures; and (4) loss of LWD.

The FTA species inhabit stream ranging from 0.5 to 4 percent in gradient. At the lower end of this range (where many of the most productive streams are), fine sediment derived from road surface erosion would settle out in slack water areas and may infiltrate flat tributary species habitat. "Cleaner" gravels would benefit flat tributary species from reduction of fine sediment filling of the interstitial spaces needed for their breeding and larval development.

The FTA lies immediately downstream from the steep tributary species association (STA) streams, and to a lesser extent, headwater tributaries. The FTA streams are often adversely affected by disturbances in lower order streams. The principal effect on the FTA and its habitat from industrial scale-logging operations has been the accumulation of both coarse and fine sediment originating from upstream sources. Another major impact to these streams has been from riparian forest harvesting during the initial logging in the region. The FTA streams of the Plan area region have been substantially affected by the loss of in-channel wood supplies due to the historical riparian forest harvest, "steam cleaning" activities and cedar salvage. These effects are found within similar landscapes on other commercial forest lands in the region.

Lands downstream from the Plan area that support the FTA are virtually all held in private ownership. These properties would be managed under a variety of land uses and management practices including commercial timber, agricultural and rural residential. The level of protection for FTA streams and species on these lands is currently highly variable and there would continue to be significant uncertainty in this area. This would be the case, if for no other reason, due to fragmented ownership and various standards associated with different land uses making consistent management and protection unlikely. Therefore, the Plan Area FTA streams may provide a focal point for maintaining functional habitat for these species and may be an important sub-regional opportunity for higher than average habitat function, species diversity and population sizes.

Harvest/thinning and road building/maintenance activities in upland areas, as proposed, could result in artificially high sediment loads in some streams occupied by FTA species in the Plan Area. Sedimentation could result in filling of some deeper stream pools required by older and larger flat tributary species. Additionally, fine gravels necessary for resident flat tributary species spawning could be degraded as a result of these activities.

The Plan Area has approximately 2,000 total active road miles (see Table 14 of the HCP) which traverse a variety of landscapes and cover approximately 3.7 percent of the land base. Weighted road density for the entire Plan Area currently is 4.9 miles per square mile varying between 7.8 in the Sedimentary (SIG) to 4.1 in the Alpine Glacial lithotopographic units (AGL) (see Table 14 of the HCP). Proposed maintenance and utilization of active roads represent a potential source of delivery of coarse and fine sediments into streams inhabited by FTA species in the Plan Area.

Any new road building activity in FTA species watersheds could adversely affect the species, depending on the location of proposed road building (e.g., steep slopes, unstable slopes, riparian areas, etc.) and drainage network in the proposed Plan Area. Improperly-sized or -placed culverts at stream crossings could be passage barriers that restrict movement of FTA species or their prey. Riparian buffers and other measures as proposed, would likely help to minimize these impacts. Although proposed road use in most of the Plan area would be limited to the logging activity (which is generally concentrated in place and time), even little or unused roads could continue to deliver sediment to potentially occupied streams in excess of natural rates in the long-term, at least until these roads are permanently abandoned (i.e., stabilized and put to bed). Each affected creek and river contributes to the water quality of a spawning, rearing, and/or foraging corridor for FTA species where present (or potentially present) in a stream system.

One-hundred-foot buffer strips on each side of a stream's channel migration zone are typically stated as the minimal size needed to buffer most adverse effects of logging on streams (Hall and Lantz 1969; Moring 1975; Erman *et al.* 1977), and may not be adequate for adverse effects due to roads. Everest *et al.* (1987) found that logging roads, not the harvesting practice itself (unless both sides of a stream bank were clear-cut), were responsible for a large percentage of the sediment that enters an aquatic system. The channel network is increased by roads, because the roads act as tributaries, creating a more efficient sediment delivery system (Castro and Reckendorf 1995).

The introduction of sediment in excess of natural amounts can have multiple adverse effects on

channel conditions and processes resulting in effects on FTA species survival, the food web, and water quality conditions, such as water temperature and dissolved oxygen (Rhodes *et al.* 1994). Fine sediments can influence incubation survival and emergence success of FTA species young (Weaver and White 1985), and can also limit access to substrate interstices that are important cover during rearing and overwintering (Goetz 1994; Jakober 1995). Shifts in sediment loads set off a complex of channel responses including changes in pool volumes, depth and frequency, and changes channel morphology (including slope, sinuosity, shape, velocity, flooding regime, and sediment transport) (Rhodes *et al.* 1994; Castro and Reckendorf 1995). Adverse effects to FTA species associated with artificially high sediment and siltation levels in general include: impacts to spawning, rearing, migration and foraging behavior; habitat degradation; food supply disturbances; and, decreased water quality and quantity.

Direct Injury/Mortality

Direct injury or death could occur to flat tributary species due to instream activities which includes electrofishing. Electrofishing activities would be used as part of research and monitoring in the proposed HCP. Electrofishing would be used for last fish distribution monitoring only, which does not entail multiple passes through the same stream reach. In addition, all electrofishing would be done according to Service-approved protocols, which minimize risk to fish by limiting voltages, amperatures, and timing of electrofishing to avoid sensitive periods. Instream activities, including electrofishing, could also result in trampling of flat tributary species juveniles or eggs. However, since only one pass would be made to each stream being monitored, impacts to flat tributary species due to instream activities are expected to be minimal.

These may be adverse impacts to FTA from exposure to nitrogenous fertilizers in surface water (see general effects section). Although Simpson is not directly assessing these impacts, they are collecting surface water data to measure these compounds in water on the Plan Area. U.S. EPA has developed water quality criteria for nitrates for warm water fishes. In an attempt to determine whether fish are being adversely affected the surface water data collected by Simpson should be compared to these criteria to determine if the surface water concentration exceed the criteria would provide an indication as to the level of exceedence and hence adverse effects. According to recent literature amphibian are likely more sensitive than fish to nitrgenous substances.

Mainstem Species (MA)

Proposed Permit Species in the Mainstem Species Association (MA) include bull trout, dolly varden, torrent sculpin, longnose dace, Pacific lamprey, river lamprey and western toad. Effects to bull trout, dolly varden and western toad are fully described in Appendix A.

Pertinent Mitigation and Minimization Measures

Proposed mitigation and minimization measures for MA are detailed in Section 5.2 of the Plan and summarized below: 1) implementation of the RCR (Riparian Conservation Reserve program); 2) implementation of the wetland conservation program and wetlands protection program; 3)

implementation of the road management program; 4) implementation of the unstable slopes management program, 5) application of the TMDL standards, 6) hydrologic maturity prescriptions, and 7) amphibian research and monitoring program.

MA species are distributed within three lithotopographic units (LTUs) in the Plan Area; the Alpine Glacial (AGL) the Sedimentary Inner Gorge (SIG), and the Recessional Outwash Plain (ROP) LTUs, and six channel classes within these; the AGL - Qa6, AGL - Qo8, SIG - Qa6, SIG - L4, ROP - Qc7, and ROP - Qc8 in the mainstem tributary association (Table 13 HCP). Riparian buffers for these channel classifications range from an average of 30 to 65 meters (98 to 214 feet), and all are identified as no harvest with the exception of some experimental thinning, the buffers widths assigned to various channel classifications would largely reduce impacts from timber harvest because their width would in many cases be approximately equal to or greater than 100 feet(the minimum identified to offset impacts of timber harvest according to the peer-reviewed literature).

The MA stream channel buffers are measured from the channel migration zone (CMZ) or the break inslope (BIS). The CMZ is defined as the flood plain and lower terraces of streams and rivers that may be occupied by the channel at some future time. This extends to the 100 year flood plain and in cases of highly erodible soils may extend beyond to include low terraces. The toes of such valley slopes abut the CMZ BIS is defined as an identifiable position on valley walls of streams that is characterized by a slope deflection which separates the valley wall from more general upland terrain. This break is often greater than 40 percent and is typically characterized by subtle changes in understory vegetation toward a drier community in the upslope direction.

As proposed, no harvest would occur within the channel migration zone (CMZ), or break in slope (BIS), along perennial streams within the Plan Area, which would reduce sediment effects to MA species habitat.

The AGL-Qa6, SIG-Qa6, ROP-Qo7, and ROP-Q c8 streams fall under the Channel Migration Riparian Strategy, which emphasizes retaining sediment and organic matter, and maintaining nutrient processing. Other riparian forest function would be provided through this strategy including, bank stability and the growth of large specimen cedar and spruce for contribution of LWD. The purpose of this strategy is to maintain the floodplain processes that contribute to nutrient processing with the soil and the hyporheic zone, and ensure continued development of topographic complexity of floodplain surfaces. This strategy is expected to continue development of floodplain complexity and microtopography including the many types of small channels that are important for overwintering habitat of char (HCP appendix B).

The AGL-Qo8, and SIG-L4 streams fall under the Inner Gorge Riparian Strategy, where the primary management function is to provide LWD from unstable slopes. The purpose of this strategy is to provide wood large enough to maintain position or lodge inchannel classes like SIG-L4, AGL-Qo8, and AGL-Qa6 channels. To accomplish larger trees which would eventually provide LWD in large channels, the timber harvest boundary is set back from directly delivering inner gorge sideslopes. Floodplain complexity would be enhanced by this strategy over the long run. The largest trees that have the highest likelihood of recruiting to the river would be retained under this strategy (HCP

Appendix B).

The RCR program, as proposed, would limit harvest in riparian zones (see Section 5.2.1 of the HCP). No salvage of standing dead or downed trees would be permitted in the proposed RCR, although some snags and downed wood (potential large woody debris in streams) would likely be removed for non-salvage reasons, such as liability and safety, yarding access, or riparian road crossing access.

The proposed road management program (see Section 5.2.4 of the HCP) would reduce sedimentation and siltation entering streams used by MA species, but effects could still occur in the Plan Area depending on the location of proposed road building and drainage network in the proposed Plan Area. It is possible that some areas sensitive to mass wasting and delivery of sediments to MA species could be adversely affected by new road building as proposed. Riparian buffers and other measures as proposed, would likely help to buffer these effects. For example, to the extent operationally feasible, Simpson would avoid new road locations on steep (greater than 60 percent slope angle) slopes and limit roads through riparian areas. Road construction would be limited in riparian areas and on unstable slopes, and Simpson is implementing best management practices in their road construction as well as minimizing the number of channel crossings. Road remediation, as proposed, would likely substantially reduce sediment delivery from some existing roads in the Plan Area over time, however, there would be short-term impacts from sediment delivery to streams from such projects.

Roads would be prioritized for remediation based upon need, and roads in the worst condition (those delivering sediment into aquatic habitats) would be remediated first in the proposed ITP term. It is anticipated that the majority of early road decommissioning would occur in the CUP and SIG LTUs, which contain the channel classes utilized by MA species in the Plan Area. Simpson would complete road remediation for these roads within the first six to seven years of the proposed ITP term, seventy-five percent of roads needing remediation would be completed by year ten, and 100 percent of roads identified needing remediation would be completed by year fifteen of the Plan (see Section 5.2.4 of the HCP). Sediment impacts to MA species streams from roads in the Plan Area would thus decline within the first six to ten years of the Plan, and would be highly reduced by year fifteen of the Plan, benefitting MA species .

The Plan includes provisions to manage forest cover in the rain-on-snow (ROS) sub-basins so that hydrologically mature forests cover at least 50 percent of the area in each sub-basin, and no more than 25 percent of the area in each sub-basin would be covered by hydrologically immature forests. This management would reduce the frequency of major storm flows that are capable of shifting instream habitat structure, and it also is expected to substantially reduce the amount of coarse and fine sediments transported downstream.

The unstable slopes management program, as proposed, would prevent harvest on slopes Simpson designates as unstable (see Section 5.2.5 of the HCP), reducing sediment delivery into MA species stream habitats.

The Plan is expected to result in a high recruitment rate and total number of coniferous trees into

stream large woody debris (LWD). This is expected due to: 1) the large amount of riparian buffers along all streams; and (2) wide no-harvest buffers, including all areas below the break-in-slope. Buffers should lead to high levels of LWD recruitment, detritus recruitment, stream shading, and protection of hillsides immediately adjacent to streamsides

To address the adverse impacts to MA species resulting from water quality degradation (sediment input and elevation of stream temperature), the proposed action includes a Total Maximum Daily Load (TMDL) agreement that the applicant would implement to fulfill their obligations under the Clean Water Act. The analytical approach described in the TMDL (Appendix G of the HCP) for protecting stream temperatures and reducing sediment input provides additional assurance that the proposed action would satisfy water quality needs for aquatic dependent species covered by the Plan. The TMDL is not a component of the Plan but is linked through the adaptive management; it offers a direct measurement of instream conditions, which would provide a means of directly measuring the effectiveness of the riparian prescriptions. All other management prescriptions are designed to manipulate the riparian environment, the TMDL provides a direct measure of in-stream conditions as a result of implementing the riparian prescriptions and would significantly contribute to the knowledge necessary to trigger adaptive management

Habitat and Disturbance Effects

Members of the MA could be affected by the proposed action in much the same way as those in the FTA because they need pools for rearing and stable spawning gravel for reproducing. However, the direct linkages to habitat management are more difficult to demonstrate for the MA species. This difficulty stems from the uncertainties associated with establishing cause and effect relationships for specific land management activities and in-channel habitat conditions in large rivers. For example, adverse effects could occur as a consequence of landslides, but mass wasting from river escarpments is almost always due to natural contributing factors, such as erosion of landslide toes. Likewise, linkages between management activities and temperature of mainstem waters are tenuous due to the naturally open canopy over large channels (Simpson 1999).

Harvest/thinning and road building/maintenance activities in upland areas, as proposed, could result in artificially high sediment loads in some of the streams occupied by MA species in the Plan Area. This sedimentation could result in filling of some deeper stream pools required by older and larger MA species .

Road building/maintenance and harvest through experimental thinning, as proposed in some riparian areas, could result in the removal of riparian canopy and disturbance of natural riparian vegetation and the reduction in leaf litter delivery and large wood recruitment to streams, degrading the components of MA species habitat. This could reduce stream shading and channel stability, elevate fine sediments in spawning gravels and filling of substrate interstices, reduce pool habitats, altering nutrient balance and physical character of the stream, reduce cover and overall stream habitat complexity, and restrict natural movements of juvenile and adult MA species .

The Plan Area has approximately 2,000 total active road miles (see Table 14 of the HCP) which

traverse a variety of landscapes and cover approximately 3.7 percent of the land base. Weighted road density for the entire Plan Area currently is 4.9 miles per square mile varying between 7.8 in the Sedimentary (SIG) to 4.1 in the Alpine Glacial lithotopographic units (AGL) (see Table 14 of the HCP). Proposed maintenance and utilization of active roads represent a potential source of delivery of coarse and fine sediments into streams inhabited by MA species in the Plan Area.

New road building activity in MA species watersheds could adversely affect the MA species, depending on the location of proposed road building (e.g., steep slopes, unstable slopes, riparian areas, etc.) and drainage network in the proposed Plan Area. Improperly sized or placed culverts at stream crossings could be passage barriers that restrict movement of MA species or their prey. Riparian buffers and other measures as proposed, would likely help to buffer these effects. Although proposed road use in most of the Plan area would be limited to the logging activity (which is generally concentrated in place and time), even little or unused roads could continue to deliver sediments to potentially occupied streams in excess of natural rates in the long-term, at least until these roads are permanently abandoned (i.e., stabilized and put to bed). Each affected creek and river contributes to the water quality of a spawning, rearing, and/or foraging corridor for MA species where present (or potentially present) in a stream system.

One-hundred-foot buffer strips on each side of a stream's channel migration zone are typically stated as the minimal size needed to buffer most adverse effects of logging on streams (Hall and Lantz 1969; Moring 1975; Erman *et al.* 1977), and may not be adequate for adverse effects due to roads. Everest *et al.* (1987) found that logging roads, not the harvesting practice itself (unless both sides of a stream bank were clear-cut), were responsible for a large percentage of the sediment that enters an aquatic system. The channel network is increased by roads, because the roads act as tributaries, creating a more efficient sediment delivery system (Castro and Reckendorf 1995). Buffer widths prescribed in the Plan meet or exceed 100-feet, minimizing effects of sediment delivery from logging, and reducing such effects from road management.

The introduction of sediment in excess of natural amounts can have multiple adverse effects on channel conditions and processes resulting in effects on MA species survival, the food web, and water quality conditions, such as water temperature and dissolved oxygen (Rhodes *et al.* 1994). Fine sediments can influence incubation survival and emergence success of MA species young (Weaver and White 1985), and can also limit access to substrate interstices that are important cover during rearing and overwintering (Goetz 1994; Jakober 1995). Shifts in sediment loads set off a complex of channel responses including changes in pool volumes, depth and frequency, and changes channel morphology (including slope, sinuosity, shape, velocity, flooding regime, and sediment transport) (Rhodes *et al.* 1994; Castro and Reckendorf 1995).

As proposed, experimental thinning would occur in RCRs on approximately 1000 acres over the Plan area in the first ten years of the Plan. There could also be an unknown amount of additional acres (up to 5,160 acres) thinned in the RCRs after year ten of the proposed ITP term, in undetermined locations over the Plan Area. The purpose of this thinning is to accelerate the development of late seral forest characteristics (greater than 120 years of age). The results of this management would be reviewed at the end of the ten year period by the Services and Simpson to determine whether the

management is expected to reach the intended goal. Adaptive management changes may be made at that time for managing the remaining 5,160 acres. Other provisions of this management include: (1) thinned areas would be well distributed among channel classes to gain a broad sample of vegetation responses from different riparian areas; and (2) thinning treatments would vary according to the different plant associations studied and the treatments would be replicated (EIS). As proposed, areas selected for thinning would be weighted by the number of miles of each channel class in the RCR (EIS) . Of the initial 1000 acres of thinning, approximately 187 acres (approximately 19 percent) could occur within channel classes where MA species are likely to be found in the Plan Area. Considering that substantial conservation for MA species depends on the RCRs, contributions of large woody debris and stream shading could be reduced by proposed experimental thinning, however, the wide distribution, and small number of acres thinned over the first ten years of the Plan reduces this effect to MA species.

Direct Injury/Mortality

Direct injury or death could occur to MA species due to instream activities which includes electrofishing. Electrofishing activities would be used as part of research and monitoring in the proposed HCP. Electrofishing would be used for last fish distribution monitoring only, which does not entail multiple passes through the same stream reach. In addition, all electrofishing would be done according to Service approved protocols, which minimize risk to fish by limiting voltage and amperages used and timing of surveys. Instream activities including electrofishing could also result in trampling of MA species juveniles, alevins or eggs, however, since only one pass would be made to each stream being monitored, effects to MA species is expected to be infrequent.

These may be adverse impacts to MA species from exposure to nitrogenous fertilizers in surface water (see general effects section). Although Simpson is not directly assessing these impacts, they are collecting surface water data to measure these compounds in water on the Plan Area. U.S. EPA has developed water quality criteria for nitrates for warm water fishes. In an attempt to determine whether fish are being adversely affected the surface water data collected by Simpson should be compared to these criteria to determine if the surface water concentration exceed the criteria would provide an indication as to the level of exceedence and hence adverse effects. According to recent literature amphibian are likely more sensitive than fish to nitrgenous substances.

Lentic Species

Proposed Permit Species in the Lentic Species Association include prickly sculpin, Olympic mudminnow, threespine stickleback, northwestern salamander, long-toed salamander and red-legged frog.

Pertinent Mitigation and Minimization Measures

Proposed mitigation and minimization measures for lentic species are detailed in Section 5.2 of the HCP and summarized below: 1) implementation of the RCR (Riparian Conservation Reserve

program); 2) implementation of the wetland conservation program and wetlands protection program; 3) implementation of the road management program; 4) implementation of the unstable slopes management program; 5) application of the TMDL standards, (5) hydrologic maturity prescriptions, and (6) amphibian research/monitoring/adaptive management program.

Approximately 12,355 acres (4.7 percent of the Plan Area) of wetlands exist in the Plan Area. Of this total, 2,572 acres (1.0 percent) are riverine channel bed, 3,724 acres (1.4 percent) are forested wetlands (of which half would be conserved), and 6,056 acres (2.3 percent) are non-forested wetlands. Approximately 10,604 acres of non-forested wetlands and their buffers (see Table 4.8 FEIS) would be protected under the Plan. Buffers widths would vary according to hydro-geomorphic classification (HGM) (see HCP Section 5.2.3.1 for description of use of HGM in wetlands inventory program). Proposed thinning would not be permitted within the inner 33 feet of these buffers, and as much as 50 percent of the tree stems could be thinned in the outer residual buffer width. Trees remaining after proposed thinning would be similar in size and species to those present prior to thinning.

All forested wetlands in proposed RCRs would be protected, and approximately 2,793 acres of forested wetlands (not connected with riparian areas) would be protected. This represents 75 percent of the forested wetland acreage outside the proposed riverine riparian conservation areas in the Plan Area (EIS 4.5). In addition to the proposed buffer prescriptions applied to non-forested and forested wetlands in the Plan Area, when non-forested wetlands of any HGM class occur as a mosaic of small wetlands, the entire area would be managed as a "wetland complex" with the most restrictive proposed HGM class present established, and management restrictions applied (HCP Section 5.2.3.2.). The Stillwater River area within the ROP LTU in the Plan Area contains an extremely high density of such wetland complexes, which are highly important to LA species. Although this area only encompasses approximately five percent of the Plan Area, it has approximately 20 and 31 percent of the non-forested and forested wetlands respectively (HCP).

Road construction can alter wetland hydrology resulting in changes in water levels within wetlands (HCP). The proposed road management program (HCP Section 5.2.4) would reduce sediment and silt entering streams which could connect to LA species habitat, or into wetlands directly used by LA species. It is likely that some LA species habitat areas sensitive to delivery of sediments would be adversely affected by new road building as proposed. Riparian buffers and other measures as proposed, would likely help to buffer these effects. Road construction would be limited in riparian areas and on unstable slopes, and Simpson proposes implementation of best management practices in their road construction, as well as minimizing the number of channel crossings. Road remediation, as proposed, would likely substantially reduce sediment delivery from some existing roads in the Plan Area over time, however, there would be increased short-term impacts from sediment delivery to streams from such projects.

Roads would be evaluated to assess influences on the hydrologic integrity (including water quality) of all wetlands within the Plan Area within 10 years after the issuance of the proposed ITP. This would guide remedial road work for the benefit of wetlands. Roads would be prioritized for remediation based upon need, and roads in the worst condition would be remediated first in the proposed ITP

term. It is anticipated that the majority of early road decommissioning would occur in the SIG LTUs, which contain wetland habitat likely used by LA species in the Plan Area. Simpson would complete road remediation for the worst roads within the first six to seven years of the proposed ITP term; 75 percent of roads needing remediation by year 10; and 100 percent of roads needing remediation by year 15 of the Plan (HCP Section 5.2.4). Sediment impacts to LA species habitat from roads in the Plan Area would thus decline within the first six to ten years of the Plan, and would be highly reduced by year 15 of the Plan, benefitting LA species.

The unstable slopes management program, as proposed, would prevent harvest on slopes Simpson designates as unstable (HCP Section 5.2.5), reducing sediment delivery overall into wetland habitats.

Since invasion by exotic plant species degrades LA species' habitats, exotic plant species would be monitored within wetland habitats by periodically surveying a subset of the wetlands.

In addition to monitoring abundance of stream breeding amphibians and western toads in relation to Plan prescriptions, Simpson has also committed to monitoring how amphibians are affected by operational application of nitrogenous fertilizers. Simpson would continue its ongoing research in this area and expand it to include water sampling and surveys for larval abnormalities of pond breeding amphibians. Wildlife monitoring questions for the Plan Area include how the relative abundance and distribution of stream breeding amphibians would change under the Plan (HCP Section 9.4.3). Simpson plans on using a strong experimental design that utilizes before and after, and control and impact, study sites to ascertain the trends in relative abundance of these animals as they may relate to implementation of Plan prescriptions. The study design that Simpson has offered to implement in their monitoring program is likely to detect any statistically significant differences between treated and control sites due to management treatments (Simpson pers. com). Adaptive management would be applied to modify the prescriptions relative to results of the research monitoring program.

Habitat and Disturbance Effects

Adverse effects to wetlands and the LA may occur through delivery of fine sediments from road ditch lines, changes in hydrologic regime of a wetland (by the addition or subtraction of normal water flow through ditch line piracy or rerouting), and alterations of near shore habitat through changes in the riparian forest. Since water surfaces are already largely exposed to the sun, it is unlikely that riparian management would measurably alter water temperatures in wetlands.
Riparian forests have a smaller influence on the function of wetland habitat than they do on riverine systems. The physical habitat itself is not driven by logs and fluvial action and the nutrient cycling processes and trophic pathways are also vastly different from riverine systems. However, wetlands are susceptible to some land use practices. Eutrophication, for example, is a concern if nutrients are chronically elevated in waters draining into wetlands, and sedimentation can fill wetlands over time. In the forested environment, these kinds of impacts are unlikely and not apparent in the Plan Area despite a long history of timber management (FEIS Section 4.6).

Harvest/thinning and road building/maintenance activities in upland areas, as proposed, could result in artificially sediment loads in some of the wetlands used by LA species in the Plan Area. These

activities are represented by approximately 219,000 acres of upland timber, approximately 250 miles of new road construction, and potentially up to 2,001 miles of roads that would be remediated within the Plan Area over the life of the Plan.

Removal of forest cover in forested wetland buffers could significantly alter the temperature and moisture conditions during summer months, and under certain circumstances lead to the death of some LA species (HCP 7.2.1.5). Plan prescriptions for buffers on forested wetlands should minimize the chances for this to occur.

Road building/maintenance and harvest through experimental thinning or wetland buffer thinning, as proposed in some riparian and wetland areas, could result in the removal of riparian canopy and disturbance of natural riparian vegetation and the reduction in leaf litter delivery and large wood recruitment to wetlands, potentially degrading the components of LA species habitat. This could alter nutrient balance and the physical character of the wetland, and reduce cover and overall wetland habitat complexity. Effects from any increased sediment could be translocated into adjoining wetland habitats.

The Plan Area has approximately 2,000 total active road miles which traverse a variety of landscapes and cover approximately 3.7 percent of the land base. Weighted road density for the entire Plan Area currently is 4.9 miles per square mile varying between 7.8 in the Sedimentary, to 4.1 in the Alpine Glacial, lithotopographic units (HCP Table 14). Proposed maintenance and use of active roads represent a potential source of delivery of coarse and fine sediments into streams that feed into wetlands, or into wetland habitats occupied by LA species in the Plan Area.

Depending on the location of proposed road building (e.g., steep slopes, unstable slopes, riparian areas, etc.) and drainage network in the proposed Plan Area, riparian buffers and other measures as proposed, would likely help to minimize these impacts. Although proposed road use in most of the Plan area would be limited to the logging activity (which is generally concentrated in place and time), even little or unused roads could continue to deliver significant sediments to potentially occupied wetlands in excess of natural rates in the long-term, at least until these roads are permanently abandoned (i.e., stabilized and put to bed).

Direct Injury/Mortality

Amphibians may experience direct harm from exposure to nitrogenous fertilizers in surface water. While it is not clear how fertilizer treatments in managed forest lands in the Pacific Northwest affect amphibian populations, recent studies have indicated that pond-breeding amphibians from the Pacific Northwest, including northwestern salamanders and red-legged frogs, experience high mortality at the Ambient Water Quality Criteria level for nitrite for warm-water fishes and a significant larval mortality at the recommended limits of nitrite concentration for drinking water (Marco, *et al.* 1999). Studies also show that high levels of nitrate and nitrite can significantly deform amphibians, inhibit their behavior, and even cause significant levels of death to some Pacific Northwest pond-breeding amphibian populations (Marco *et al.* 1999). There may be adverse impacts to LA fish species from exposure to nitrogenous fertilizers in surface water (see general effects section). Although Simpson is

not directly assessing these impacts, they are collecting surface water data to measure these compounds in water on the Plan Area. U.S. EPA has developed water quality criteria for nitrates for warm water fishes. In an attempt to determine whether fish are being adversely affected, the surface water data collected by Simpson should be compared to these criteria, to determine if the surface water concentration exceed the criteria, which would provide an indication as to the level of exceedence and hence adverse effects. According to recent literature, amphibians are likely more sensitive than fish to nitrgenous substances in the action area.

Snag Dependent Species

The following discussion of effects of the proposed action applies to all cavity nesting proposed Permit Species.

Pertinent Mitigation and Minimization Measures

Mitigation and minimization measures for the cavity nesting proposed Permit Species are described in Section 5.3.7 (Plan) and summarized below: (1) Implementation of the RCR program which would protect existing snags and downed trees within RCR's (2) establishment and implementation of the Wildlife Tree Conservation Program (Section 5.2.2); (3) establishment and implementation of the Wetlands Program (Section 5.2.3); (4) monitoring of snag habitat under all of the above programs at years 20 and 40 of the proposed ITP term, and adaptive management applied as needed, and (5) there would be no salvage of any residual "old-growth" downed wood or stumps throughout the entire Plan Area.

Habitat and Disturbance Effects

Cavity nesting proposed Permit Species and their habitat would likely be negatively affected under the proposed action due to the loss of large and medium snags from upland areas outside of any conservation areas. This is due to the gradual loss of forests more than 45 years old under Simpson's 45-50 year rotation schedule outside conservation areas. Some snags would be lost due to liability and safety restrictions that require felling of snags, including those within conservation areas; these are snags that could potentially fall (and are thus considered dangerous) onto planned proposed activities such as harvest, thinning, and road building/maintenance. Cavity nesting proposed Permit Species habitat could also be directly lost due to timber harvest associated with the experimental thinning program proposed under the Plan. This program involves thinning on not more than 1,000 acres of the RCR during the first 10 years of the proposed ITP term, but after ten years up to an additional 5,160 acres of RCR could potentially be thinned throughout the remaining forty years of the proposed ITP term. Lastly, cavity nesting proposed Permit Species habitat would likely be lost due yarding, or to road building, due to clearing for access or construction.

The snags and green leave trees provided by proposed management would be widely distributed due to the spacial extent of proposed riparian conservation zones, conservation provided along Type 4 and 5 streams, as well as that provided by the Supplemental Wildlife Tree Conservation Program.

On average, potential recruitment trees are expected to be widely distributed and large due to (1) the Supplemental Wildlife Tree Conservation Program which would conserve an average of four of the eight trees per acre as dominant trees (average of14-16 inches DBH), and the presence of the 800-foot spacing element; (2) forested wetland conservation; (3) amount of riparian protection provided along Type 4 and 5 streams, which includes a minimum of 80 trees per 1,000 feet along Type 5 streams; and (4) the no-harvest inner buffers around non-forested wetlands.

Chestnut-back chickadees, and pileated woodpeckers prefer older age forest habitats. Other permitted bird species also use older forest components, and benefit from older forest conservation. Coniferous forest in older age classes allowed to remain or develop in the Plan Area would have the structural characteristics (in particular, large snags) most heavily utilized by these species. A small amount (approximately 1,138 acres) of old-growth forest stands currently exist in the Plan Area (minimum stand size of five acres). Approximately 200 to 400 additional acres of old-growth trees exist in small patches or stringers of old-growth less than five acres in size, primarily within proposed RCRs (Simpson 1999). Proposed management would result in conservation of approximately 72 percent (823) acres of the existing old-growth forest in the Plan Area. Approximately 315 acres of old-growth forests exists outside the RCR, and those forests are proposed to be harvested .

The Plan would protect approximately 4,951 acres of coniferous forest currently older than 70 years. This figure includes the conservation of 70 percent of all forest older than 120 years on the Plan Area, as described above. Approximately 21,760 acres of forest 71-119 years old, and 1,138 acres of forest 120 years old and older exist on the Plan Area, for a total of 22,898 acres of forest older than 70 years old on the Plan Area currently. A total of approximately 15,306 acres of deciduous and coniferous forest currently older than 70 years would be lost, as a result of proposed short rotation timber harvest outside conservation areas during the first 20 years of the proposed ITP (a majority of that forest would be coniferous). This proposed 15,306 acres of timber harvest (forest greater than 70 years old) would reduce potential and suitable chestnut-back chickadee and pileated woodpecker habitat in the Plan Area during the proposed ITP; more than 5,000 acres (4,951 acres of forest proposed to be conserved currently exist in the Plan Area) of forests older than 70 years are expected to develop in the conservation areas during the 50 year proposed ITP term. At year 50, the forests older than 70 years in the conservation areas is expected to be 26,078 acres, of which approximately 19,000 acres would be coniferous forest (Figure 4.1).

The proposed action would lead to the development of an estimated minimum 1,991 additional acres of early stage old-growth stands (greater than 120 years-old and minimum 5 acres) in the RCR. This habitat would develop from stands currently older than 70 years of age. Approximately 162 acres is predicted to develop by year 2024, and 1,231 aces by year 2049. Since stands that develop outside the conservation areas would be harvested on a 45 year rotation, additional preferred chestnut-back chickadee and pileated woodpecker habitat would not likely develop outside the conservation areas.

Under the proposed RCR program, no salvage of standing dead or downed trees would be permitted in the RCR, which should help maintain cavity nesting bird habitat. A sample survey of the RCR area indicates that the proposed RCR acres currently contain 1.06 snags per acre of 12-24 inches DBH, and 1.14 snags per acre greater than 24 inches DBH (Simpson 1999). All existing and large

snags that develop in the RCR would be retained (except where liability issues require felling), possibly resulting in more than two snags, one each, in the 12-24 and greater than 24 inches DBH size classes (Simpson 1999) per acre.

Old-growth logs are no longer common in the Plan Area or Assessment Area due to past timber harvest practices. As proposed, old-growth cull logs found within management units would not be cut-up for firewood, cedar shakes or otherwise removed; this would retain this important component of pileated woodpecker, northern flicker, hairy woodpecker, and prey habitats for northern saw-whet owl, northern pygmy owls and western screech owls throughout the Plan Area. RCR, LFR and Wetland Conservation Area buffers would also provide medium and large logs in riparian areas in the Plan Area, providing foraging habitat for these species over the proposed ITP term.

Some proposed RCRs include acreage reaching into the uplands away from the streams within the Plan Area. These (nine) areas are called Late-Seral Forest Reserves (LFRs), and total 6,415 acres in the Plan Area. They are relatively large contiguous size areas of forest, and range in size from 263 to 1,234 acres, with an average of 713 acres. Establishment of LFR's in addition to RCR's would maintain existing mature forest (50-100 years-old) and somewhat older forests (more than 100 years-old) in these areas, and enhance the availability of old-age forest habitat by allowing these forests to successional age during the proposed ITP term. The proposed LFRs are connected to adjoining forests conserved in the RCR network, and younger forests (30-50 years old) would also be dispersed in surrounding timber management areas (Simpson 1999). The LFRs would provide core habitats within snag dependent bird species home ranges, and refuges where those populations are expected to be sustained during the proposed ITP term. Overall, a majority of these LFRs currently have mature (50 plus years old) hardwood forest, with a lower percentage of coniferous forest. However, the largest LFR (North Fork Skokomish which is 1,234 acres in size) consists of 51 percent coniferous forest, of which 75 percent is at least 50 years old. Additionally, six of the nine LFRs have at least 30 percent coniferous forest 30 to 50-years old (see Table 7 in the HCP) as well as interspersed stands older than 70 years and in some patches of forest older than 120 years. During the first 25 years of the proposed ITP term, a majority of the forests in all of the LFRs would be greater than 50 years old, and by the end of the proposed ITP term a majority would be older than 70 years. Additionally, the percentage of coniferous and mixed coniferous forest is expected to gradually increase through natural succession (see Section 6.2.1.3 of the HCP).

Some regions of the Plan Area have greater concentrations of conservation areas as compared to the average for the entire Plan Area. Four regions in particular, the Alpine Glacial LTU, Sedimentary Inner Gorge LTU, Stillwater Wetlands Complex, and Skokomish Watershed cover approximately forty percent of the Plan Area, and they have 20 to 25 percent of their areas designated for conservation. Conservation areas in these regions generally are larger and in closer juxtaposition (i.e., 0.25 to 2.0 mile) than elsewhere in the Plan Area. These high concentrations of conservation areas interspersed within a matrix of younger forest habitat would likely provide substantial snag dependent bird species habitat.

Outside of the RCRs and LFRs, Simpson's proposed upland management involves managing timber units with 40-50 year timber harvest rotations. Most uplands in the Plan Area currently consist of

coniferous forests stands one to sixty years old (Simpson 1999). Stands less than approximately 30 years-old typically have snags only in the smallest size class (less than twelve inches DBH). Once stands reach harvest maturity age of 40 to 60 years old (for this particular ownership) the snag size and density increases dramatically (Simpson 1999). The Dry Creek study area showed two non-commercially thinned units with 60 year old coniferous forest had a total of 10 snags per acre distributed among the following snag density: approximately 8 snags per acre (6-12 inches DBH, 1.4 snags per acre (12-22 inches DBH, 0.8 snags per acre (22-32 inches DBH) and 0.3 snags per acre (greater than 32 inches DBH) (Simpson 1999). Coniferous species made up a majority of the three largest size classes (Simpson 1999). This size class diversity would meet the needs of many snag dependent bird species; however, many of these stands remain on the landscape for only 10 to 30 years before they are harvested, and the amount of this forest age class would vary through time. Covered cavity nesting bird utilize large and small snags for nesting and foraging, and could be detrimentally affected by short-term timber harvest rotations; however, snags conserved and developed within the riparian areas should help sustain chestnut-back chickadee populations through the cutting rotations that occur outside the conservation areas (EIS).

Under the Wildlife Tree Conservation Program, a minimum average of eight trees per acre at least ten inches DBH, for each section in the Plan Area that currently does not meet this eight trees per acre threshold, would be conserved. A minimum of four of the eight trees left under the Wildlife Tree Conservation Program would be dominant or co-dominant trees, with the remaining trees being any one or a combination of the following: cedar, hemlock, or other conifer with a live crown (7 inch minimum DBH), residual old growth, or safe snags. The trees left may be dead, dying, or green leave trees, and may be clumped or dispersed within harvest units. In addition to the Wildlife Tree Conservation Program, some individual trees or small clumps of trees outside the RCR would be left by Simpson during harvesting operations. These trees would supplement those that would be present during the course of day-to-day management of 50-year old stand rotations. This would be voluntary for Simpson, because they cannot be quantified until after timber harvest is conducted within each timber harvest unit. At this time there are no provision to include these voluntary trees as mitigation credit, because they cannot be quantified, but in doing so, some mature tree habitat would remain on the landscape outside the RCR when stands are harvested and the regenerating stands are young (less than 35 years old). These trees typically would be retained within or adjacent to timber harvest units and consist of trees that have little merchantable value, do not present a safety liability, and can be left without significantly restricting harvesting or yarding operations.

Under the proposed action's Wetland Conservation Program, at least fifty percent of the forested wetland stem density currently present, would be conserved, providing cavity nesting bird snag habitat surrounding important foraging areas for permitted species such as tree and violet-green swallow, and western bluebird.

The combination of the RCR, LFR, Wildlife Tree Conservation and Wetland Conservation Program would result in conservation of 33,4012 additional acres of riparian, wetland, and unstable slopes. The total number of potential recruitment trees conserved under the Plan was assumed to be an average of 175 trees per acre for the riparian and wetland buffers, and all conserved unstable slopes; 1,862 acres of forested wetlands; and 8 trees per acre for the approximately 43,200 acres included in

the Wildlife Tree Conservation Program (Simpson 1999). Considering these assumptions, there would be a total of approximately 25 potential recruitment trees averaged per acre of the 261,575-acre Plan Area. A majority of these trees would be a minimum of thirteen inches DBH. Other green leave trees are expected to be left in the Plan area, within timber management units outside conservation areas; however, the number and location were not defined well enough to include in this analysis (Simpson 1999). The exact number of snags or partially dead trees recruited from these trees is not known; however, natural mortality rates in uplands and snag recruitment rates for clearcut edges along riparian areas indicate that as many as 4.7 medium snags (12-24 inches DBH) per acre could be expected during the first 20 years and a lower rate of recruitment for large snags (HCP).

Covered cavity nesting birds may also experience competition within and between species for snag habitats concentrated in the RCR and wetland conservation zones, resulting in failure to nest in any given year.

The primary activities under the Plan that may result in disturbance of the permitted cavity nesting species in the Plan Area include any operations that involve human activities on roads or in suitable habitat such as the following: (1) timber harvest, (2) silvicultural treatments within RCRs (2) road removal, decommissioning, maintenance, improvement and routine road use.

Timber harvest outside of conservation areas, and from experimental thinning inside of conservation areas, could disturb nesting cavity nesting birds if performed adjacent to occupied nesting habitat during the nesting season. Disturbance could result in temporary or permanent displacement of birds, and the effect of the disturbance is unknown, since many species' tolerance to disturbance is not well studied.

The likelihood of disturbing any actively nesting permitted cavity nesting bird pairs in the Plan area due to road management is expected to be decreasing during the proposed ITP term due to remediation of roads during the first 10 to15 years under the proposed action, according to the schedule committed to in the Plan for such projects. Having fewer forest roads would reduce the amount of disturbance related to road maintenance, improvement, and use, over the long term in the Plan Area.

Direct Injury/Mortality

Timber harvesting is not expected to directly injure or kill adult birds, due to their ability to fly from those operations. Timber harvest may, however, destroy eggs, or kill chicks each year, and temporal noise disturbances could result in nesting failure.

CUMULATIVE EFFECTS

Cumulative effects are those effects of future State, tribal, local, or private actions, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation. These are actions, unrelated to the proposed action, that are likely to occur,

bearing in mind the economic, administrative, or legal hurdles which remain to be cleared (51 ***CFR*** 106). 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.

Future actions, not expected to be subject to consultation pursuant to section 7 of the Act, include:

1. Existing non-Federal forest lands in the action area (outside the Plan Area and outside proposed ITP potentially affected portions of the Assessment Area) will largely continue to be managed and harvested for timber resources, including clear-cut logging according to Washington State Forest Practices Regulations; those without HCPs would have effects cumulative to the effects of the subject proposed action. Roads will be created and maintained to access these forest stands. Forest roads will impact the usability of adjacent suitable habitats. Construction of timber haul roads is expected to continue to access small parcels within the managed forest landscape. Roads in forested landscapes will negatively affect species by impeding use of habitats adjacent to roads, blocking passage from downstream to upstream habitats (by fish), providing a constant source of artificially high sediment to streams, and increased human access (which may impact security of adjacent habitats). Road management on these forests will be according to Washington State Forest Practices Regulations.

   Forest management generally results in temporal and spacial changes in ecological communities across the landscape, including age or structural changes resulting from harvest and other forest management actions such as planting, pruning and fertilization; thinning and controlled burns. Intensive forest management will likely maintain these lands in earlier seral stages (i.e., 40 to 50 years of age) with fewer structures or features such as snags, down logs, large trees, variable vertical layers, and endemic levels of forest "pests" and "diseases." These practices will affect proposed covered snag dependent species by removal of existing snag habitats, and delaying the development of suitable snag habitat into the future though short timber harvest rotation. Ongoing forestry practices will continue to affect marbled murrelets, pileated woodpeckers and bald eagles, mainly through preclusion of development of suitable habitat (that would otherwise develop through natural successional processes), through disturbance, and through continued exclusion of later seral stages of forest due to harvest activities. Timber harvesting will continue to cause forest fragmentation at a landscape scale, and structural simplification at the stand level. Natural agents of disturbance, such as fire and plant diseases, will continue to have their normal functioning disrupted. High levels of sediment delivery to the waters of the action area will likely continue as a result of these forestry practices, particularly from erosion associated with roads and clear-cut practices. Fertilizer applications on managed forests will continue to affect nutrient loads entering receiving waters of the action area through run-off, as well as potentially directly affecting amphibians as a result of absorption through the skin of fertilizer if they come in contact with fertilizer pellets. Other chemicals will likely be released into the environment during forestry operations, including fuel, oil, and coolants used in equipment for harvesting and road-building operations.

Forestry practices will continue to cause the loss of functional groups or reductions in the number of species through selection for and against certain plant species through planting, cutting, and herbicide practices. The reduction or loss of these plant species will result in concomitant reductions in species that occupy a particular level in the food web (grazers, browsers, predators, decomposers), which likely causes declines in ecosystem functioning (Tilman *et al.* 1997). Two important groups of species in conifer-dominated forests are hardwood trees and shrubs, which are present at one or more stages of succession and are frequently viewed as "weeds" in forestry practices, and thus controlled. Mountain beavers will continue to be controlled in order to protect planted trees from damage on managed forests. Adverse water temperature effects (abnormally high water temperatures) from reduced tree canopy shade are expected to gradually subside over the next 100-years as riparian buffers improve due to advancement and improvement in forestry practices regionally. Two proposed Permit Species, the bull trout and tailed frog, are particularly temperature sensitive, and would be adversely affected by increased water temperatures in habitat they utilize in the Plan Area, caused by changes in action area lands surrounding the Plan Area. Intensive forest management generally results in adverse impacts such as continued loss/preclusion of older forest habitats and habitat structures, increased fragmentation of forest age classes, loss of large contiguous and interior forest habitats, decreased water quality, degradation of riparian and aquatic habitats, and increased displacement of wildlife individuals.

Future trends of natural disturbances (such as fire) and potential effects, as modified by forestry practices are difficult to predict. Unexpected catastrophic natural disturbances in concert and/or synergized with human caused future actions, could negatively affect species, suitable habitats, and species recovery planning.

Development of HCPs or other wildlife management plans are likely to alter the basic management of these forest lands of the action area. As HCPs are completed, it is expected that the Service would issue an Incidental Take Permit, requiring further section 7 analysis at the time of such action. Therefore, management actions under potential future HCPs are not considered a cumulative impact for this proposed action.

2. Although, there is very little agricultural and grazing use of lands within the Plan Area, Agricultural and grazing uses of the valleys of the action area will continue. Grazing and agricultural activities will result in continued destruction of woody riparian and upland vegetation, elimination/preclusion of snags and mature downed wood, propagation of exotic plant species, loss of shade protection of streams, reduced or eliminated large woody debris contribution to streams, increased sediment and nutrient inputs, and channel incision and erosion. Riparian bank protection afforded by native woody vegetation along streams will continue to be trampled, degraded, or eliminated. Agricultural activities will continue to cause pesticides, fertilizer, and manure to run-off into receiving waters. Aquatic species that are proposed Permit Species in the HCP could thus be affected by agricultural activities occurring in the lands surrounding the Plan Area. Proposed Permit Species in the Main Stem Species Association such as bull trout, Pacific lamprey, river lamprey and western toad, and in

the Lentic Species Association such as prickly sculpin, threespine stickleback, Olympic mudminnow and northwestern salamander would be most likely affected by these described run-off affects due to their location in habitats in lower elevation areas within the Plan Area.

The 1995 Washington State Data Book indicates that in 1992 approximately 15.7 million, or about 37 percent, of Washington's 42.6 million acres was in farmland. Although not identified by the 1995 Data Book, it is likely that western counties comprise a lower percentage of Washington's farmland than eastern counties. The total amount of farmland shows steady decreasing trends from 19.1 million acres in 1964 to 15.7 million acres in 1992. No data was available for the Olympic Peninsula. The number of smaller farms (less than 259 acres) shows the biggest decrease (from 70,000 in 1945 to about 30,000 in 1992). Farmlands tend to occur in low elevation, low gradient areas in the action area. In the action area most suitable habitat conversion to agricultural lands occurs along valleys. Some residential and commercial development will likely occur in current agriculture areas in the action area (outside the Plan Area) displacing farmland development.

3. Residential and commercial development in the action area will likely continue to grow at a slow to moderate rate, resulting in loss of fish and wildlife habitat and individual animals. This loss is expected to continue mainly in areas lower in elevation than the Plan Area, in much the same fashion as has occurred to date. This development will likely further degrade dispersal corridors/linkages between core natural areas north and south of the Plan Area that are important in the future for wide ranging species. Development will continue to subsidize increases in wildlife species most adaptable to human development, such as common raven, American crow, and coyote. The effects of increased Corvids are a concern because they are a particularly significant predator upon marbled murrelets (USDI 1995).

Development expected in the future will largely have watershed effects on anadromous fish, particularly pollution, increased storm runoff peaks, modified sedimentation regimes, and continued impetus for increased flood damage reduction actions. Most development will occur along the Pacific and Puget Sound coasts, and along highway corridors. New development results in permanent loss of native ecological communities. Development actions include suitable habitat conversion for urban, other residential, or commercial uses, and for structures or networks providing infrastructure support such as hydropower and irrigation diversions, roads, and power-lines. Development effects generally includes physical displacement and fragmentation of habitat, noise disturbance, exposure to contaminants, and declining air and water quality.

According to the 1995 Washington State Data Book, Washington's population grew by more than 560,000 between 1990 and 1993 [sic] to a total of nearly 5.5 million in 1995. This growth reflects a natural increase (estimated births minus estimated deaths) of more than 200,000 and a net migration of more than 360,000 (Washington State 1995) for the reported period. The 24 western counties in Washington account for 84 percent of the total population and 83 percent of the total growth. More than 44,000 housing permits were issued in Washington in 1994. Housing permits issued show a positive trend from the early 1990's,

with four to 20 percent annual change. It is likely that future population growth and housing starts will exhibit similar trends. The Olympic Peninsula is not likely to receive a large share of this growth due to its relative isolation from existing large urban centers, with the exception of the portion of the action area closest to Olympia. Residential growth on the Olympic Peninsula will mainly occur in and near the towns of Pt. Angeles, Shelton, and Aberdeen.

Increased residential, commercial, and agricultural development will likely place increased demands on the existing infrastructures such as the transportation system. Highway expansion and upgrading of the current road system will likely be emphasized over new highway construction in the action area. Increasing trends in conversion of suitable habitats for pipelines, aqueducts, power lines, are likely to occur during the proposed ITP term. Development of such projects which includes the participation of a Federal agency or utilize Federal funding would require further analysis under section 7 of the Act, and are not cumulative to the effects of this action. Suitable or potential habitat for listed species converted for infrastructure use likely will provide few life requisites. Roads and other corridor developments can affect wildlife access such as restricting use of habitats on the opposite sides of a highway or blocking passage from downstream to upstream habitats. Accompanying human use and management may also adversely affect adjacent areas of otherwise suitable habitats.

4. Continued development, modification, and disturbance of the floodplains and channels of the action area (outside of the proposed Plan Area) are expected to continue as human population numbers in the action area increase, adversely affecting proposed covered fish and amphibian species such as coastal cutthroat trout, bull trout, and western toad. Most of these changes are expected to occur in the largely privately-owned lower-elevation areas. These changes are some of the largest future threats to bull trout and coastal cutthroat trout. Listed anadromous fish would typically (except for these changes) spend large amounts of time in the downstream low gradient reaches of a river system, where they have unimpeded upstream and downstream passage. The most important expected human-caused changes to the floodplain and channels include: channelization, levee construction (and elimination of a river's access to its floodplain during most storm events), and channel armoring; removal and reduction in large woody debris, and removal of riparian forest and other vegetative covers; increased sedimentation and turbidity; modified riparian successional processes and disturbance regimes; and increased pollution. These changes will reduce habitat function for listed fish species, particularly habitat for migration (juvenile out and adult upstream, as well as seasonal alternate rearing habitats) life-history stages. These changes would also: increase vulnerability to predation and exposure to contaminants; will eliminate high-flow refugia such as side-channel swamps, riverine ponds, and small runoff tributaries; eliminate undercut bank and pool habitat; reduce shade, filtration, and nutrient input from riparian vegetation; and reduce capacity for the stream/river- reach to produce food. It is expected that lower reaches of stream/rivers within the action area will continue to significantly degrade in ecological function for subject aquatic species in the future, impairing recovery efforts for these species.

5. Illegal activities such as poaching, unauthorized off-road vehicle use and target shooting,

trespass, and dumping are likely to continue within the action area. These activities have high potential to adversely affect listed fish and wildlife directly (for example, poaching of bull trout) or indirectly (such as dumping of waste oil where it eventually enters the waters of the action area and causes toxicity to aquatic proposed Permit Species). These activities will continue to degrade the action area, reducing the ability and potential for this area to support listed species in the future.

6. Resource extraction activities will also likely continue in the action area outside the proposed Plan Area, many of which will have adverse effects similar to those describe for forestry practices above. Many of these areas are in degraded status as a result of past human activities, but have good potential for passive restoration of partial ecological function if artificial disturbances are largely reduced. Regulation and enforcement of resource extraction activities in relation to effects on listed species, including forestry practices, is expected to improve in the future, helping to increase overall ecologically function in the areas surrounding the Plan Area for most subject species. To the extent that take of listed species may occur as result of these activities and enforcement would be activated, the parties involved in these activities would likely be subject to the prohibitions of section 9 and the penalties of section 11 of the Act.

7. Pesticides will continue to be used on private lands within the action area. Pesticides includes herbicide use and fertilization, whose use will contribute to reduction/modification of vegetation forage for species such as band-tail pigeons, and will likely impact amphibians and fish thru toxic effects from ground surface or aquatic exposure. Fertilizer use will likely cause increased nutrient loads entering waters of the action area through run-off, adversely affecting aquatic ecosystems and their species. Excessive amounts of nutrients may cause enrichment of waterbodies, stimulating algal blooms (EPA 2000). Herbicides, insecticides, and fungicides used to control forest pests and undesirable plant species, can be toxic to aquatic organisms (EPA 2000). Pesticides that are applied to foliage or soils, or are applied by aerial means, are most readily transported to surface waters and ground waters (Norris and Moore 1971). Some pesticides with high solubilities can be extremely harmful, causing either acute or chronic effects in aquatic organisms, including reduced growth or reproduction, cancer, and organ malfunction or failure (Brown 1974). Persistent pesticides that tend to sorb onto particulates are also of environmental concern since these relatively nonpolar compounds have the tendency to bioaccumulate (EPA 2000).

To the extent that EPA has effectively consulted on potential adverse effects of the use of specific pesticides on particular listed species that may occur within the action area of the subject HCP, then use of these particular pesticides, per the terms and conditions of the Biological Opinion from this consultation with EPA, would be exempted from the prohibitions of section 9 of the Act, and thus are considered part of the Environmental Baseline for the subject action. To the extent that EPA has not consulted on potential adverse effects of specific pesticides, the use of these pesticides and any adverse effects to these listed species occurring within the action area remain cumulative to the effects of the subject action.

8. Recreational activities expected in the action area range from primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, and roaded modified rural such as campgrounds and summer homes. There is evidence of an excess supply of the more developed, motorized forms of recreation and a high and increasing demand for recreation settings with little development, little management activity, and no motorized access (USDA 1993 [FEMAT]). More than 47 million people visited the 110,000 hectares (270,000 acres) of Washington State Parks in 1994, an increase of more than five million from 1987 attendance (Washington State 1995) (the State lands in the action area are covered by an HCP with DNR, and thus DNR covered activities are part of the Environmental Baseline). Although some private lands may be developed for recreation in the future, it is likely that trends in recreational use will be similar to current uses (e.g., high use on public lands). The majority of developed recreation sites will likely occur in roaded settings. Potential impacts of fishing include increased risks of salmon stock viability, declines of salmon carcasses for wildlife foraging, and wildlife displacement during fishing activities. Hunting fluctuates in response to population levels, weather, and regulation by Washington Department of Fish and Wildlife. The number of licensed deer and elk hunters has decreased since 1975. Numbers of small game harvested have also declined steadily from nearly 1.48 million in 1975 to around 0.43 million in 1994 (Washington State 1995). Generally adverse impacts are from displacement of wildlife during hunting activities. Most recreation in the action area will occur on public land subject to past or future Federal actions (Federal lands and DNR lands), however, since Federal agencies do not have control over hunting activities on Federal lands, the effects of hunting are cumulative to the action proposed herein.

CONCLUSION

After reviewing the current status of the 46 subject species discussed herein, the environmental baseline or the action area, the effects of the proposed action, and the cumulative effects on these species, it is our Biological/Conference Opinion that the action, as proposed, is not likely to jeopardize the continued existence of any of the following 46 species:

Cutthroat trout
Shorthead sculpin
Riffle sculpin
Coast Range sculpin
Reticulate sculpin
Speckeled dace
Brook lamprey
Bull trout
Dolly varden
Torrent sculpin
Longnose dace
Pacific lamprey

River lamprey
Prickly sculpin
Olympic mudminnow
Threespine stickleback

Roosevelt elk
Marbled murrelet
Bald eagle
Harlequin duck
Band-tailed pigeon
Pileated woodpecker
Wood duck
Western bluebird
Purple martin
Common merganser
Downy woodpecker
Black-capped chickadee

Chestnut-back chickadee	Western screech owl
Red-breasted sapsucker	Northern pigmy owl
Tree swallow	Northern saw-whet owl
Violet-green swallow	Northern flicker
Hairy woodpecker	Olympic torrent salamander
	Tailed frog
	Van Dyke's salamander
	Cope's giant salamander
	Western red-backed salamander
	Western toad
	Northwestern salamander
	Long-toed salamander
	Red-legged frog

We base this conclusion on the following reasons and considerations: the proposed conservation and management measures would minimize and offset a substantial portion of the direct, indirect and cumulative effects of the proposed action. Additionally, significant conservation for many of these subject species is afforded by previous HCPs in the action area (and rangewide), particularly the HCP for Washington State Department of Natural Resources. Most importantly, the conservation of Federal lands, predominantly afforded by the continued implementation of the Northwest Forest Plan, provides a majority portion of the balance of the conservation essential for the subject species' long-term survival within the action area and/or rangewide. Thus, with the assured conservation of these public and private lands by previous actions, in combination with the conservation proposed herein, we conclude that the proposed action is not likely to threaten the continued existence of the species noted above.

Critical habitat has been designated for the marbled murrelet within the action area. No critical habitat for marbled murrelets exists within the proposed project footprint (Plan Area or potentially added lands of the Assessment Area), thus no critical habitat would be directly affected. The critical habitat for the marbled murrelet in the balance of the action area is not likely to be adversely affected (due to indirect effects) as a result of the proposed action, thus the proposed action is not likely to result in the destruction or adverse modification of designated critical habitat for the marbled murrelet.

Because critical habitat has not been proposed or designated for the remaining 45 subject species, no critical habitat for these species would be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act, and Federal regulations issued pursuant to section 4(d) of the Act, prohibit take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. 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 a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Note that 42 of the 46 species addressed in this Biological and Conference Opinion are not currently listed or proposed (three are listed species, one is proposed). Therefore, no take prohibition is in place for these 42 species at the time of this writing. The incidental take statements below, (and the section 10(a)(1)(B) permit as it pertains to these species), do not become effective until (if and when) the currently unlisted species are listed under the Act. To the extent these incidental take statements conclude that take of any migratory bird species listed as threatened or endangered under the Act will result from the Service's issuance of the Incidental Take Permit, the Service will not refer the incidental take of such migratory bird or eagle for prosecution under Migratory Bird Treaty Act of 1918, as amended (16 USC sections 703-712) or the Bald and Golden Eagle protection Act of 1940, as amended (16 USC sections 668-668-d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

The Service anticipates that the proposed action has the potential to result in the incidental take of proposed Permit Species, as detailed below. We anticipate incidental take of individuals of the proposed Permit Species would be typically difficult to detect for the following reasons: 1) low likelihood of finding an individual injury or death (and relating it to the action), given the relatively low density, secretive nature/concealing habitat (such as fossorial or log dwelling species), small size, and/or sporadic distribution of most proposed Permit Species; 2) the large area involved in the proposed activities; 3) the delayed effects of many of the activities that could take proposed Permit Species; 4) the rapid rate of decomposition of some of the proposed Permit Species (particularly fish) after death; 5) the high probability of scavenging of dead individuals by predators. In the Incidental Take Statement below, we have used anticipated pre- and post-project activity habitat conditions as a functional surrogate indicator of take.

Amount or Extent of Take

Listed Species

Marbled Murrelet

The Service anticipates that an undetermined number of marbled murrelets would be taken over a 50-

year period as a result of this proposed action. The number of marbled murrelets taken is \limited to those that might occur within or immediately adjacent (within one mile) to the 261,575-acre Plan Area, and those potentially covered lands allowed to be added for coverage per Provision 10 of the IA. The number of marbled murrelets anticipated to be taken is small, because of the low number of marbled murrelets thought to occur within the project footprint at this time (due to limited habitat extant on-site), as well as the very low number of murrelets expected to become established in currently unoccupied areas of the Plan Area during the proposed ITP term (due to limited habitat expected to successionally develop during the proposed ITP term), and due to the level of protection provided by the proposed HCP. Significant avoidance and minimization measures are part of the prescriptions of the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - The Service is authorizing incidental take of marbled murrelets in the form of harm, within the Plan Area as a result of harvest of up to a total of 315 acres of suitable murrelet (but currently unoccupied) habitat outside of Riparian Conservation Reserves. Since the timing of harvest of the currently unoccupied 315 acres of suitable murrelet habitat is unknown, take in the form of harm could occur if the habitat becomes occupied some time subsequent to completion of the protocol surveys, and the habitat is harvested during the nesting season. Murrelet habitat that is currently occupied (as determined by 1998-2000 protocol surveys, and any other surveys subsequently performed) would be protected from direct harm.

The Service anticipates harm to murrelets in occupied habitat as a result of the proposed action: harm in the form of habitat degradation (for example, increased wind exposure of nests from partial harvest of buffers) associated with some limited buffer intrusion proposed (see Section 7.2.2.1 of the HCP).

Simpson has proposed retention of at least 823 acres of old-growth and late successional forest within the Plan Area; the Service does not anticipate proposed Covered Activities to occur within this 823 acres, which would limit the amount of harm. The Service anticipate that all murrelets in currently occupied habitat (as determined by surveys) outside of Riparian Conservation Reserves (RCRs) would be protected from harm, as well as murrelets within RCRs. On potentially covered lands allowed to be added to the Plan Area for coverage per Provision 10 of the IA, the Service anticipates that protocol surveys would be performed and all habitat determined to be occupied to be avoided as above.

Harassment - Take, in the form of harassment, due to disturbance of undiscovered nesting murrelets, is anticipated to occur. The extent of harassment is anticipated to be somewhat minimal considering the status of the species. Specifically, the Service is authorizing take of murrelets due to disturbance within the Plan Area, and those on potentially covered lands allowed to be added for coverage per Provision 10 of the IA, and those immediately adjacent (within one mile) of the Plan Area, associated with timber harvest activities, if and when these activities are conducted near marbled murrelets. The Service is authorizing take of murrelets, due to harassment, as a result of activities near suitable habitat within the RCRs that is currently occupied, or which could become occupied over the proposed ITP term (162 acres expected to develop within the RCR by year 25, and 1231 acres

expected to develop within the RCR by year 50 of the proposed ITP term). Murrelets could be taken due to harassment as a result of harvest of trees outside of, but adjacent to RCRs. The Service is authorizing take for murrelets associated with habitat outside of RCRs that becomes occupied prior to being harvested, and for murrelets associated with occupied habitat outside of the RCRs as a result of harvest of trees within 300 feet of such habitat. The Service is authorizing take, due to harassment, of murrelets associated with habitat that is within 0.25 mile of up to 250 miles of new road construction over the term of the HCP, a small portion of which may be as close as 300 feet to occupied murrelet habitat, and for activities associated with potential remediation of a maximum of 2,001 miles of system roads (during the first 15 years of the proposed permit term,100 percent of all roads needing remediation would have such work completed; thus all potential take associated with road remediation would occur within the first 15 years of the permit term). The Service is authorizing take due to harassment of all murrelets associated with activities in habitat adjacent to a maximum of 6,160 acres of experimental thinning sites over the proposed ITP term, where timber harvest may occur. A small portion of the 6,160 acres could be adjacent to occupied marbled murrelet habitat (but would not occur within suitable or occupied habitat). The Service anticipates take due to harassment for all murrelets within one mile of any blasting activities occurring between September 1 and September 15 of any given year. Take due to harassment of murrelets is not authorized during the time period April 1 through August 30 for blasting, as Simpson has stated that they would not blast during this time period near murrelets. Take may occur on an unknown number of acres due to blasting in an unknown number of sites and locations over the life of the HCP, potentially causing nesting upset, loss of eggs, or nest abandonment if this blasting occurs proximal to nests. The Service anticipates take in the form of harassment in limited areas of the Plan Area involved in proposed Covered Activities that were subject to protocol surveys and determined to be unoccupied, but become occupied during the ITP term.

Direct Injury or Death - Same as for Harm.

Bald Eagle

The Service anticipates that an undetermined number of bald eagles would be taken over a 50-year period as a result of this proposed action. Only winter roosting and migrants are currently known from the Plan Area; no known nesting activity is currently known. A small amount of nesting is likely to occur during the proposed ITP term within the Plan Area. Nesting during the proposed permit term is more likely within lands allowed to be added for coverage per Provision 10 of the IA, particularly near Puget Sound (nesting activity in this area is currently undetermined). The number of bald eagles anticipated to be taken is small, but the potential for take to occur is moderate. A small number of bald eagles are expected to occur within the Plan Area and environs during the proposed permit term as most of the potential habitat is in a relatively young successional stage, and a relatively small amount of high function perching and nesting habitat is expected to develop during the proposed ITP term. The level of protection provided by the proposed action is moderate. The proposed action includes development and implementation of bald eagle management plans that would ostensibly conserve the known eagle roost site and staging areas within the North Fork Skokomish River valley.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of bald eagles, particularly existing roosting habitat. No nesting is known to occur within the Plan Area. One communal roost site has been verified to exist in the Plan Area. Most mature riparian forest, where roosting and perching generally would be expected to occur, is currently limited to (and would continue to be limited to) the RCR conservation areas, and would largely remain unaltered as a result of the proposed action. Nesting, if it occurs within the Plan Area during the term of the HCP is likely to be in mature forest or along major rivers and streams, and most of this habitat is contained within the RCR conservation areas. All potential successional development of bald eagle nesting or roosting habitat in the Plan Area would likely be precluded by logging associated activities (through removal of potential mature trees and snags) outside of conservation areas. All actual nest sites within the Plan Area, or within lands allowed to be added for coverage per IA, would be conserved, thus no eagles associated with nest habitat are anticipated to be harmed. Despite the proposed development and implementation of a bald eagle management plan for the communal roost site in the North Fork Skokomish River valley, the applicant has indicated the potential for loss of trees or stands of trees used for bald eagle staging or roosting at this site through removal for timber harvest or road building; this communal roost site supports approximately 30 bald eagles. The Service is authorizing incidental take of bald eagles due to harm associated with the communal roost site, as a result of loss of habitat.

Harassment - Harassment, in the form of disturbance of an undetermined number of roosting bald eagles, is anticipated to occur. One communal roost site found in the Plan Area currently contains 30 bald eagles. No harassment of nesting bald eagles is anticipated over the term of the proposed permit. Potential harassment at the largest roost site in the Plan Area is expected to be limited by development of a bald eagle management plan to be approved by the State; no specific substantial protections are otherwise proposed herein. Specifically, we anticipate disturbance of bald eagles associated with the communal roost site within the Plan Area, and/or on lands allowed to be added for coverage per the IA, mainly as a result of harvest/thinning of timber, road building, or road remediation adjacent to occupied bald eagle roosting or staging habitat. Thus the Service is authorizing take due to disturbance of all bald eagles associated with of timber harvest adjacent to bald eagle roosting habitat, a maximum of 250 miles of new road construction, a maximum of 2,001 miles of system road remediation within the first fifteen years of the proposed ITP term, and a maximum of 6,160 acres of experimental thinning. This take would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas, known bald eagle nest sites and bald eagle roost sites.

Bull Trout

The Service anticipates that an undetermined number of bull trout associated with 354 miles of bull trout streams may be taken over the 50-year proposed ITP term as a result of the proposed action. Bull trout are known to utilize the action area and are likely to be found in the Plan Area during the proposed ITP term, particularly in the South Fork Skokomish River watershed, and possibly the Wynoochee and Satsop River watersheds. For this analysis, all areas in the Plan Area except the Shelton area, are assumed to contain bull trout. Minimal survey data is available for the Plan Area. Occupation of the Plan Area is likely to be somewhat limited due to natural conditions as well as past

historical anthropogenic influences. Because of the inherent biological characteristics of bull trout, the likelihood of discovering an individual death or injury attributable to proposed Plan is very small.

The Service anticipates that impacts to bull trout would be difficult to detect at the individual organism level for the following reason(s): (1) bull trout are wide-ranging and are affected by factors beyond the control of Simpson; (2) juveniles, fry, and eggs have small body size and are, therefore, difficult to detect when alive; (3) finding dead or impaired specimens is unlikely, especially considering the often small body size of eggs and fry, denseness of vegetation/ substrate, and remoteness of the area; (4) losses may be masked by seasonal fluctuations in numbers or other causes; (5) dead or impaired specimens may be washed downstream of the site where the impact occurred; and (6) dead or impaired specimens may be consumed by other fish and wildlife species. Therefore, even though the Service expects incidental take to occur from the effects of the proposed action, the best scientific and commercial data available are not sufficient to enable the Service to estimate a specific number of individuals incidentally taken based on loss or injury of individuals of the species. For instance, if the estimated bull trout population were to increase during the proposed ITP term, a larger number of individuals may become subject to some level of take. Conversely, if bull trout were to decrease, less take might occur. Consequently, take is estimated based on conditions likely to result in take during the 50-year HCP period.

The incidental take over 50 years is anticipated to be in the following forms:

Harm and/or Harassment - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of bull trout. Take of bull trout is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, or 42,574 acres out of 261,575 acres (see Table 7 of the HCP); most suitable bull trout habitat is within RCR conservation areas, substantially limiting take due to harm and/or harassment. The remaining 219,000 acres of the Plan Area would be subject to project impacts as proposed and described in the HCP. Degradation of habitat could occur indirectly through sedimentation and turbidity effects downstream of these lands (or downstream of lands allowed to be added for coverage), and through blockage/degradation of passage of any fish to habitat upstream (and subsequent ecological effects, such as reduced nutrient inputs to the system from salmon mortality). The proposed Covered Activities are expected to mainly affect bull trout habitat through timber harvest activities in the form of experimental thinning and road building/maintenance/remediation. It is undetermined how many miles of suitable bull trout stream habitat would be indirectly affected.

The Service anticipates harm and/or harassment to bull trout currently occupying 354 miles of bull trout stream habitat as a result of the proposed action, as limited by proposed restrictions within RCR conservation areas; this take would mainly occur from forest thinning and road crossing maintenance. It is not possible to predict how each stream would be affected at this point in time, so the Service has relied on an assessment of a worst-case scenario. The Service anticipates take due to harm and/or harassment as a result of timber harvest (experimental thinning) of bull trout associated with stream habitats on a maximum of 6,160 acres (187 acres in the first 10 years of the permit term, and up to 5,973 acres (total of 6,160 acres minus 187 acres) for the remaining 40 years of the permit term. In addition, the Service anticipates take for bull trout associated with habitat adjacent to up to

250 acres of new road construction, and for bull trout associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to bull trout habitat resulting from road remediation should be eliminated. On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some bull trout habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that bull trout occur throughout potential bull trout habitat managed by Simpson. Because bull trout distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact bull trout. Take is generally expected to be low; only a minimal number of individuals would likely be affected and impacts should be rare and localized. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is low, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of bull trout as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to bull trout. The level of take due to instream activities , which could result in trampling of eggs or alevins, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Proposed Species

Coastal Cutthroat Trout

The Service anticipates that an undetermined number of coastal cutthroat trout may be taken over the 50-year proposed ITP term as a result of the proposed action. Coastal cutthroat trout are known to utilize the action area and Plan Area; particularly the Stillwater River and tributaries of the East Fork Satsop River within the Plan Area and environs. Minimal survey data is available for the Plan Area. Occupation of the Plan Area is likely to be moderate over the proposed ITP term. The number of coastal cutthroat trout anticipated to be taken is small when compared to the taxon's status. The level of protection provided by the proposed HCP is moderate.

The incidental take over 50 years is anticipated to be in the following forms:

Harm and/or Harassment - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of cutthroat trout. Take of cutthroat trout is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, or 42,574 acres out of 261,575

(see Table 7 of the HCP); most suitable cutthroat trout habitat is within RCR conservation areas, substantially limiting take due to harm and/or harassment. The remaining 219,001 acres of the Plan Area would be subject to project impacts as proposed and described in the HCP. Degradation of habitat could occur indirectly through sedimentation and turbidity effects downstream of these lands (downstream of lands allowed to be added for coverage), and through blockage/degradation of passage of any fish to habitat upstream (and subsequent ecological effects, such as reduced nutrient inputs to the system from salmon mortality).

The proposed Covered Activities are expected to mainly affect cutthroat trout habitat through timber harvest activities in the form of experimental thinning and road building/maintenance/remediation. It is undetermined how many miles of suitable cutthroat trout stream habitat would be indirectly affected. The Service anticipates harm and/or harassment to cutthroat trout currently occupying stream habitats as a result of the proposed action, as limited by proposed restrictions within RCR conservation areas; this take would mainly occur from forest thinning and road crossing maintenance. It is not possible to predict how each stream would be affected at this point in time, so the Service has relied on an assessment of a worst-case scenario. Cutthroat trout that are utilizing mainstem and flat tributary stream habitat could be taken due to harm/harassment as a result of sediment impacts resulting from experimental thinning within RCRs.

The Service anticipates take for cutthroat trout associated with stream habitats on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take for cutthroat trout associated with habitat adjacent to up to 250 acres of new road construction, and for cutthroat trout associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to cutthroat trout habitat resulting from road remediation should be eliminated.

On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some cutthroat trout habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that cutthroat trout occur throughout potential cutthroat trout habitat managed by Simpson. Because cutthroat trout distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact cutthroat trout. Take is generally expected to be low; only a minimal number of individuals would likely be affected and impacts should be rare and localized. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is low, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of cutthroat trout as a result of implementing the proposed action. Direct injury or death could occur due to

instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to cutthroat trout. The level of take due to instream activities , which could result in trampling of eggs or alevins, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Other Proposed Permit Species - Species Not Listed as Threatened or Endangered

Please note, that of the remaining proposed Permit Species detailed below, none are currently listed, therefore, no take prohibitions exist for these species. Therefore, development of incidental take statements for these species is not imminently needed at this time. The following incidental take statements would become effective if and when these species are listed, and the Service determines that continued implementation of the proposed HCP and proposed incidental take permit will not jeopardize the continued existence of any of these species.

Harlequin Duck

The Service anticipates that an undetermined number of harlequin ducks would be taken over a 50-year period as a result of the proposed action. Harlequin ducks are known from the action area. Harlequin ducks were known from the Plan Area in the 1960's, and were observed on the Satsop and Skokomish Rivers by WDFW in recent years. The number of harlequin ducks anticipated to be taken is small, mainly because of the low number of harlequin ducks expected to occur within the Plan Area (or on lands allowed to be added for coverage) during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of harlequin ducks. Take due to harm of harlequin ducks is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, or 42,574 acres out of 261,575 acres, particularly partial protection of riparian zones in RCRs near fast moving streams within the Plan Area, and within lands allowed to be added for coverage. Take due to harm of harlequin ducks would also be limited by the HCP provision restricting on timber harvesting, road construction and blasting within 0.25 miles of known nesting harlequin ducks. Take in the form of harm would mainly occur during harvest/thinning and road building/maintenance activities that occur in mature or old-growth forests, particularly those activities that cause elimination of dense vegetation, piles of woody debris, or hollow trees/snags near clear rocky streams. The Service anticipates take in the form of harm of harlequin duck associated with stream habitats on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take in the form of harm of harlequin duck associated with habitat adjacent to up to 250 acres of new road construction.

Harassment - Take in the form of harassment due to disturbance of an undetermined number of harlequin ducks, is anticipated to occur. The Service anticipates disturbance of harlequin ducks within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of

harvest/thinning of timber and road building/maintenance adjacent to or within riparian zones occupied by harlequin ducks. Take due to harassment would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas. Since there would be no surveys for harlequin duck in the Plan Area, and, it is not possible to predict how each stream having potential harlequin duck habitat would be affected at this point in time by the harvest or thinning of timber, the Service has relied on an assessment of a worst-case scenario to assess the level of take due to harassment of harlequin ducks in the Plan Area.

Harlequin duck that are utilizing mainstem and flat tributary stream habitat could be taken due to harm/harassment as a result of sediment impacts from experimental thinning within RCRs. The Service anticipates take for harlequin duck associated with stream habitats on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take for harlequin duck associated with habitat adjacent to up to 250 acres of new road construction, and for harlequin duck associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to harlequin duck habitat resulting from road remediation should be eliminated.

Direct Injury or Death - Most suitable harlequin duck nesting habitat is contained within the conservation areas; we anticipate a low amount of direct injury or death of harlequin ducks to occur from implementing any proposed Covered Activities, as most adults would avoid areas occupied by human activity.

Band-tailed Pigeon

The Service anticipates that an undetermined number of band-tailed pigeons would be taken over a 50-year period as a result of the proposed action. Band-tailed pigeons are known from the action area and Plan Area. The number of band-tailed pigeons anticipated to be taken is low-moderate; mainly because of the moderate number of band-tailed pigeons expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP. No take is anticipated as a result of pesticide or herbicide use in the Plan Area as a result of the proposed action, as pesticide or herbicide use is not a proposed covered activity; thus no take is authorized for pesticide or herbicide use under the proposed ITP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of band-tailed pigeons. Take due to harm of band-tailed pigeons is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, particularly partial or full protection of mature and old-growth forest. In addition, take due to harm of band-tailed pigeons is limited by protection of all mineral springs in the Plan area. Take due to harm of band-tailed pigeons in the form of harm would mainly occur during harvest/thinning of mature and old-growth forests, road building activities, and forest stand enhancement activities that degrade band-tailed pigeon habitat. The Service anticipates take due to harm of band-tailed pigeons associated with habitat degradation from maximum of 6,160 acres of experimental thinning over the life of the HCP.

In addition, the Service anticipates take due to harm of band-tailed pigeons associated with habitat adjacent to up to 250 acres of new road construction. The Service anticipates take due to harm to band-tailed pigeons as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment - Take due to harassment, in the form of disturbance of an undetermined number of band-tailed pigeons, is anticipated to occur. We anticipate disturbance of band-tailed pigeons within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber, forest stand enhancement activities, and road building/maintenance adjacent to, or within, habitat occupied by band-tailed pigeon; this take would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas, limits on experimental ecological thinning over the term of the HCP, and limits on new road construction over the term of the HCP.

The Service anticipates take due to harassment for band-tailed pigeons associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for band-tailed pigeons associated with habitat adjacent to up to 250 acres of new road construction, and for band-tailed pigeons associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to band-tailed pigeons habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to band-tailed pigeons as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - The Service anticipates a small amount of direct injury or death of band-tailed pigeons to occur from implementing Covered Activities, particularly nestlings and fledglings; most adults would avoid areas occupied by human activity.

Roosevelt Elk

The Service anticipates that an undetermined number of Roosevelt elk would be taken over a 50-year period as a result of the proposed action. Roosevelt elk are known from the action area and Plan Area. The number of Roosevelt elk anticipated to be taken is low, mainly because of the moderate number of Roosevelt elk expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - The proposed Covered Activities would substantially affect habitat suitability of Roosevelt elk. Take due to harm of Roosevelt elk is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area (see Table 7 of the HCP), and road closures and log truck traffic limitations adjacent to the Wynoochee elk pastures. Take of Roosevelt elk in the form of harm would mainly occur during harvest/thinning of mature and old-growth forests, forest stand enhancement activities, and road building activities, that degrade Roosevelt elk forage and/or cover habitat.

Harassment - Take in the form of harassment, due to of disturbance of an undetermined number of

Roosevelt elk, is anticipated to occur. The Service anticipates disturbance of Roosevelt elk within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of human presence and noise during harvest of timber, forest stand enhancement activities, and road building/maintenance adjacent to or within habitat occupied by Roosevelt elk; this take would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas, limits on experimental ecological thinning over the term of the HCP, road closures, and limits on new road construction over the term of the HCP. The Service anticipates take in the form of harm of Roosevelt elk associated with of 219,000 acres of timber which would be harvested outside of conservation areas over the proposed ITP term. Take associated with the 219,000 acres would occur only for those acres harvested that are in mature or old-growth age classes which provide cover habitat for Roosevelt elk.

The Service anticipates take in the form of harassment due to disturbance for Roosevelt elk associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take in the form of harassment for Roosevelt elk associated with habitat adjacent to up to 250 acres of new road construction, and for Roosevelt elk associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to Roosevelt elk habitat resulting from road remediation should be eliminated. The Service anticipates take in the form of harassment due to disturbance to Roosevelt elk as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a low amount of direct injury or death of Roosevelt elk to occur from implementing proposed Covered Activities, in particular from vehicle strikes.

Downy Woodpecker

The Service anticipates that an undetermined number of downy woodpeckers would be taken over a 50-year period as a result of the proposed action. Downy woodpeckers are known from the action area and Plan Area. The number of downy woodpeckers anticipated to be taken is moderate, mainly because of the moderate number of downy woodpeckers expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of downy woodpeckers. Take due to harm of downy woodpeckers is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, and proposed programs that retain some larger trees (RCR program, wetland conservation program, wildlife tree conservation program, see Section 5.2 of the HCP). Take in the form of harm would mainly occur during harvest/thinning of mature and old-growth forests and road building activities, particularly those activities that cause removal of snags. The Service anticipates take in the form of harm of downy woodpeckers associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of downy woodpeckers

associated with habitat adjacent to up to 250 acres of new road construction. The Service anticipates take due to harm to downy woodpeckers as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment - Take due to harassment, in the form of disturbance of an undetermined number of downy woodpeckers, is anticipated to occur. We anticipate disturbance of downy woodpeckers within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber, forest stand enhancement activities, and road building/maintenance adjacent to, or within, habitat occupied by downy woodpeckers; this take would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas, limits on experimental ecological thinning over the term of the HCP, and limits on new road construction over the term of the HCP.

The Service anticipates take in the form of harassment for downy woodpeckers associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take for downy woodpeckers associated with habitat adjacent to up to 250 acres of new road construction, and take due to harassment of downy woodpeckers associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to downy woodpecker habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to downy woodpeckers as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term. The Service anticipates take due to harm to downy woodpeckers as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - The Service anticipates a small amount of direct injury or death of downy woodpeckers to occur from implementing Covered Activities, particularly nestlings and fledglings; most adults would avoid areas occupied by human activity.

Black-capped Chickadee

The Service anticipates that an undetermined number of black-capped chickadees would be taken over a 50-year period as a result of the proposed action. Black-capped chickadees are known from the action area and Plan Area. The number of black-capped chickadees anticipated to be taken is moderate, mainly because of the high number of black-capped chickadees expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of black-capped chickadee. Take due to harm of black-capped chickadee is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, and proposed programs that retain some larger trees (RCR program, wetland conservation program, wildlife tree conservation program, see Section 5.2 of the HCP). Take in the form of harm would mainly occur

during harvest/thinning of mature and old-growth forests and road building activities, particularly those activities that cause removal of snags. The Service anticipates take in the form of harm of black-capped chickadee associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take in the form of harm of black-capped chickadee associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to black-capped chickadee as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment - Take due to harassment, in the form of disturbance of an undetermined number of black-capped chickadee, is anticipated to occur. We anticipate disturbance of black-capped chickadee within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber, forest stand enhancement activities, and road building/maintenance adjacent to, or within, habitat occupied by black-capped chickadee; this take would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas, limits on experimental ecological thinning over the term of the HCP, and limits on new road construction over the term of the HCP.

The Service anticipates take in the form of harassment for black-capped chickadee associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take for black-capped chickadee associated with habitat adjacent to up to 250 acres of new road construction, and for black-capped chickadee associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to downy woodpecker habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to black-capped chickadee as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - The Service anticipates a small amount of direct injury or death of black-capped chickadee to occur from implementing Covered Activities, particularly nestlings and fledglings; most adults would avoid areas occupied by human activity.

Western Bluebird

The Service anticipates that an undetermined number of western bluebirds would be taken over a 50-year period as a result of the proposed action. Western bluebirds are known from the action area and Plan Area. The number of western bluebirds anticipated to be taken is limited, mainly because of the low number of western bluebirds expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of western bluebird. Take of western bluebirds due to harm is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, and proposed programs that retain some larger trees (RCR program, wetland conservation program, wildlife tree conservation

program, see Section 5.2 of the HCP). Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harassment for western bluebird associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for western bluebird associated with habitat adjacent to up to 250 acres of new road construction. The Service anticipates take due to harm to western bluebird as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment - Take due to harassment, in the form of disturbance of an undetermined number of western bluebird, is anticipated to occur. The Service anticipates disturbance of western bluebird within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber, forest stand enhancement activities, and road building/maintenance adjacent to, or within, habitat occupied by western bluebird. Take due to harassment of western bluebird would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas, limits on experimental ecological thinning over the term of the HCP, and limits on new road construction over the term of the HCP.

The Service anticipates take due to harassment for western bluebird associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for western bluebird associated with habitat adjacent to up to 250 acres of new road construction, and for western bluebird associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to western bluebird habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to western bluebird as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a moderate amount of direct injury or death of western bluebird to occur from implementing Covered Activities, particularly to nestlings and fledglings.

Purple Martin

The Service anticipates that an undetermined number of purple martin would be taken over a 50-year period as a result of the proposed action. Purple martins are known from the action area and Plan Area. The number of purple martins anticipated to be taken is small, mainly because of the low number of purple martins expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of purple martin. Take of purple martins due to harm is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, and proposed programs that retain some larger trees (RCR program, wetland conservation program, wildlife tree conservation program,

see Section 5.2 of the HCP). Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harm of purple martin associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of purple martin associated with habitat adjacent to up to 250 acres of new road construction. The Service anticipates take due to harm to purple martin as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment - Take due to harassment, in the form of disturbance of an undetermined number of purple martin, is anticipated to occur. The Service anticipates disturbance of purple martin within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber, forest stand enhancement activities, and road building/maintenance adjacent to, or within, habitat occupied by purple martin. Take due to harassment of purple martin would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas, limits on experimental ecological thinning over the term of the HCP, and limits on new road construction over the term of the HCP.

The Service anticipates take due to harassment for purple martin associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for purple martin associated with habitat adjacent to up to 250 acres of new road construction, and for purple martin associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to purple martin habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to purple martin as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a small amount of direct injury or death of purple martins to occur from implementing Covered Activities, particularly to nestlings and fledglings.

Chestnut-backed Chickadee

The Service anticipates that an undetermined number of chestnut-backed chickadees would be taken over a 50-year period as a result of the proposed action. Occupation of the Plan Area by chestnut-backed chickadees is undetermined. Chestnut backed-chickadees are known from the action area. The number of chestnut-backed chickadees anticipated to be taken is small, mainly because of the low number of chestnut-backed chickadees expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of chestnut-backed chickadees. Take of chestnut-backed chickadees is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, and proposed programs that retain some larger trees (RCR program, wetland conservation program, wildlife tree conservation program, see Section 5.2 of the HCP). Take in the form of harm would mainly occur during harvest/thinning of older forests and road building activities, particularly those activities that cause removal of larger snags and stumps.

Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harm of chestnut-backed chickadee associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of chestnut-backed chickadee associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to chestnut-backed chickadee as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment – Take in the form of harassment in the form of disturbance of an undetermined number of chestnut-backed chickadees, is anticipated to occur. The Service anticipates disturbance of chestnut-backed chickadees within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber and road building/maintenance adjacent to or within habitat occupied by chestnut-backed chickadees; this take would be limited by the restrictions proposed within the HCP, including protection of conservation areas, limits on experimental ecological thinning, and limits on new road construction.

The Service anticipates take due to harassment for chestnut-backed chickadee associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for chestnut-backed chickadee associated with habitat adjacent to up to 250 acres of new road construction, and for chestnut-backed chickadee associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to chestnut-backed chickadee habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to chestnut-backed chickadee as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a small amount of direct injury or death of chestnut-backed chickadees to occur from implementing Covered Activities, particularly to nestlings and fledglings.

Red-breasted Sapsucker

The Service anticipates that an undetermined number of red-breasted sapsuckers would be taken over a 50-year period as a result of the proposed action. Red-breasted sapsuckers are known from the action area and are likely to occur in the Plan Area. The number of red-breasted sapsuckers anticipated to be taken is small, mainly because of the low number of red-breasted sapsuckers expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of red-breasted sapsuckers. Take of red-breasted sapsuckers is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, and proposed programs that retain some larger trees and partially protect riparian areas and wetlands (RCR program, wetland conservation program, wildlife tree conservation program, see Section 5.2 of the HCP). Take in the form of harm would mainly occur during harvest/thinning of forests and road building activities, particularly those activities that cause removal of larger snags.

The Service anticipates take due to harm of red-breasted sapsucker associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of red-breasted sapsucker associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to red-breasted sapsucker as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment – Take in the form of harassment in the form of disturbance of an undetermined number of red-breasted sapsuckers, is anticipated to occur. The Service anticipates disturbance of red-breasted sapsuckers within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber and road building/maintenance adjacent to or within habitat occupied by red-breasted sapsuckers; this take would be limited by the restrictions proposed within the HCP, including protection of conservation areas, limits on experimental ecological thinning, and limits on new road construction.

The Service anticipates take due to harassment for red-breasted sapsucker associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for red-breasted sapsucker associated with habitat adjacent to up to 250 acres of new road construction, and for red-breasted sapsucker associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to red-breasted sapsucker habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to red-breasted sapsucker as a

result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a small amount of direct injury or death of red-breasted sapsuckers to occur from implementing Covered Activities, particularly to nestlings and fledglings.

Tree Swallow

The Service anticipates that an undetermined number of tree swallows would be taken over a 50-year period as a result of the proposed action. Tree swallows are known from the action area and Plan Area. The number of tree swallows anticipated to be taken is moderate, mainly because of the moderate number of tree swallows expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of tree swallows. Take of tree swallows is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, and proposed programs that retain some larger trees and partially protect wetlands. Take in the form of harm would mainly occur during harvest/thinning of forests and road building activities, particularly those activities that cause removal of larger snags.

Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harm of tree swallow associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of tree swallow associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to tree swallow as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment – Take in the form of harassment, due to disturbance of an undetermined number of tree swallows, is anticipated to occur. We anticipate disturbance of tree swallows within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber and road building/maintenance adjacent to or within habitat occupied by tree swallows; this take would be limited by the restrictions proposed within the HCP, including protection of conservation areas, limits on experimental ecological thinning, and limits on new road construction.

The Service anticipates take due to harassment for tree swallow associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for tree swallow associated with habitat adjacent to up to 250 acres

of new road construction, and for tree swallow associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to tree swallow habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to tree swallow as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a small amount of direct injury or death of tree swallows to occur from implementing Covered Activities, particularly to nestlings and fledglings.

Violet-green Swallow

The Service anticipates that an undetermined number of violet-green swallows would be taken over a 50-year period as a result of the proposed action. Violet-green swallows are known from the action area and Plan Area. The number of violet-green swallows anticipated to be taken is moderate, mainly because of the moderate number of violet-green swallows expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of violet-green swallows. Take of violet-green swallows is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, and proposed programs that retain some larger trees and partially protect riparian areas wetlands. Take in the form of harm would mainly occur during harvest/thinning of forests and road building activities, particularly those activities that cause removal of larger snags.

Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harm of violet-green swallow associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of violet-green swallow associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to violet-green swallow as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment –Take in the form of harassment, due to disturbance of an undetermined number of violet-green swallows, is anticipated to occur. We anticipate disturbance of violet-green swallows within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber and road building/maintenance adjacent to or within habitat occupied by violet-green swallows; this take would be limited by the restrictions proposed within the HCP, including

protection of conservation areas, limits on experimental ecological thinning, and limits on new road construction.

The Service anticipates take due to harassment for violet-green swallow associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for violet-green swallow associated with habitat adjacent to up to 250 acres of new road construction, and for violet-green swallow associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to violet-green swallow habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to violet-green swallow as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a small amount of direct injury or death of violet-green swallows to occur from implementing Covered Activities, particularly to nestlings and fledglings.

Hairy Woodpecker

The Service anticipates that an undetermined number of hairy woodpeckers would be taken over a 50-year period as a result of the proposed action. Hairy woodpeckers are known from the action area and Plan Area. The number of hairy woodpeckers anticipated to be taken is limited, mainly because of the low number of hairy woodpeckers expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of hairy woodpeckers. Take of hairy woodpeckers is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, protection of RCR conservation areas, and proposed programs that retain some larger trees. Take in the form of harm would mainly occur during harvest/thinning of mature and old-growth forests and road building activities, particularly those activities that cause removal of larger snags, as well as stumps and large logs.

Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harm of hairy woodpecker associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of hairy woodpecker associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to hairy woodpecker as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment – Take in the form of harassment, due to disturbance of an undetermined number of hairy woodpeckers, is anticipated to occur. We anticipate disturbance of hairy woodpeckers within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber and road building/maintenance adjacent to or within habitat occupied by hairy woodpeckers; this take would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas, limits on experimental ecological thinning, and limits on new road construction.

The Service anticipates take due to harassment for hairy woodpecker associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for hairy woodpecker associated with habitat adjacent to up to 250 acres of new road construction, and for hairy woodpecker associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to hairy woodpecker habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to hairy woodpecker as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a low amount of direct injury or death of hairy woodpeckers to occur from implementing Covered Activities, particularly nestlings and fledglings.

Western Screech Owl

The Service anticipates that an undetermined number of western screech owls would be taken over a 50-year period as a result of the proposed action. Western screech owls are known from the action area and Plan Area. The number of western screech owls anticipated to be taken is small, mainly because of the low number of western screech owls expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of western screech owls. Take of western screech owls is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, protection of RCR conservation areas, and proposed programs that retain some larger trees and wetland areas.

Take in the form of harm would mainly occur during harvest/thinning of mature and old-growth forests and road building activities, particularly those activities that cause removal of mature and old-growth forests and larger snags.

Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those

that cause elimination of snags. The Service anticipates take due to harm of western screech owl associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of western screech owl associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to western screech owl as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment – Take in the form of harassment, due to disturbance of an undetermined number of western screech owls, is anticipated to occur. We anticipate disturbance of western screech owls within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber and road building/maintenance adjacent to or within habitat occupied by western screech owls; this take would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas, limits on experimental ecological thinning, and limits on new road construction.

The Service anticipates take due to harassment for western screech owl associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for western screech owl associated with habitat adjacent to up to 250 acres of new road construction, and for western screech owl associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to western screech owl habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to western screech owl as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a low amount of direct injury or death of western screech owls to occur from implementing Covered Activities.

Northern Pygmy Owl

The Service anticipates that an undetermined number of northern pygmy owls would be taken over a 50-year period as a result of the proposed action. Northern pygmy owls are known from the action area and Plan Area. The number of northern pygmy owls anticipated to be taken is small, mainly because of the low number of northern pygmy owls expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of northern pygmy owls. Take of northern pygmy owls is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, protection of RCR conservation areas, and proposed programs that retain some larger trees and snags . Take in the form of harm

would mainly occur during harvest/thinning of mature and old-growth forests and road building activities, particularly those activities that cause removal of mature and old-growth forests, as well as snags and large logs.

Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harm of northern pygmy owl associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of northern pygmy owl associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to northern pygmy owl as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment – Take in the form of harassment, due to disturbance of an undetermined number of northern pygmy owls, is anticipated to occur. We anticipate disturbance of northern pygmy owls within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber and road building/maintenance adjacent to or within habitat occupied by northern pygmy owls; this take would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas, limits on experimental ecological thinning, and limits on new road construction.

The Service anticipates take due to harassment for northern pygmy owl associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for northern pygmy owl associated with habitat adjacent to up to 250 acres of new road construction, and for northern pygmy owl owl associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to northern pygmy owl habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to northern pygmy owl as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a small amount of direct injury or death of northern pygmy owls to occur from implementing Covered Activities.

Northern Saw-whet Owl

The Service anticipates that an undetermined number of northern saw-whet owls would be taken over a 50-year period as a result of the proposed action. Northern saw-whet owls are known from the action area and Plan Area. The number of northern saw-whet owls anticipated to be taken is small, mainly because of the low number of northern saw-whet owls expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of northern saw-whet owls. Take of northern saw-whet owls is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that retain some larger trees, snags, and wetland areas. Take in the form of harm would mainly occur during harvest/thinning of mature and old-growth forests and road building activities, particularly those activities that cause removal of mature and old-growth forests and larger snags.

Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harm of northern saw-whet owl associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of northern saw-whet owl associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to northern saw-whet owl as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment – Take in the form of harassment, due to disturbance of an undetermined number of northern saw-whet owls, is anticipated to occur. We anticipate disturbance of northern saw-whet owls within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber and road building/maintenance adjacent to or within habitat occupied by northern saw-whet owls.

The Service anticipates take due to harassment for northern saw-whet owl associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for northern saw-whet owl associated with habitat adjacent to up to 250 acres of new road construction, and for northern saw-whet owl associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to northern saw-whet owl habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to northern saw-whet owl as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a small amount of direct injury or death of northern saw-whet owls to occur from implementing Covered Activities.

Northern Flicker

The Service anticipates that an undetermined number of northern flickers would be taken over a 50-year period as a result of the proposed action. Northern flickers are common in the action area and Plan Area. The number of northern flickers anticipated to be taken is moderate, mainly because of the high number of northern flickers expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of northern flickers. Take of northern flickers is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that retain some larger trees and snags . Take in the form of harm would mainly occur during forest harvest and road building activities, particularly those activities that cause removal of snags.

Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harm of northern flickers associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of northern flicker associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to northern flicker as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment – Take in the form of harassment, due to disturbance of an undetermined number of northern flickers, is anticipated to occur. We anticipate disturbance of northern flickers within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber and road building/maintenance adjacent to or within habitat occupied by northern flickers.

The Service anticipates take due to harassment for northern flicker associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for northern flicker associated with habitat adjacent to up to 250 acres of new road construction, and for northern flicker associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to northern flicker habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to northern flicker as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a moderate amount of direct injury or death of northern

flickers to occur from implementing Covered Activities.

Pileated Woodpecker

The Service anticipates that an undetermined number of pileated woodpeckers would be taken over a 50-year period as a result of the proposed action. Pileated woodpeckers are known from the action area and Plan Area. The number of pileated woodpeckers anticipated to be taken is limited, mainly because of the limited number of pileated woodpeckers expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of pileated woodpeckers. Take of pileated woodpeckers is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, and proposed programs that retain some larger trees, snags, and older forest seral stages (see Section 5 of the HCP). Take in the form of harm would mainly occur during harvest/thinning of mature and old-growth forests, particularly those activities that cause elimination or damage of large snags, stumps, and logs.

Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harm of pileated woodpeckers associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of northern flicker associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to pileated woodpeckers as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment –Take in the form of harassment, due to disturbance of an undetermined number of pileated woodpeckers, is anticipated to occur. We anticipate disturbance of pileated woodpeckers within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber and road building/maintenance adjacent to or within habitat occupied by pileated woodpeckers; this take would be limited by the restrictions proposed within the HCP, including protection of RCR conservation areas and Late-Seral Forest Reserves, limits on experimental ecological thinning, and limits on new road construction.

Take in the form of harassment would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harm of pileated woodpecker associated with habitat on a maximum of 6,160 acres of experimental thinning

over the life of the HCP. In addition, the Service anticipates take due to harm of pileated woodpecker associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to pileated woodpecker as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Direct Injury or Death - We anticipate a very small amount of direct injury or death of pileated woodpeckers to occur from implementing Covered Activities.

Wood Duck

The Service anticipates that an undetermined number of wood ducks would be taken over a 50-year period as a result of the proposed action. Wood ducks are known from action area and Plan Area. The number of wood ducks anticipated to be taken is small, mainly because of the low number of wood ducks expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of wood ducks. Take of wood ducks is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands and some larger trees and snags . Take in the form of harm would mainly occur during forest harvest and road building and maintenance activities, particularly those activities that cause removal of snags or affect the wetlands surrounding still waters.

Take in the form of harm would mainly occur during harvest of timber in the upland areas outside conservation areas, or experimental thinning of forests and road building activities, particularly those that cause elimination of snags. The Service anticipates take due to harm of wood duck associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of wood ducks associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to wood duck as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment - Harassment, in the form of disturbance of an undetermined number of wood ducks, is anticipated to occur. We anticipate disturbance of wood ducks within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest of timber and road building/maintenance adjacent to or within habitat occupied by wood ducks.

The Service anticipates take due to harassment for wood ducks associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for wood ducks associated with habitat adjacent to up to 250 acres of new road construction, and for wood ducks associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100

percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP, effects to wood duck habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to wood ducks associated with 219,000 acres of timber harvest outside of conservation areas that would be harvested over the proposed ITP term.

Direct Injury or Death - We anticipate a low amount of direct injury or death of wood ducks to occur from implementing Covered Activities.

Common Merganser

The Service anticipates that an undetermined number of common mergansers would be taken over a 50-year period as a result of the proposed action. Common mergansers are known from action area and Plan Area. The number of common mergansers anticipated to be taken is small, mainly because of the low number of common mergansers expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of common mergansers. Take of common mergansers is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands and some larger trees and snags. Take in the form of harm would mainly occur during forest harvest/thinning in the upland areas outside conservation areas, road building and maintenance activities, and experimental thinning; this form of take would largely occur as a result of activities that cause removal of snags near water or affect wetlands surrounding waters.

The Service anticipates take due to harm associated with habitat degradation from a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harm of common mergansers associated with habitat adjacent to up to 250 acres of new road construction, and take due to harm to common merganser as a result of up to 219,000 acres of timber harvest outside of conservation areas over the proposed ITP term.

Harassment - Harassment, in the form of disturbance of an undetermined number of common mergansers, is anticipated to occur. We anticipate disturbance of common mergansers within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building/maintenance adjacent to or within habitat occupied by common mergansers.

The Service anticipates take due to harassment for common mergansers associated with habitat on a maximum of 6,160 acres of experimental thinning over the life of the HCP. In addition, the Service anticipates take due to harassment for common mergansers associated with habitat adjacent to up to 250 acres of new road construction, and for common mergansers associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP

term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to common merganser habitat resulting from road remediation should be eliminated. The Service anticipates take due to harassment to common mergansers associated with 219,000 acres of timber harvest outside of conservation areas that would be harvested over the proposed ITP term.

Direct Injury or Death - We anticipate a small-moderate amount of direct injury or death of common mergansers to occur from implementing Covered Activities.

Olympic Torrent Salamander

The Service anticipates that an undetermined number of Olympic torrent salamanders would be taken over a 50-year period as a result of the proposed action. Olympic torrent salamanders are known from action area and Plan Area. The number Olympic torrent salamanders anticipated to be taken is small, mainly because of the low number of Olympic torrent salamanders expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm/Harassment - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of Olympic torrent salamanders. Take of Olympic torrent salamanders is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, proposed programs that protect wetlands and some larger trees. In addition, Simpson's amphibian research and monitoring programs could reduce the amount of take of Olympic torrent salamanders in the future as information is gained, and adaptive management is applied. Take in the form of harm/harass would mainly occur during forest harvest/thinning and road building and maintenance activities, particularly those activities that cause sedimentation/siltation, increase stream temperatures, disturbance to Olympic torrent salamanders, or reduce riparian canopy cover of seeps, springs, or fast moving streams.

Take in the form of harm/harass would mainly occur during harvest of timber in the upland areas outside conservation areas, and road building activities that may cause increase sediment in Olympic torrent salamander habitat. The Service anticipates take due to harm/harass of Olympic torrent salamanders associated with habitat adjacent to up to 250 acres of new road construction due to timber harvest, and for Olympic torrent salamanders associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to Olympic torrent salamander habitat resulting from road remediation should be eliminated. Since Simpson would be focusing on road remediation within the CUP lithotopographic unit, where headwaters habitat occurs, and would complete remediation in these areas in 6-7 years of ITP initiation, effects due to road remediation on Olympic torrent salamanders would be greatly reduced early in the proposed ITP term.

The Service anticipates take due to harm/harass to Olympic torrent salamanders as a result of harvest of 219,000 acres of timber outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian and unstable slope buffers) adjacent/upslope to headwater stream habitat.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of Olympic torrent salamder as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to Olympic torrent salamander . The level of take due to instream activities , which could result in trampling of adults, juveniles or eggs, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Tailed Frog

The Service anticipates that an undetermined number of tailed frogs would be taken over a 50-year period as a result of the proposed action. Tailed frogs are known from action area and Plan Area. The number tailed frogs anticipated to be taken is moderate, mainly because of the moderate number of tailed frogs expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm/Harassment - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of tailed frogs. Take of tailed frogs in the form of harm/harass is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands. In addition, Simpson's amphibian research and monitoring programs could reduce the amount of take of tailed frogs in the future as information is gained, and adaptive management is applied. Take in the form of harm/harass would mainly occur as a result of forest harvest/thinning and road building/maintenance activities, particularly those activities that remove riparian cover or decrease riparian humidity, cause changes in stream temperature, cause siltation or nutrient effects, disturb tailed frogs, or results in loss of mature/old-growth forest near fast moving perennial streams with dense vegetation.

Take in the form of harm/harass would mainly occur during harvest of timber in the upland areas outside conservation areas, and road building activities that may cause increase sediment in tailed frog habitat. The Service anticipates take due to harm/harass of tailed frogs associated with habitat adjacent to up to 250 acres of new road construction due to timber harvest, and for tailed frogs associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to tailed frog habitat resulting from road remediation should be eliminated. Since Simpson would be focusing on road remdiation within

the CUP lithotopographic unit, where headwaters habitat occurs, and would complete remediation in these areas in 6-7 years of proposed ITP initiation, effects due to road remediation on tailed frogs will be greatly reduced early in the proposed ITP term. The Service anticipates take due to harm/harass to tailed frogs as a result of harvest of 219,000 acres of timber outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian and unstable slope buffers) adjacent/upslope to headwater stream habitat.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of tailed frog as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to tailed frog . The level of take due to instream activities , which could result in trampling of adults, juveniles or eggs, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Cope's Giant Salamander

The Service anticipates that an undetermined number of Cope's giant salamander salamanders would be taken over a 50-year period as a result of the proposed action. Cope's giant salamanders are known from action area and Plan Area. The number Cope's giant salamanders anticipated to be taken is small, mainly because of the low number of Cope's giant salamanders expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm/Harassment - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of Cope's giant salamanders. Take of Cope's giant salamanders is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands, aquatic areas, and downed logs. In addition, Simpson's amphibian research and monitoring programs could reduce the amount of take of Cope's giant salamanders in the future as information is gained, and adaptive management is applied. Take in the form of harm/harass would mainly occur during harvest/thinning, slash abatement, fertilization, and road building and maintenance activities, particularly those activities that reduce shade, increase siltation or sedimentation, cause nutrient effects, disturbance to Cope's giant salamanders, or eliminate large woody debris in low-moderate gradient streams.

Take in the form of harm/harass would mainly occur during harvest of timber in the upland areas outside conservation areas, and road building activities that may cause increase sediment in Cope's giant salamander habitat. The Service anticipates take due to harm/harass of Cope's giant salamanders associated with habitat adjacent to up to 250 acres of new road construction due to

timber harvest, and for Cope's giant salamanders associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to Cope's giant salamander habitat resulting from road remediation should be eliminated. Since Simpson would be focusing on road remdiation within the CUP lithotopographic unit, where headwaters habitat occurs, and would complete remediation in these areas in 6-7 years of proposed ITP initiation, effects due to road remediation on Cope's giant salamanders would be greatly reduced early in the proposed ITP term. The Service anticipates take due to harm/harass to Cope's giant salamanders as a result of harvest of 219,000 acres of timber outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian and unstable slope buffers) adjacent/upslope to headwater stream habitat.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of Cope's giant salamander as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to Cope's giant salamander . The level of take due to instream activities , which could result in trampling of adults, juveniles or eggs, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term

Western Redback Salamander

The Service anticipates that an undetermined number of western redback salamanders would be taken over a 50-year period as a result of the proposed action. Western redback salamanders are known from action area and Plan Area. The number of western redback salamanders anticipated to be taken is high, mainly because of the high number of western redback salamanders expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm/Harassment - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of western redback salamanders. Take in the form of harm/harassment of western redback salamanders is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands and some larger trees and downed wood. In addition, Simpson's amphibian research and monitoring programs could reduce the amount of take of western red-back salamanders in the future as information is gained, and adaptive management is applied. Take in the form of harm/harassment would mainly occur during forest harvest/thinning, slash abatement, and road building/maintenance activities, particularly those activities that disturb moist talus slopes, or cause

elimination of larger downed wood or stumps near seeps or springs, or that disturb western redback salamanders.

Take in the form of harm/harass would mainly occur during harvest of timber in the upland areas outside conservation areas, and road building activities that may cause increase sediment in western red-backed salamander habitat. The Service anticipates take due to harm/harass of western red-backed salamanders associated with habitat adjacent to up to 250 acres of new road construction due to timber harvest, and for western red-backed salamanders associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to western red-backed salamander habitat resulting from road remediation should be eliminated. Since Simpson would be focusing on road remdiation within the CUP lithotopographic unit, where headwaters habitat occurs, and would complete remediation in these areas in 6-7 years of proposed ITP initiation, effects due to road remediation on western red-backed salamanders would be greatly reduced early in the proposed ITP term. The Service anticipates take due to harm/harass to western red-backed salamanders as a result of harvest of 219,000 acres of timber outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian and unstable slope buffers) adjacent/upslope to headwater stream habitat.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of western red-backed salamander as a result of implementing the proposed action.

Van Dyke's Salamander

The Service anticipates that an undetermined number of Van Dykes salamanders would be taken over a 50-year period as a result of the proposed action. Van Dyke's salamanders are known from action area and Plan Area. The number Van Dyke's salamanders anticipated to be taken is small, mainly because of the low number of Van Dyke's salamanders expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm/Harassment - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of Van Dyke's salamanders. Take in the form of harm/harassment of Van Dyke's salamanders is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands, some larger trees, and large downed logs. In addition, Simpson's amphibian research and monitoring programs could reduce the amount of take of Van Dyke's salamanders in the future as information is gained, and adaptive management is applied. Take in the form of harm/harassment would mainly occur during forest harvest/thinning. slash abatement, fertilization, and road building/maintenance activities, particularly those activities that cause elimination of larger

trees or downed wood near streams, remove moist mature or old-growth forest, disturb wet talus slopes near streams, disturb Van Dyke's salamanders, or cause nutrient or sedimentation effects along/in headwater streams or seeps.

Take in the form of harm/harass would mainly occur during harvest of timber in the upland areas outside conservation areas, and road building activities that may cause increase sediment in salamander habitat. The Service anticipates take due to harm/harass of Van Dyke's salamanders associated with habitat adjacent to up to 250 acres of new road construction due to timber harvest. The Service anticipates take due to harm/harass to Van Dyke's salamanders as a result of harvest of 219,000 acres of timber outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian and unstable slope buffers) adjacent/upslope to steep tributary stream habitat.

Direct Injury or Death - The Service anticipates a small amount of direct injury or death of Van Dyke's salamanders to occur from implementing covered activities that disturb logs such as site preparation, or other timber harvest activities.

Western Toad

The Service anticipates that an undetermined number of western toads would be taken over a 50-year period as a result of the proposed action. Western toads are known from action area and Plan Area. The number western toads anticipated to be taken is moderate, mainly because of the moderate-high number of western toads expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm- It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of western toads. Take in the form of harm of western toads is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands and downed wood. In addition, Simpson's amphibian research and monitoring programs could reduce the amount of take of western toads in the future as information is gained, and adaptive management is applied. Take in the form of harm would mainly occur during forest harvest/thinning, fertilization, and road building/maintenance activities, particularly those activities that cause removal of downed wood, or affect waters or wetlands through sedimentation or nutrient effects.

Harassment - Harassment, in the form of disturbance of an undetermined number of western toads, is anticipated to occur. We anticipate disturbance of western toads within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building/maintenance adjacent to or within habitat occupied by western toads.

The Service anticipates take in the form of harm/harass for western toads associated with experimental thinning activity in suitable western toad riparian habitats on a maximum of 5,347 acres (187 acres of suitable habitat disturbed by experimental thinning in the first 10 years of the ITP term, and up to 5,160 acres for the remaining 40 years of the proposed ITP term). In addition, the Service anticipates take for western toad associated with habitat adjacent or within to up to 250 acres of new road construction, and for western toad associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to western toad habitat resulting from road remediation should be eliminated. On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some western toad habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to western toads . The level of take due to instream activities , which could result in trampling of adults, juveniles or eggs, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Northwestern Salamander

The Service anticipates that an undetermined number of northwestern salamanders would be taken over a 50-year period as a result of the proposed action. Northwestern salamanders are known from action area and Plan Area. The number northwestern salamanders anticipated to be taken is small, mainly because of the low number of northwestern salamanders expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of northwestern salamanders. Take in the form of harm of northwestern salamanders is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands and some downed wood. In addition, Simpson's amphibian research and monitoring programs could reduce the amount of take of northwestern salamanders in the future as information is gained, and adaptive management is applied. Take in the form of harm would mainly occur during harvest/thinning/hauling, fertilization, slash abatement, and road building and maintenance activities,

particularly those activities that cause removal of forest cover and downed wood, crush migrating individuals, or affect ponds and streams (such as causing artificially high nutrient or sedimentation levels).

Harassment - Take, in the form of harassment, due to disturbance of an undetermined number of northwestern salamanders, is anticipated to occur. The Service anticipates disturbance of northwestern salamanders within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning/hauling and road building/maintenance adjacent to or within habitat occupied by northwestern salamanders.

Take in the form of harm/harass would mainly occur during harvest of timber in the upland areas outside conservation areas, experimental thinning within the conservation areas, thinning within wetland buffers, and road building activities that may cause increase sediment in salamander habitat. The Service anticipates take due to harm/harass of northwestern salamanders associated with habitat adjacent to up to 250 acres of new road construction due to timber harvest, and for Northwestern salamanders associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to Northwestern salamander habitat resulting from road remediation should be eliminated. The Service anticipates take due to harm/harass to northwestern salamanders associated with 931 acres of timber within the outer buffers on wetlands buffers that would be thinned according to wetland prescriptions in the Plan. The Service anticipates take due to harm/harass to Northwestern salamanders as a result of harvest of 219,000 acres of timber outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian and unstable slope buffers) adjacent/upslope to stream wetland habitat.

Direct Injury or Death - The Service anticipates a small amount of direct injury or death of northwestern salamanders to occur from implementing covered activities that disturb logs such as site preparation, or other timber harvest activities.

Long-toed Salamander

The Service anticipates that an undetermined number of long-toed salamanders would be taken over a 50-year period as a result of the proposed action. Long-toed salamanders are known from action area and Plan Area. The number of long-toed salamanders anticipated to be taken is low-moderate, mainly because of the moderate number of long-toed salamanders expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of long-toed salamanders. Take of long-toed salamanders is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands and some downed wood. In addition, Simpson's amphibian research and monitoring programs could reduce the amount of take of long-toed salamanders in the future as information is gained, and adaptive management is applied. Take in the form of harm would mainly occur during harvest/thinning/hauling, fertilization, slash abatement, and road building/maintenance activities, particularly those activities that cause removal of cover/downed wood or crush burrows within 0.6 mile of ponds, or affect the nutrient or sedimentation levels of permanent ponds, and/or degrade surrounding vegetation.

Harassment - Take in the form of harassment, idue to disturbance of an undetermined number of long-toed salamanders, is anticipated to occur. The Service anticipates disturbance of long-toed salamanders within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning/hauling, slash abatement, and road building/maintenance adjacent to or within habitat occupied by long-toed salamanders.

Take in the form of harm/harass would mainly occur during harvest of timber in the upland areas outside conservation areas, experimental thinning within the conservation areas, thinning within wetland buffers, and road building activities that may cause increase sediment in salamander habitat. The Service anticipates take due to harm/harass of long-toed salamanders associated with habitat adjacent to up to 250 acres of new road construction due to timber harvest, and for long-toed salamanders associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to long-toed salamander habitat resulting from road remediation should be eliminated. The Service anticipates take due to harm/harass to long-toed salamanders associated with 931 acres of timber within the outer buffers on wetlands buffers that would be thinned according to wetland prescriptions in the Plan. The Service anticipates take due to harm/harass to long-toed salamanders as a result of harvest of 219,000 acres of timber outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian and wetland buffers) adjacent/upslope to wetland habitat for the species.

Direct Injury or Death - The Service anticipates a small amount of direct injury or death of Van Dyke's salamanders to occur from implementing covered activities that disturb logs such as site preparation, or other timber harvest activities.

Red-legged Frog

The Service anticipates that an undetermined number of red-legged frogs would be taken over a 50-year period as a result of the proposed action. Red-legged frogs are known from action area and Plan

Area. The number red-legged frogs anticipated to be taken is moderate, mainly because of the high number of red-legged frogs expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of red-legged frogs. Take of red-legged frogs is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands. In addition, Simpson's amphibian research and monitoring programs could reduce the amount of take of red-legged frogs in the future as information is gained, and adaptive management is applied. Take in the form of harm would mainly occur during forest harvest/thinning/hauling, slash abatement, fertilization, and road building/maintenance activities, particularly those activities that cause removal of removal of older forest, downed wood, caused drying of vegetation or litter, or affect the temperature/nutrient/sediment levels of shallow (less than 7 feet) waters in lakes, ponds, or slow moving portions of streams/rivers.

Harassment - Take in the form of harassment, due to disturbance of an undetermined number of red-legged frogs, is anticipated to occur. We anticipate disturbance of red-legged frogs within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning/hauling of timber and road building/maintenance adjacent to or within habitat occupied by red-legged frogs.

Take in the form of harm/harass would mainly occur during harvest of timber in the upland areas outside conservation areas, experimental thinning within the conservation areas, thinning within wetland buffers, and road building activities that may cause increase sediment in red-legged frog habitat. The Service anticipates take due to harm/harass of red-legged frogs associated with habitat adjacent to up to 250 acres of new road construction due to timber harvest, and for red-legged frogs associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to red-legged frog habitat resulting from road remediation should be eliminated. The Service anticipates take due to harm/harass to red-legged frog associated with 931 acres of timber within the outer buffers on wetlands buffers that would be thinned according to wetland prescriptions in the Plan. The Service anticipates take due to harm/harass to red-legged frogs as a result of harvest of up to 219,000 acres of timber outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian and unstable slope buffers) adjacent/upslope to stream wetland habitat.

Direct Injury or Death - We anticipate a moderate amount of direct injury or death of red-legged frog to occur from implementing timber harvest activities.

Shorthead Sculpin

The Service anticipates that an undetermined number of short-head sculpins would be taken over a 50-year period as a result of the proposed action. Short-head sculpins are known from action area and Plan Area. The number short-head sculpins anticipated to be taken is small, mainly because of the low number of short-head sculpins expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of short-head sculpins. Take of short-head sculpins is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas. Take in the form of harm would mainly occur during forest harvest/thinning, fertilization, and road building/maintenance activities, particularly those activities that cause sedimentation, nutrient, or temperature effects to headwater streams below 1600 feet elevation.

Harassment – Take in the form of harassment, due to disturbance of an undetermined number of short-head sculpins, is anticipated to occur. We anticipate disturbance of short-head sculpins within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building/maintenance adjacent to or within habitat occupied by short-head sculpins.

It is not possible to predict how each stream would be affected at this point in time, so the Service has relied on an assessment of a worst-case scenario. The Service anticipates take in the form of harm/harassment for shorthead sculpin associated with habitat adjacent to up to 250 acres of new road construction, and for shorthead sculpin associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to shorthead sculpin habitat resulting from road remediation should be eliminated. Since Simpson would be focusing on road remediation within the CUP and AGL lithotopographic units, where steep tributary stream habitat occurs, and would complete remediation in these areas within 6-7 years of proposed ITP initiation, effects due to road remediation on shorthead sculpins would be greatly reduced early in the proposed ITP term. The Service anticipates take in the form of harm/harass of shorthead sculpin associated with 219,000 acres of timber which would be harvested outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian and unstable slope buffers) adjacent/upslope to steep tributary stream stream habitat.

On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some shorthead sculpin habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that shorthead sculpin occur throughout potential shorthead sculpin habitat managed by Simpson. Because shorthead sculpin distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact shorthead sculpin. Take is generally expected to be low; only a minimal number of individuals would likely be affected and impacts should be rare and localized. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is low, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of shorthead sculpin as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to shorthead sculpin. The level of take due to instream activities , which could result in trampling of eggs, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Riffle Sculpin

The Service anticipates that an undetermined number of riffle sculpin would be taken over a 50-year period as a result of the proposed action. Riffle sculpins are known from action area and Plan Area. The number riffle sculpins anticipated to be taken is moderate, mainly because of the moderate number of riffle sculpins expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of riffle sculpins. Take of riffle sculpins is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands and some larger trees. Take in the form of harm would mainly occur during road building/maintenance/utilization activities, forest harvest/thinning, and fertilization, particularly those activities that cause sedimentation, temperature, or nutrient effects to streams and rivers utilized by the species.

Harassment – Take in the form of harassment, due to disturbance of an undetermined number of riffle sculpins, is anticipated to occur. The Service anticipates disturbance of riffle sculpins in the Assessment Area, mainly as a result of harvest/thinning of timber and road building/maintenance adjacent to, or within habitat occupied by riffle sculpins.

The Service anticipates harm and/or harassment to riffle sculpin currently occupying stream habitats as a result of the proposed action, as limited by proposed restrictions within RCR conservation areas; this take would mainly occur from sedimentation and siltation resulting from road building/maintenance/utilization and road channel crossing maintenance, and forest harvest and thinning. It is not possible to predict how each stream would be affected, so the Service has relied on an assessment of a worst-case scenario. The Service anticipates take for riffle sculpin associated with stream habitats from a maximum of 5,792 acres (632 acres in the first 10 years of the ITP term, and potentially up to 5,160 acres for the remaining 40 years of the proposed ITP term) of experimental thinning over the life of the HCP. In addition, the Service anticipates take of riffle sculpin associated with habitat adjacent or downslope to up to 250 acres of new road construction, and for riffle sculpin associated with habitat adjacent or downslope to potential remediation of up to 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to riffle sculpin habitat resulting from road remediation should be eliminated. The Service anticipates take in the form of harm/harass of riffle sculpin associated with 219,000 acres of timber which would be harvested outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian buffers) adjacent/upslope to flat tributary stream habitat.

Some riffle sculpin habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities. On potentially covered lands in the Assessment Area, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas.

Harm and harassment estimates are based on the assumption that riffle sculpin occur throughout potential riffle sculpin habitat managed by Simpson. Because riffle sculpin distribution is not likely continuous, only a fraction of the acres and activities described above likely have the potential to impact riffle sculpin. Take is generally expected to be moderate, but localized. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is moderate, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of riffle sculpin as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to riffle sculpin. The level of take due to instream activities, which could result in trampling of eggs, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Coast Range Sculpin

The Service anticipates that an undetermined number of coast range sculpins would be taken over a 50-year period as a result of the proposed action. Coast range sculpins are known from action area and Plan Area. The number coast range sculpins anticipated to be taken is small, mainly because of the low-moderate number of coast range sculpins expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of coast range sculpins. Take of coast range sculpins is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas. Take in the form of harm would mainly occur during forest harvest/thinning, fertilization, and road building/maintenance activities, particularly those activities that cause sedimentation or nutrient effects to lakes or medium/large size streams.

Harassment - Harassment, in the form of disturbance of an undetermined number of coast range sculpins, is anticipated to occur. We anticipate disturbance of coast range sculpins within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building/maintenance adjacent to or within habitat occupied by coast range sculpins.

The Service anticipates harm and/or harassment to coast range sculpin currently occupying stream habitats as a result of the proposed action, as limited by proposed restrictions within RCR conservation areas; this take would mainly occur from forest thinning and road crossing maintenance. It is not possible to predict how each stream would be affected at this point in time, so the Service has relied on an assessment of a worst-case scenario. The Service anticipates take for coast range sculpin associated with stream habitats on a maximum of 5,792 acres (632 acres in the first 10 years of the ITP term, and up to 5,160 acres for the remaining 40 years of the ITP term) of experimental thinning over the life of the HCP. In addition, the Service anticipates take for coast range sculpin associated with habitat adjacent to up to 250 acres of new road construction, and for coast range sculpin associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the

first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to coast range sculpin habitat resulting from road remediation should be eliminated. The Service anticipates take in the form of harm/harass of coast range sculpin associated with 219,000 acres of timber which would be harvested outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian buffers) adjacent/upslope to flat tributary stream habitat.

On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some coast range sculpin habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that coast range sculpin occur throughout potential coast range sculpin habitat managed by Simpson. Because coast range sculpin distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact coast range sculpin. Take is generally expected to be small and impacts should be localized. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is low, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected, to the extent that take could possibly occur

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of coast range sculpin as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to coast range sculpin. The level of take due to instream activities , which could result in trampling of eggs, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Reticulate Sculpin

The Service anticipates that an undetermined number of reticulate sculpins would be taken over a 50-year period as a result of the proposed action. Reticulate sculpins are known from action area and Plan Area. The number reticulate sculpins anticipated to be taken is small-moderate

mainly because of the low-moderate number of reticulate sculpins expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of reticulate sculpins. Take of reticulate sculpins is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas. Take in the form of harm would mainly occur during forest harvest/thinning, fertilization, and road building/maintenance activities, particularly those activities that cause sedimentation or nutrient effects to small to medium size streams.

Harassment – Take in the form of harassment, due to disturbance of an undetermined number of reticulate sculpins, is anticipated to occur. The Service anticipate disturbance of reticulate sculpins within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building/maintenance adjacent to or within habitat occupied by reticulate sculpins.

The Service anticipates harm and/or harassment to reticulate sculpin currently occupying stream habitats as a result of the proposed action, as limited by proposed restrictions within RCR conservation areas; this take would mainly occur from forest thinning and road crossing maintenance. It is not possible to predict how each stream would be affected at this point in time, so the Service has relied on an assessment of a worst-case scenario. The Service anticipates take for reticulate sculpin associated with stream habitats on a maximum of 5,792 acres (632 acres in the first 10 years of the ITP term, and up to 5,160 acres for the remaining 40 years of the ITP term) of experimental thinning over the life of the HCP. In addition, the Service anticipates take for reticulate sculpin associated with habitat adjacent to up to 250 acres of new road construction, and for reticulate sculpin associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to reticulate sculpin habitat resulting from road remediation should be eliminated. The Service anticipates take in the form of harm/harass of reticulate sculpin associated with 219,000 acres of timber which would be harvested outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian buffers) adjacent/upslope to flat tributary stream habitat.

On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some reticulate sculpin habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that reticulate sculpin occur throughout

potential reticulate sculpin habitat managed by Simpson. Because reticulate sculpin distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact reticulate sculpin. Take is generally expected to small-moderate and impacts should be localized. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is low, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of reticulate sculpin as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to reticulate sculpin. The level of take due to instream activities, which could result in trampling of eggs, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term

Torrent Sculpin

The Service anticipates that an undetermined number of torrent sculpins would be taken over a 50-year period as a result of the proposed action. Torrent sculpins are known from action area and Plan Area. The number torrent sculpins anticipated to be taken is moderate mainly because of the low-moderate number of torrent sculpins expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of torrent sculpins. Take of torrent sculpins is limited by partial or full conservation/protection of portions of the Plan Area, including implementing RCR conservation areas and unstable slope prescriptions. Take in the form of harm would mainly occur during forest harvest/thinning and road building/maintenance activities, particularly those activities that cause sedimentation effects to streams more than 7 feet wide.

Harassment – Take in the form of harassment, due to disturbance of an undetermined number of torrent sculpins, is anticipated to occur. The Service anticipates disturbance of torrent sculpins within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building/maintenance adjacent to or within habitat occupied by torrent sculpins.

The Service anticipates harm and/or harassment to torrent sculpin currently occupying stream habitats as a result of the proposed action, as limited by proposed restrictions within RCR conservation areas; this take would mainly occur from forest thinning and road crossing maintenance. It is not possible to

predict how each stream would be affected at this point in time, so the Service has relied on an assessment of a worst-case scenario. The Service anticipates take for torrent sculpin associated with stream habitats on a maximum of 5,347 acres (187 acres in the first 10 years of the proposed ITP term, and up to 5,160 acres for the remaining 40 years of the proposed ITP term) of experimental thinning over the life of the HCP. In addition, the Service anticipates take for torrent sculpin associated with habitat adjacent to up to 250 acres of new road construction, and for torrent sculpin associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to torrent sculpin habitat resulting from road remediation should be eliminated. On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some torrent sculpin habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that torrent sculpin occur throughout potential torrent sculpin habitat managed by Simpson. Because torrent sculpin distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact torrent sculpin. Take is generally expected to be moderate and impacts should somewhat localized. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is moderate, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of torrent sculpin as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to reticulate sculpin. The level of take due to instream activities , which could result in trampling of eggs, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term

Prickly Sculpin

The Service anticipates that an undetermined number of prickly sculpins would be taken over a 50-year period as a result of the proposed action. Prickly sculpins are known from action area and Plan Area. The number prickly sculpins anticipated to be taken is small mainly because of the low-moderate number of prickly sculpins expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of prickly sculpins. Take of prickly sculpins is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands and reduce road effects. Take in the form of harm would mainly occur during forest harvest/thinning, fertilization, and road building/maintenance activities, particularly those activities that cause sedimentation or nutrient effects to lakes, wetlands, and medium sized streams.

Harassment – Take in the form of harassment, due to disturbance of an undetermined number of prickly sculpins, is anticipated to occur. We anticipate disturbance of prickly sculpins within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building/maintenance adjacent to or within habitat occupied by prickly sculpins.

Take in the form of harm/harass would mainly occur during harvest of timber in the upland areas outside conservation areas, experimental thinning within the conservation areas, thinning within wetland buffers, and road building activities that may cause increase sediment in sculpin habitat. The Service anticipates take due to harm/harass of prickly sculpin associated with habitat adjacent to up to 250 acres of new road construction due to timber harvest, and for prickly sculpin associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to prickly sculpin habitat resulting from road remediation should be eliminated. The Service anticipates take due to harm/harass to prickly sculpin associated with 931 acres of timber within the outer buffers on wetlands buffers that would be thinned according to wetland prescriptions in the Plan. The Service anticipates take due to harm/harass to prickly sculpin as a result of harvest of 219,000 acres of timber outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian and wetland buffers) adjacent/upslope to stream wetland habitat.

Direct Injury or Death - We anticipate a small amount of direct injury or death of prickly sculpins to occur from implementing proposed Covered Activities.

Speckled Dace

The Service anticipates that an undetermined number of speckled dace would be taken over a 50-year period as a result of the proposed action. Speckled dace are known from action area and Plan Area. The number speckled dace anticipated to be taken is small mainly because of the low-moderate number of speckled dace expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of speckled dace. Take of speckled dace is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands and reduce road effects. Take in the form of harm would mainly occur during forest harvest/thinning, fertilization, and road building/maintenance activities, particularly those activities that cause nutrient or sedimentation effects to slower water streams, lakes, wetlands.

Harassment - Harassment, in the form of disturbance of an undetermined number of speckled dace, is anticipated to occur. The Service anticipates disturbance of speckled dace within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building/maintenance adjacent to or within habitat occupied by speckled dace.

The Service anticipates harm and/or harassment to speckled dace currently occupying stream habitats as a result of the proposed action, as limited by proposed restrictions within RCR conservation areas; this take would mainly occur from forest thinning and road crossing maintenance. It is not possible to predict how each stream would be affected at this point in time, so the Service has relied on an assessment of a worst-case scenario. The Service anticipates take for speckled dace associated with stream habitats on a maximum of 5,792 acres (632 acres in the first 10 years of the proposed ITP term, and up to 5,160 acres for the remaining 40 years of the proposed ITP term) of experimental thinning over the life of the HCP. In addition, the Service anticipates take for speckled dace associated with habitat adjacent to up to 250 acres of new road construction, and for speckled dace associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to speckled dace habitat resulting from road remediation should be eliminated. The Service anticipates take in the form of harm/harass of speckled dace associated with 219,000 acres of timber which would be harvested outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian buffers) adjacent/upslope to flat tributary stream habitat.

On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some speckled dace habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that speckled dace sculpin occur throughout potential speckled dace habitat managed by Simpson. Because speckled dace distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact speckled dace. Take is generally expected to be small and impacts should be rare and localized. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is low, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of speckled dace as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to speckled dace. The level of take due to instream activities , which could result in trampling of eggs, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Brook Lamprey

The Service anticipates that an undetermined number of brook lampreys would be taken over a 50-year period as a result of the proposed action. Brook lampreys are known from action area and Plan Area. The number brook lampreys anticipated to be taken is moderate mainly because of the moderate number of brook lampreys expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of brook lampreys. Take of brook lampreys is limited by partial or full conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that reduce road effects. Take in the form of harm would mainly occur during forest harvest/thinning, fertilization, and road building/maintenance activities, particularly those activities that cause sedimentation or nutrient effects to streams and rivers.

Harassment - Harassment, in the form of disturbance of an undetermined number of brook lampreys, is anticipated to occur. The Service anticipates disturbance of brook lampreys within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building/maintenance adjacent to or within habitat occupied by brook lampreys.

The Service anticipates harm and/or harassment to brook lamprey currently occupying stream habitats as a result of the proposed action, as limited by proposed restrictions within RCR

conservation areas; this take would mainly occur from forest thinning and road crossing maintenance. It is not possible to predict how each stream would be affected at this point in time, so the Service has relied on an assessment of a worst-case scenario. The Service anticipates take for brook lamprey associated with stream habitats on a maximum of 5,792 acres (632 acres in the first 10 years of the proposed ITP term, and up to 5,160 acres for the remaining 40 years of the proposed ITP term) of experimental thinning over the life of the HCP. In addition, the Service anticipates take for brook lamprey associated with habitat adjacent to up to 250 acres of new road construction, and for brook lamprey associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to brook lamprey habitat resulting from road remediation should be eliminated. The Service anticipates take in the form of harm/harass of brook lamprey associated with 219,000 acres of timber which would be harvested outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian buffers) adjacent/upslope to flat tributary stream habitat.

On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some brook lamprey habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that brook lamprey occur throughout potential brook lamprey habitat managed by Simpson. Because brook lamprey distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact brook lamprey. Take is generally expected to be moderate and impacts should be somewhat localized. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is moderate, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of brook lamprey as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to brook lamprey. The level of take due to instream activities , which could result in trampling of eggs or alevins, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term

Dolly Varden

The Service anticipates that an undetermined number of dolly vardens would be taken over a 50-year period as a result of the proposed action. Dolly vardens are known from action area and Plan Area. The number dolly vardens anticipated to be taken is small-moderate mainly because of the moderate number of dolly vardens expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

The Service anticipates that impacts to dolly varden would be difficult to detect at the individual organism level for the following reason(s): (1) dolly varden are wide-ranging and are affected by factors beyond the control of Simpson; (2) juveniles, fry, and eggs have small body size and are, therefore, difficult to detect when alive; (3) finding dead or impaired specimens is unlikely, especially considering the often small body size of eggs and fry, denseness of vegetation/ substrate, and remoteness of the area; (4) losses may be masked by seasonal fluctuations in numbers or other causes; (5) dead or impaired specimens may be washed downstream of the site where the impact occurred; and (6) dead or impaired specimens may be consumed by other fish and wildlife species. Therefore, even though the Service expects incidental take to occur from the effects of the proposed action, the best scientific and commercial data available are not sufficient to enable the Service to estimate a specific number of individuals incidentally taken based on loss or injury of individuals of the species. For instance, if the estimated dolly varden population were to increase during the proposed ITP term, a larger number of individuals may become subject to some level of take. Conversely, if dolly varden were to decrease, less take might occur. Consequently, take is estimated based on conditions likely to result in take during the 50-year HCP period.

The incidental take over 50 years is anticipated to be in the following forms:

Harm and/or Harassment - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of dolly varden. Take of dolly varden is limited by partial or full conservation/protection of at least 16.3 percent of the Plan Area, or 42,574 acres out of 261,575 acres (see Table 7 of the HCP); most suitable dolly varden habitat is within RCR conservation areas, substantially limiting take due to harm and/or harassment. The remaining219,001 acres of the Plan Area would be subject to project impacts as proposed and described in the HCP. Degradation of habitat could occur indirectly through sedimentation and turbidity effects downstream of these lands (or downstream of lands allowed to be added for coverage), and through blockage/degradation of passage of any fish to habitat upstream (and subsequent ecological effects, such as reduced nutrient inputs to the system from salmon mortality). The proposed Covered Activities are expected to mainly affect dolly varden habitat through timber harvest activities in the form of experimental thinning and road building/maintenance/remediation. It is undetermined how many miles of suitable dolly varden stream habitat would be indirectly affected.

The Service anticipates harm and/or harassment to dolly varden currently occupying stream habitats as a result of the proposed action, as limited by proposed restrictions within RCR conservation areas; this take would mainly occur from forest thinning and road crossing maintenance. It is not possible to predict how each stream would be affected at this point in time, so the Service has relied on an assessment of a worst-case scenario. The Service anticipates take for dolly varden associated with stream habitats on a maximum of 5,347 acres (187 acres in the first 10 years of the proposed ITP term, and up to 5,160 acres for the remaining 40 years of the proposed ITP term) of experimental thinning over the life of the HCP. In addition, the Service anticipates take for dolly varden associated with habitat adjacent to up to 250 acres of new road construction, and for dolly varden associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to dolly varden habitat resulting from road remediation should be eliminated. On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some dolly varden habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that dolly varden occur throughout potential dolly varden habitat managed by Simpson. Because dolly varden distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact dolly varden. Take is generally expected to be small to moderate and impacts should be localized. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is small to moderate, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of dolly varden as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to dolly varden. The level of take due to instream activities which could result in trampling of eggs or alevins, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Longnose Dace

The Service anticipates that an undetermined number of longnose dace would be taken over a 50-year period as a result of the proposed action. Longnose dace are known from action area and Plan Area. The number of longnose dace anticipated to be taken is small, mainly because of the low number of

longnose dace expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of longnose dace. Take of longnose dace is limited by conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect aquatic areas. Take in the form of harm would mainly occur during forest harvest/thinning, and road building/maintenance activities, particularly those that cause sedimentation of fast moving streams and rivers.

Harassment - Take in the form of harassment, due to disturbance of an undetermined number of longnose dace, is anticipated to occur. The Service anticipates disturbance of longnose dace within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building/maintenance.

The Service anticipates harm and/or harassment to longnose dace currently occupying stream habitats as a result of the proposed action, as limited by proposed restrictions within RCR conservation areas; this take would mainly occur from forest thinning and road crossing maintenance. It is not possible to predict how each stream would be affected at this point in time, so the Service has relied on an assessment of a worst-case scenario. The Service anticipates take for longnose dace associated with stream habitats on a maximum of 5,347 acres (187 acres in the first 10 years of the proposed ITP term, and up to 5,160 acres for the remaining 40 years of the proposed ITP term) of experimental thinning over the life of the HCP. In addition, the Service anticipates take for longnose dace associated with habitat adjacent to up to 250 acres of new road construction, and for longnose dace associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to longnose dace habitat resulting from road remediation should be eliminated. On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some longnose dace habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that longnose dace occur throughout potential longnose dace habitat managed by Simpson. Because longnose dace distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact longnose dace. Take is generally expected to be small and impacts should be localized. Therefore,

the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is low, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of longnose dace as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to longnose dace. The level of take due to instream activities , which could result in trampling of eggs, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Pacific Lamprey

The Service anticipates that an undetermined number of Pacific lampreys would be taken over a 50-year period as a result of the proposed action. Pacific lampreys are known from action area and Plan Area. The number Pacific lampreys anticipated to be taken is small to moderate, mainly because of the low to moderate number expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of Pacific lampreys. Take of Pacific lampreys is limited by conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect unstable slopes. Take in the form of harm would mainly occur during forest harvest/thinning, fertilization, and road building/maintenance activities, particularly those that cause sedimentation of rivers and larger streams, particularly those that affect slower moving waters.

Harassment - Take in the form of harassment, due to disturbance of an undetermined number of Pacific lampreys, is anticipated to occur. The Service anticipates disturbance of Pacific lampreys within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning and road building/maintenance activities.

The Service anticipates harm and/or harassment to Pacific lamprey currently occupying stream habitats, as a result of the proposed action, as limited by proposed restrictions within RCR conservation areas; this take would mainly occur from sedimentation from harvest and road associated activities, as well as forest thinning and road crossing maintenance. It is not possible to predict how each stream would be affected, so the Service has relied on an assessment of a worst-case

scenario. We anticipate take for Pacific lamprey associated with undetermined number of stream miles degraded by sedimentation resulting from proposed harvest activtities on up to219,000 acres of the Plan Area, and an undetermined acreage of proposed harvest within the Assessment Area. The Service anticipates take for Pacific lamprey associated with stream habitats on a maximum of 5,347 acres (187 acres in the first 10 years of the proposed ITP term, and up to 5,160 acres for the remaining 40 years of the proposed ITP term) of experimental thinning over the life of the HCP. In addition, the Service anticipates take for Pacific lamprey associated with habitat downstream-adjacent to up to 250 acres of new road construction, and for Pacific lamprey associated with habitat downstream adjacent to potential remediation or maintenance of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). Past year 15 of the proposed ITP term, effects to Pacific lamprey habitat resulting from road remediation should be mostly eliminated. On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some Pacific lamprey habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that Pacific lamprey occur throughout potential Pacific lamprey habitat managed by Simpson. Because Pacific lamprey distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact Pacific lamprey. Take is generally expected to be low. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is low, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of Pacific lamprey as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to Pacific lamprey. The level of take due to instream activities , which could result in trampling of eggs or alevins, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

River Lamprey

The Service anticipates that an undetermined number of river lampreys would be taken over a 50-year period as a result of the proposed action. Occupation of the action area and Plan Area by river lamprey is undetermined. The number of river lampreys anticipated to be taken is small, mainly

because of the low number expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of river lampreys. Take of river lampreys is limited by conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect aquatic areas and unstable slopes. Take in the form of harm would mainly occur during forest harvest/thinning, fertilization, and road building/maintenance activities, particularly those that affect streams and rivers.

Harassment - Take in the form of harassment, due to disturbance of an undetermined number of river lampreys, is anticipated to occur. We anticipate disturbance of river lampreys within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning and road building/maintenance activities.

The Service anticipates harm and/or harassment to river lamprey currently occupying stream habitats as a result of the proposed action, as limited by proposed restrictions within RCR conservation areas; this take would mainly occur from forest thinning and road crossing maintenance. It is not possible to predict how each stream would be affected at this point in time, so the Service has relied on an assessment of a worst-case scenario. The Service anticipates take for river lamprey associated with stream habitats on a maximum of 5,347 acres (187 acres in the first 10 years of the proposed ITP term, and up to 5,160 acres for the remaining 40 years of the proposed ITP term) of experimental thinning over the life of the HCP. In addition, the Service anticipates take for river lamprey associated with habitat adjacent to up to 250 acres of new road construction, and for river lamprey associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the proposed ITP term, effects to river lamprey habitat resulting from road remediation should be eliminated. On potentially covered lands allowed to be added to the Plan Area for coverage, the Service anticipates that potential take would be limited by the proposed prescriptions protecting stream and wetland areas. Some river lamprey habitat would likely be degraded as a result of increased stream temperature effects, due to decreased shading of streams resulting from removed forest canopy near streams, particularly from harvest/thinning or road clearing associated activities.

Harm and harassment estimates are based on the assumption that river lamprey occur throughout potential river lamprey habitat managed by Simpson. Because river lamprey distribution is likely not continuous, only a fraction of the acres and activities described above have the potential to impact river lamprey. Take is generally expected to be low; only a minimal number of individuals would

likely be affected and impacts should be rare and localized. Therefore, the number of individuals likely to be subject to impacts at any particular time, or the numbers of individuals which may be taken, is low, yet unquantifiable. Estimates of indirect take are in terms of the amount of habitat affected to the extent that take could possibly occur.

Direct Injury or Death - The Service anticipates a low amount of direct injury or death of river lamprey as a result of implementing the proposed action. Direct injury or death could occur due to instream activities or electrofishing. The level of take associated with electrofishing is anticipated to be low because it would be used for last fish distribution only, which does not entail multiple passes through the same stream reach, and it would be done according to Service approved protocols to minimize risk to river lamprey. The level of take due to instream activities , which could result in trampling of eggs or alevins, is also anticipated to be low due to the limited amount of instream work anticipated over the proposed ITP term.

Olympic Mudminnow

The Service anticipates that an undetermined number of Olympic mudminnow would be taken over a 50-year period as a result of the proposed action. Olympic mudminnows are known from action area and Plan Area. The number Olympic mudminnows anticipated to be taken is small, mainly because of the low number expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - It is undetermined to what extent the proposed Covered Activities would substantially affect habitat suitability of Olympic mudminnows. Take of Olympic mudminnows is limited by conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect aquatic areas. Take in the form of harm would mainly occur during forest harvest/thinning, fertilization, and road building/maintenance activities.

Harassment - Take in the form harassment, due to disturbance of an undetermined number Olympic mudminnows, is anticipated to occur. The Service anticipates disturbance of Olympic mudminnows within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building/maintenance.

Take in the form of harm/harass would mainly occur during harvest of timber in the upland areas outside conservation areas, experimental thinning within the conservation areas, thinning within wetland buffers, and road building activities that may cause increase sediment in mudminnow habitat. The Service anticipates take due to harm/harass of Olympic mudminnows associated with habitat adjacent to up to 250 acres of new road construction due to timber harvest, and for Olympic mudminnow associated with habitat adjacent to potential remediation of 2,001 miles of system roads

(during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation would have such work completed). By year 15 of the Proposed ITP term, effects to Olympic mudminnow habitat resulting from road remediation should be eliminated. The Service anticipates take due to harm/harass to Olympic mudminnow associated with 931 acres of timber within the outer buffers on wetlands buffers that would be thinned according to wetland prescriptions in the Plan. The Service anticipates take due to harm/harass to Olympic mudminnows as a result of harvest of 219,000 acres of timber outside of conservation areas over the proposed ITP term. Of this acreage, an undetermined amount of take would occur in the form of harm/harassment from harvest (outside of proposed riparian and wetland buffers) adjacent/upslope to stream wetlands habitat for the species.

Direct Injury or Death - We anticipate a moderate amount of direct injury or death of Olympic mudminnows to occur from implementing Covered Activities.

Threespine Stickleback

The Service anticipates that an undetermined number of threespine sticklebacks would be taken over a 50-year period as a result of the proposed action. Threespine sticklebacks are known from action area and Plan Area. The number of threespine sticklebacks anticipated to be taken is moderate, mainly because of the moderate number of threespine sticklebacks expected to occur within the Plan Area during the proposed ITP term, and due to the level of protection provided by the proposed HCP.

The incidental take over 50 years is anticipated to be in the following forms:

Harm - Take in the form of harm of threespine sticklebacks is limited by conservation/protection of portions of the Plan Area, including protection of RCR conservation areas, and proposed programs that protect wetlands and streams. Take in the form of harm would mainly occur during forest harvest/thinning, fertilization, and road building activities, particularly those activities that affect slack water streams and wetlands.

Harassment - Take in the form of harassment due to disturbance of an undetermined number threespine sticklebacks, is anticipated to occur. We anticipate disturbance of threespine sticklebacks within the Plan Area, and on lands allowed to be added for coverage, mainly as a result of harvest/thinning of timber and road building.

Take in the form of harm/harass would mainly occur during harvest of timber in the upland areas outside conservation areas, experimental thinning within the conservation areas, thinning within wetland buffers, and road building activities that may cause increase sediment in stickleback habitat. The Service anticipates take due to harm/harass of northwestern salamanders associated with habitat adjacent to up to 250 acres of new road construction due to timber harvest, and for Threespine sticklebacks associated with habitat adjacent to potential remediation of 2,001 miles of system roads (during the first 15 years of the proposed ITP term,100 percent of all roads needing remediation

would have such work completed). By year 15 of the Proposed ITP term, effects to Threespine stickleback habitat resulting from road remediation should be eliminated. The Service anticipates take due to harm/harass to threespine stickleback associated with 931 acres of timber within the outer buffers on wetlands buffers that would be thinned according to wetland prescriptions in the Plan. The Service anticipates take due to harm/harass to threespine stickleback as a result of harvest of 219,000 acres of timber outside of conservation areas over the proposed ITP term. An undetermined amount of take, in the form of harm/harassment of threespine sticklebacks associated with the 219,000 acres of forest harvest outside of conservation areas, would occur from harvest (outside of proposed wetland/riparian buffers) adjacent/upslope to adjacent to stream wetlands.

Direct Injury or Death - We anticipate a moderate amount of direct injury or death of threespine stickleback to occur from implementing Covered Activities.

Effect of Take

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the above species, or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES/TERMS AND CONDITIONS

The proposed Simpson HCP, IA, and associated documents, identify anticipated impacts to proposed Permit Species likely to result from the proposed action, and the measures proposed to minimize or mitigate those impacts. All conservation measures described in the proposed HCP, together with the terms and conditions described in the IA and the section 10(a)(1)(B) permit are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement, pursuant to 50 ***CFR*** section 402.14(i). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the Act to apply. If Simpson fails to adhere to these terms and conditions, the protection of the section 10(a)(1)(B) permit and section 7(o)(2) may lapse. The amount or extent of incidental take anticipated under the proposed Simpson HCP, associated reporting requirements, and provisions for disposing of dead or injured animals, are calculated per the proposed action described in the HCP, IA, and the accompanying section 10(a)(1)(B) permit.
The Service should provide technical advice on monitoring and other biological issues associated with implementation of the HCP.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse

effects of a proposed action on listed species or critical habitat, help implement recovery plans, or to develop information.

We recommend the following per our section 7(a)(1) responsibilities:

- The Service should conduct regular compliance monitoring and review the periodic reports.
- The Service should assist Simpson in coordinating with surrounding landowners, particularly the U.S. Forest Service.
- The Service shall serve on the Scientific Advisory Team (SAT) to review monitoring programs and to make recommendations regarding adaptive management decisions.
- The Service should review progress made by Simpson and provide advice regarding updates and improvements to inventory data, including downed woody debris, snags, and standing defective tree; and corresponding updates to the stand structure and composition data in the RCRs, bull trout, western toad, and stream breeding amphibian distribution.

REINITIATION – CLOSING STATEMENT

This concludes formal consultation on the proposed Simpson HCP, IA, and ITP. 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 maintained (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 listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding this Biological/Conference Opinion, please contact Linda Saunders-Ogg of my staff at (360) 753-5826 or the letterhead phone/address.

Gerry A. Jackson