Upper Clack Thin

Fisheries Biological Evaluation
Clackamas River Ranger District, Mt. Hood National Forest
Fifth Field Watershed: Upper Clackamas

Table 1. List of Proposed, Endangered, Threatened, or Sensitive (PETS) Fish and Aquatic Mollusk Species found on the Mt. Hood National Forest and addressed under this Biological Evaluation:

	Date of Listing & Critical Habitat	Suitable Habitat Present	Species Present	Effects of Actions Alternatives	
Endangered Species Act Listing by ESU/DPS ***Threatened***				***No Action (A)***	***Action (B)***
Lower Columbia River steelhead & CH (*Oncorhynchus mykiss*)	1/06 9/05	Yes	Yes	NE	NLAA
Lower Columbia River chinook & CH (*Oncorhynchus tshawytscha)*	6/05 9/05	Yes	No	NE	NE
Columbia River Bull Trout* (*Salvelinus confluentus*)	6/98	Yes	No	NE	NE
Middle Columbia River steelhead & CH (*Oncorhynchus mykiss*)	1/06 9/05	Yes	No	NE	NE
Upper Willamette River chinook & CH (*Oncorhynchus tshawytscha)*	6/05 9/05	Yes	Yes	NE	NLAA
Lower Columbia River coho* *(Oncorhynchus kisutch)*	6/05	Yes	Yes	NE	NLAA
Regional Forester's Special Status Species List					
Interior Redband Trout *(Oncorhynchus mykiss spp.)*	7/04	Yes	No	NI	NI
Columbia duskysnail *(Colligyrus sp. nov. 1)*	1/08	Yes	Unk	NI	MIIH
Barren Juga *(Juga hemphilli hemphilli)*	1/08	Yes	Unk	NI	MIIH
Purple-lipped Juga *(Juga hemphilli maupinensis)*	1/08	Yes	Unk	NI	MIIH
Scott's Apatanian Caddisfly *(Allomyia scotti)*	1/08	Yes	Unk	NI	MIIH

Endangered Species Act Abbreviations/ Acronyms:		**Essential Fish Habitat Abbreviations/ Acronyms:**	
NE	No Effect	NAA	Not Adversely Affected
NLAA	May Affect, Not Likely to Adversely Affect	AE	Adverse Effects
LAA	May Affect, Likely to Adversely Affect		
Regional Forester's Sensitive Species List Abbreviations/ Acronyms:			
Unk	Species presence unknown but suspected		
NI	No Impact		
MIIH	May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species		

*****critical habitat is not designated for these species on Federal lands

Written by:

/S/ *Robert Bergamini* Date: 6/3/2008
Fisheries Biologist

I. INTRODUCTION

Forest management activities that may alter the aquatic habitat or affect individuals or populations of PETS (Proposed, Endangered, Threatened, and Sensitive) fish and aquatic species require a Biological Evaluation to be completed (FSM 267l.44 and FSM 2670.32) as part of the National Environmental Policy Act process and Endangered Species Act to determine their potential effects on sensitive, threatened or endangered species. The Biological Evaluation process (FSM 2672.43) is intended to conduct and document analyses necessary to ensure proposed management actions will not likely jeopardize the continued existence or cause adverse modification of habitat for:

A. Species listed or proposed to be listed as endangered (E) or threatened (T) by the USDI-Fish and Wildlife Service or USDC-NOAA Fisheries, and their listed or proposed listed critical habitat.

The Biological Evaluation process (FSM 2672.41) is also intended to conduct and document analyses to ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native plant or contribute to animal species or trends toward Federal listing of any species for:

B. Species listed as sensitive (S) by USDA-Forest Service Region 6.

The Upper Clack Thin project proposes the thinning of plantations that are between 42 and 55 years old that occur in various land allocations including matrix, late-successional reserves, wild and scenic rivers, viewshed, earthflow, and the dry upland portion of riparian reserves. The objective of this action is to provide forest products, maintain health, vigor, and growth that results in larger wind firm trees, enhance and restore stand diversity, enhance riparian reserves by accelerating the development of mature and late-successional stand conditions, and to accelerate future large woody debris recruitment potential and snag habitat production. The proposed treatments would be designed to meet Riparian Reserve and Late Successional Reserve objectives with a single thinning entry. Entry into riparian reserves is proposed within approximately 253 acres with the action alternative. Of these acres, thinning would occur on approximately 77.5 acres that are adjacent to LFH. A watershed analysis was completed on the Upper Clackamas Watershed in 1995 (USDA, 1995).

This Biological Evaluation addresses the alternatives presented in the Upper Clack Thin Environmental Assessment (EA).

PROJECT LOCATION

The Upper Clack Thin is located within the Upper Clackamas River fifth-field watershed. The Upper Clackamas watershed includes the headwaters of the mainstem Clackamas River and all its tributaries downstream to the confluence of the Collawash River. The Upper Clackamas watershed is 100,380 acres in size and contains 62 miles of anadromous streams, 82 miles of resident fish bearing streams, and approximately 332 miles of non fish-bearing streams. Approximately 94,794 acres of the watershed is within the Mt. Hood National Forest. About 5,600 acres lie within the Confederated Tribes of the Warm Springs Reservation of Oregon, and approximately 150 acres at Austin Hot Springs are privately owned.

The Upper Clack Thin project is located in T.6S., R.6E.; T.6S., R.7E.; T.7S., R.7E.; T.8S., R.7E.; T.7S., R.8E.; Willamette Meridian. The proposed treatment area is located within nine drainages of the Upper Clackamas River. The total area of the drainages associated with the project is 52,259 acres and includes: Pinhead Creek, Last Creek, Big Bottom, Upper Clackamas River Austin, Pot Creek, Upper Clackamas Headwaters, Lowe Creek, Rhododendron Creek, and the Fawn Creek drainages.

ACTIVITIES OF THE ACTION ALTERNATIVE

The following project elements are components of the action alternative:

Timber Felling

Felling of the timber will be accomplished by hand felling or the use of mechanical harvester/processors. Harvesters will be required to work on a layer of residual slash placed in the harvester path prior to advancing the equipment. Harvester travel routes will be limited to one pass over a path whenever possible to reduce soil displacement. To reduce the risk of erosion harvesters will be restricted to operate only during the dry season (May 31 to November 1). This restriction may be waived if soils are dry or frozen.

Treatment occurring within riparian reserves is designed to meet riparian reserve objectives. This includes protecting current resources, such as maintaining stream temperatures and short-term wood recruitment needs, and long term objectives such developing large wood for future recruitment. Riparian reserve widths for this project are 180 feet (one site potential tree height) on each side of non-fish bearing streams and 360 feet (two site potential tree heights) in width on each side of fish-bearing streams (as described in watershed analysis documents).

No-cut steam protection buffers a minimum of 100 feet wide will be maintained along streams adjacent to listed fish habitat (LFH). The 100 foot no-cut buffer applies to units 16, 18, 21, 22, 23, 24, 33a, 34 and 38. A minimum 50-foot wide stream protection buffer will be maintained along all other perennial and intermittent stream channels within the project area. Larger buffer widths may be maintained on a site-specific basis to prevent any increase in sediment delivery rates or a decrease in stream shading. Buffer width design will take into account the stream influence zone, steepness of slope, size and location of trees, orientation of the site to the sun (aspect), slope stability, and stream bank stability.

Within 50 feet of the stream protection buffers, only hand felling or low impact harvesting equipment such as mechanical harvesters would be allowed. Mechanical harvesting equipment would be required to operate on slash-covered paths. Trees in this zone would be directionally felled away from the protection buffers to minimize the disturbance to the forest floor.

The thinning prescription within riparian reserves will maintain an average conifer relative density (RD) value of 30 between the stream protection buffer and one site potential tree height along all streams less than one mile from LFH. In stands greater than one mile upstream from LFH, an RD value of at least 30 would be maintained within 100 ft. of the stream. The thinning prescriptions within riparian reserves would also maintain an average 50% canopy closure up to one site potential tree height from all streams in order to retain shade-producing vegetation within the secondary shade zone. The dry upland portions of the riparian reserves would be thinned to a relative density of 20 to 35. This design criterion is expected to maintain a canopy closure that provides adequate shade over streams, and therefore is unlikely to alter water temperatures.

Gaps (or patch cuts) from 0.1 to 0.25 acre in size would be created within riparian reserves. Gaps would make up to 10% of each unit's riparian component. The distance separating a gap or patch cut from LFH would be greater than 180 feet. The distance separating a patch cut from all other streams would be at least 100 feet.

Treatment occurring within late-successional reserves would retain trees at a relative density of 20 to 40. Where riparian reserves overlap late successional reserves, the design features for riparian reserves will take priority in the riparian reserve component. In late-successional reserves trees would not be cut if they are greater than 20 inches in diameter (at a height of 4.5 feet). Skips (untreated areas) would be created that would vary in size and would comprise a minimum of 10% of each unit. Skips would be 0.25 to 1.25 acres or larger based on site-specific features. Where riparian reserves overlap late-successional reserves, the stream protection buffers may be counted as skips. Gaps within late-successional reserves would be 0.1 to 0.25 acres in size and would make up 3% to 10% of each unit's late-successional reserve component. Gaps would have 6 or fewer trees heavy thinning (25 to 50 trees/acre) would be placed in areas that are expected to grow quality wildlife forage.

Treatment within the matrix would be designed to increase health and growth that results in larger wind firm trees. The thinning prescription would maintain a relative density value of 25 to 35. Skips would be created that would vary in size and would comprise up to 5% of each unit. Where riparian reserves cross through matrix, the protection buffers adjacent to streams would be counted as skips. Gaps would be created within matrix, they would be 0.1 to 0.25 acre in size and would make up to 3% of each unit's matrix component. In addition to these gaps, larger forage openings would be created by thinning to prescription of 40 trees/acre. These areas would be 3 to 5 acres in size and would be located in areas that are conducive to grow quality forage.

Yarding

Yarding will be accomplished utilizing a combination of mechanical harvester, processor, tractor, skyline, and helicopter logging systems. The total acres of each yarding method are as follows:

- Ground Based – 800.7 acres
- Skyline – 262.4
- Helicopter – 30.7

All ground based tractor operations will take place on slopes averaging less than 30% to avoid the risk of damage to soil and water resources. Mechanical fellers would be permitted on slopes up to 35% if operated on a layer of slash. No operation of ground-based yarding equipment will be permitted between November 1 and May 31 to reduce the risk of soil compaction and erosion. This restriction may be waived if soils are dry or frozen or if operators switch to skyline or other non-ground based systems. Mechanical harvesters and forwarders would be required to work on a layer of residual slash placed in the harvester path prior to advancing the equipment.

Within 50 feet of the no-cut stream protection buffers, only low impact, minimal ground disturbing harvesting equipment such as mechanical harvesters or skyline systems (suspension yarding) would be allowed. Trees in this zone would be directionally felled away from the no-harvest buffer to minimize the disturbance to the forest floor.

Ground based equipment will be required to use existing skid trails whenever feasible. There may be instances where it is not desirable to use an existing skid trail (such as where an old skid trail crosses a wet area) and in such cases, if a skid trail is needed in the area, a new skid trail would be located that does not alter surface hydrology. The use of designated skid trails and/or forwarder paths will help to minimize detrimental soil compaction within the project area. Following harvest activities, effective ground cover will be provided on ground based skid roads that have a potential for erosion problems. Water bars and/or cross ditches will be installed where needed to disperse water and control surface run-off.

All skyline yarding will incorporate one end or full suspension if needed, such as when yarding over a stream channel or seep. Skyline yarding will not occur over LFH or within the buffers associated with these streams. Yarding corridors will be approximately 15 feet wide and 100 to 200 feet apart. Skyline yarding will be allowed during all seasons.

Road Construction/Reconstruction/Landing Construction
Road construction/reconstruction will involve construction of new semi-permanent roads, landing construction, and re-opening old temporary roads constructed when the area was originally logged.

Approximately 0.86 miles of new temporary (semi-permanent) road will be constructed to access units under the action alternative. This road construction is comprised of 0.31 miles of new road on undisturbed surfaces and 0.55 miles of road that will be constructed on previously disturbed skid trails. Temporary roads would normally be constructed, used and obliterated in the same operating season. If this is not possible, due to fire season restrictions or other unforeseen delays, the road would be winterized prior to the end of the normal operating season by out-sloping, water-barring, effectively blocking the entrance, seeding, mulching and fertilizing.

Approximately 1.51 miles of old existing temporary road and 1.75 miles of old system roads that were decommissioned would be re-opened to access the stands. The majority of these roads have been closed since the original entry into the stands. Re-opening these roads will consist of removing any gates or berms presently blocking vehicle access, brushing overgrown areas, blading, and spot rocking where needed. Most of these roads have been previously rocked. Road work will not involve any culvert installation or removal. All roads currently closed and constructed during the previous entry in proposed treatment units and that are proposed to be reopened are outside one site potential tree height (180 ft.) from streams.

Road construction will be restricted to the dry season between June 1 and October 31 unless unusually dry conditions permit activities outside this window. Conversely, road construction will not occur if conditions exceed best management practice standards that protect soil and water. All roads reopened by the project will be decommissioned following harvest activities. Decommissioning will consist of storm proofing by installing water bars and barricading the roads to vehicular traffic. Some of these roads will be used during future entries into matrix lands.

Existing landings will be used whenever feasible. The Forest Service will approve landing locations in areas where there are resource concerns. Landings in riparian reserves would be located on existing roadways not requiring expansion of the road prism, or on existing landings that require only minimum reconstruction (clearing vegetation generated from earlier entries, sloping for drainage, or surfacing for erosion control purposes) to be made suitable for use. The use of existing landings within 200 feet of LFH would be prohibited unless they are approved by NOAA Fisheries. The use of existing landings located within Riparian Reserves will only be used if they are greater than 100 feet from any stream. The size and number of landings will be kept to the minimum required to harvest the units. Landings planned for use outside of the normal operating season (June1-Oct.31) will be surfaced with aggregate material.

When helicopter yarding is incorporated, the number of landings and their size would be kept to a minimum required to reasonably harvest the units. Landings will be located by the purchaser and approved by the Forest Service.

Road Maintenance
Road maintenance will involve any work needed to renovate or upgrade road systems in order for timber transport to occur in a safe manner. Maintenance to existing system roads prior to hauling will include deep patch repairs, placement of new aggregate surfacing where necessary to upgrade the quality of the road bed and improve road drainage, reconditioning the roadbed (grading), spot patching, sealing, brushing, and ditch cleanout where needed.

Ditch cleanout would be the removal of any material that may have slid into the ditch line that could impede the drainage capability. Waste material from the ditch cleanout would be disposed in sites located outside of Riparian Reserves. Existing ditch line vegetation would be maintained whenever possible to reduce the risk of erosion. Where the potential exists to deliver sediment to streams, sediment traps or other appropriate methods will be utilized during ditch cleaning. Road construction or maintenance will be restricted to the dry season between June 1 and October 31 unless unusually dry conditions permit activities outside this window.

Log Haul
The haul route will be along both aggregate and paved surface roads. The major system roads that will be used to transport timber are Forest Service (FS) roads 4600 and 4200. These road systems are paved and maintained for public safety. Secondary roads to be used for haul such as 6310, 4640, 4650, and 5720 are paved along much of the haul route. The network of aggregate surfaced roads along the route are level two and level three system roads, where the ditches are maintained and vegetated.

There are two aggregate surfaced stream crossings along the haul route that cross over LFH at Pinhead Creek and West Pinhead Creek. Both crossings are located along road 4680140. Pinhead Creek flows intermittent at one of the crossings during dry times of the year. The other crossing is located at West Fork Pinhead Creek and has a perennial flow regime. In order to reduce the risk of road related sediment from entering LFH, haul would not be allowed over these crossings when conditions exist (e.g. during intense or prolonged rainfall) that may cause generation of road related runoff to streams. All other stream crossings where LFH occurs are along asphalt surfaced roads therefore the probability of sediments reaching the stream channels at these crossings is extremely rare. Any sediment that leaves the road surface due to run-off is expected to disperse over land or be stored within the smaller tributary streams along the haul route. If any sediment is transported downstream it would be during the beginning of the rainy season and would be diluted by a sufficient volume of water where it would be indistinguishable from background levels. It is very unlikely that any measurable amount of sediment produced during log haul would be transported to stream channels where listed fish species occur. If any sediment did enter stream courses from hauling activities, it would be in very small amounts and for a short-term duration. No adverse effect to water quality or fisheries resources is expected to occur from log hauling activities.

The majority of timber hauling would be allowed year-round on rock-aggregate surfaced roads. On natural surfaced roads haul will be limited to the dry season normally June 1 – October 31. Aggregate surfacing will be required on native surfaced roads if they are used outside of the normal operating season. During the wet season, log haul would only be permitted on asphalt and rocked roads when conditions would prevent sediment delivery to streams. Hauling and maintenance activities would be suspended when conditions exist that may cause the generation of excessive sediment, such as intense or prolonged rainfall; or when the road surface is deteriorating due to freeze-thaw cycles or from excessive use. Haul will be stopped if there is rutting of the road surface or a noticeable increase in the turbidity of water draining to the road ditches or at stream crossings. In periods of high rain-fall, the contract administrator may restrict log hauling on all roads to minimize water quality impacts.

Road Decommissioning
All new semi-permanent roads and existing temporary roads reopened by the project will be decommissioned following harvest activities. Decommissioning will consist of ripping the road surface and storm proofing by installing water bars and barricading the roads to vehicular traffic. Road decommissioning activities would be restricted to the dry season between June 1 and October 31 unless unusually dry conditions permit activities outside this window. There are no culverts associated with the semi-permanent or existing temporary roads that will be decommissioned.

Fuels Treatment
Fuels treatment following completion of harvest activities will consist of burning landing debris where needed to reduce fire hazard. No other burning or slash treatment is planned.

DESCRIPTION OF ALTERNATIVES

Alternative A - No Action

Under the No-action alternative, current management plans would continue to guide management of the project area. No timber harvest or other associated actions would be implemented to accomplish project goals.

Alternative B – Action Alternative

Alternative B proposes to commercially thin plantations that are between 42 and 63 years old that occur in various land allocations as described in the Northwest Forest Plan, including matrix, late-successional reserves, and the dry upland portion of riparian reserves. Thinning will occur on approximately 1,094 acres of matrix and late-successional reserves (LSR). Thinning is proposed on approximately 641.4 acres of LSR approximately 253.2 acres within riparian reserves. Thinning would be designed to enhance diversity by applying variable density prescriptions that includes density management elements such as trees unevenly spaced, small gaps (openings) and small skips (clumps) within residual stands. Riparian Reserve prescriptions would encourage understory growth and development of intermediate forest layers.

All stands have been planted and pre-commercially thinned. The understory vegetation such as conifers and some brush species are experiencing growth suppression due to a decrease in sunlight reaching the forest floor.

The average tree height within the stands proposed for treatment ranges from 75 feet to 198 feet with dbh averaging between 10 and 16 inches. The present stocking levels range from 133 trees per acre to 570 trees per acre. The current canopy cover in the stands ranges from 59 to 87%. The average post-thinning canopy cover for all stands would be between 42 and 57%, a prescription considered as a moderate thin. The timber to be harvested is primarily Douglas fir and western hemlock.

Logging systems under alternative B would include: 800.7 acres of ground based systems, 262.4 acres skyline, and approximately 30.7 acres of helicopter logging.

Approximately 0.86 miles of new temporary road will be constructed to access units under alternative B. This road construction is comprised of 0.31 miles of new road on undisturbed surfaces and 0.55 miles of road that will be constructed on previously disturbed skid trails. The new temporary roads will be of native surface and located on relatively flat ground or along ridge tops, outside of any riparian reserve.

All new roads are in locations where there would not be any increase in the stream drainage network. Following harvest activities, all of these roads and newly constructed landings will be ripped and seeded.

INTERRELATED OR INTERDEPENDENT ACTIONS

Secondary impacts include interrelated projects that have no independent utility apart from the proposed action, and interdependent projects that are a part of a larger action and depend on the larger action for justification.

There are no interrelated or interdependent actions for the proposed action.

PRESENCE OF PETS FISH AND AQUATIC SPECIES WITHIN OR DOWNSTREAM OF THE ACTION AREA

Columbia River Bull Trout *(Salvelinus confluentus)* - (Threatened) Bull trout were once prolific in the Clackamas River system. At present, they are believed to be extinct. Adult bull trout that occurred in the Clackamas River exhibited a fluvial life history character, maintaining residence in the main river and larger tributaries. It is quite likely that adult bull trout in the Clackamas River migrated to the Willamette and Columbia Rivers prior to construction of River Mill Dam. Adult bull trout would reside in the mainstem and larger tributaries until their spawning period during mid-August through September, at which time they would migrate upstream to smaller tributaries to spawn.

U.S. Forest Service fisheries biologists conduct fisheries sampling on an annual basis on many streams throughout the Clackamas River watershed upstream of North Fork Reservoir. To date, these sampling efforts have never yielded capture of bull trout. After several years of intensive sampling, U.S. Forest Service fisheries biologists believe that bull trout in the Clackamas River are considered to be "functionally extinct."

Lower Columbia River Steelhead (*Oncorhynchus mykiss*) - (Threatened) Adult steelhead migrate into the waters of the Clackamas River drainage above North Fork Dam primarily during April through June with peak migration occurring in May. Spawning occurs during the months of April through June in the Upper Clackamas River and during the months of March through June in the Oak Grove Fork. Steelhead use the majority of the mainstem Clackamas and major tributaries such as the South Fork of the Clackamas River, Fish Creek, Roaring River, Oak Grove Fork, Collawash River, and the Hot Springs Fork of the Collawash as spawning and rearing habitat. Winter steelhead fry emerge between late June and late July and rear in freshwater habitat for one to three years. Smolt emigration takes place March through June during spring freshets.

LCR steelhead and their designated critical habitat occur in the mainstem Clackamas River, Last Creek, and Pinhead Creek adjacent to or downstream of the action area.

Upper Willamette River Spring Chinook (*Oncorhynchus tshawytscha*) - (Threatened)
Upper Willamette River spring chinook salmon occur in the Clackamas River. The ESU consists of both naturally spawning and hatchery produced fish. These spring chinook enter the Clackamas basin from April through August and spawn from September through early October with peak spawning occurring the 3rd week in September. These fish primarily spawn and rear in the mainstem Clackamas River and larger tributaries.

Adults in the lower Clackamas drainage spawn in lower Clear Creek, Deep Creek, and Eagle Creek, below River Mill Dam and between River Mill and Faraday diversion dams. Spawning in the upper Clackamas drainage has been observed in the mainstem Clackamas from the head of North Fork Reservoir upstream to Big Bottom, the Collawash River, Hot Springs Fork of the Collawash River, lower Fish Creek, Roaring River, and the first 0.4-mile of the South Fork Clackamas River.

Upper Willamette River chinook and its critical habitat occur in the mainstem Clackamas River, Last Creek, and Pinhead Creek.

Lower Columbia River Fall Chinook (*Oncorhynchus tshawytscha*) (Threatened)
The fall chinook within the Clackamas Subbasin are thought to originate from "tule" stock which was first released into the subbasin in 1952 and continued until 1981. Since 1981 no fall chinook have been released into the Clackamas River. However some adult fall chinook released as juveniles above Willamette Falls may have strayed into the Clackamas River.

Historically fall chinook spawned in the mainstem Clackamas River above the present site of the North Fork Dam before its construction. Currently the "tule" stock of fall chinook spawn in the mainstem Clackamas River below River Mill Dam and in the lower reaches of Clear Creek. Fall Chinook spawn late August through September. These fish primarily spawn and rear in the mainstem Clackamas River and larger tributaries and are not found above River Mill Dam. The nearest occurrence of LCR chinook or its critical habitat to the project area is below River Mill Dam on the mainstem Clackamas River over 30 miles downstream of any units associated with the Upper Clack Thinning Project.

Lower Columbia River Coho Salmon (*Oncorhynchus kisutch*) (Threatened)
The Clackamas River contains the last important run of wild late-run winter coho in the Columbia Basin. Coho salmon occupy the Clackamas River and the lower reaches of streams in the Upper Clackamas watershed including the lower two miles of the Oak Grove Fork. Adult late-run winter coho enter the Clackamas River from November through February. Spawning occurs mid-January to the end of April with the peak in mid-February. Peak smolt migration takes place in April and May.

LCR coho salmon occur in the mainstem Clackamas River, Last Creek, and Pinhead Creek.

Columbia Dusky Snail
(*Colligyrus sp. nov. 1*)
Special Status

Colligyrus occurs in cold, well oxygenated perennial springs and spring outflows in shallow, slow-flowing areas. Most of the Columbia duskysnails found on the forest have been found in slow, clear, cold (<14 Celsius) water of small systems, such as spring, spring outflow and headwater tributaries. The substrate of site ranges from silt to cobble, and there seems to be a strong association with aquatic moss, especially Fontinalis. Often the snails are on the “fronds” of this moss in the sample area. There doesn’t appear to be an association with other aquatic macrophytes.

This species of aquatic mollusk has been found across the Forest during surveys conducted over the past several years (Mt. Hood National Forest, unpublished data). Habitat requirements for this species are fairly specific: cold well oxygenated springs, seeps, and small streams, preferring areas without aquatic macrophytes. Individuals have not been found in larger streams and rivers, or glacial streams.

Surveys for the Columbia duskysnail have been conducted at sites across the Forest for a wide range of projects. This mollusk has been found in many areas across the Forest and is likely to be present in seeps, springs, and smaller streams near and within the proposed project area.

Barren Juga
(*Juga hemphilli hemphilli*)
Special Status

This species of aquatic mollusk is found in fresh water habitats in small to medium sized highly oxygenated cold water streams at low elevations. The species prefers streams that have moderate velocity level bottoms with stable gravel substrates. The known range of this species is the Columbia River Gorge in Oregon and Washington. They have been found in the Mt. Hood National Forest and the Columbia Gorge National Scenic Area. They are also suspected to occur in the Gifford Pinchot National Forest.

The species reach sexual maturity in 3 years and may live 5 to 7 years. The species can breed more than once in its lifetime. They graze on rock surfaces and deciduous leaf litter for periphyton and migrate up and downstream during seasonal migrations. Cannot survive long out of water.

Purple-lipped Juga
(*Juga hemphilli maupinensis*)
Special Status

The Purple-lipped Juga is endemic to Oregon. It is found in large streams at low elevations. These snails prefer riffle habitat with stable gravel substrates, in cold well oxygenated water. It is more tolerant of silt and slack water than other Juga subspecies. The known range of the species is the Lower Deshutes River drainage, below Pelton Dam, and the Warm Springs River in Wasco and Sherman Counties, OR. Sites known from Warm Springs Reservation and Prineville BLM in Deschutes Wild and Scenic River Area.

The species reach sexual maturity in 3 years and may live 5 to 7 years. The species can breed more than once in its lifetime. They graze on rock surfaces and deciduous leaf litter for periphyton and migrate up and downstream during seasonal migrations. These snails can not survive long out of water.

Scott's Apatanian Caddisfly
(Allomyia scotti)
Special Status

This species of caddis fly inhabits small cold mountain streams. The species has been found in four locations on Mt. Hood: from an alpine stream below Timberline Lodge, the south fork of Iron Creek, from a stream at the junction of Highways 35 and 48, and on a tributary of the Salmon River. The species may occur in other localities on or near Mt. Hood, and is presumed to prefer springs supplied by permanent snowfields however, extensive surveys have not been conducted.

The larvae and pupae inhabit small, cold mountain streams, often at high elevations. The larvae occur at the base of moss fronds and pupal cases are attached to moss. Two years are required to complete the life cycle. Prepupae occur as early as June and are still present in September, but have changed to pupae by the following April. A limiting factor in the occurrence of *A. scottia* is a lack of moss fronds in small, cold, alpine streams.

EFFECTS DETERMINATION

The effects determination of the Upper Clack Thinning Project will be based on project elements of the action alternatives that could have potential direct or indirect impacts on PETS fish and aquatic species or their habitats. These project elements include:

- Timber Felling
- Road maintenance/construction
- Yarding
- Log haul
- Road decommissioning (obliteration)

The analysis of effects focused on relevant habitat indicators that potentially could be affected by these project elements. The relevant habitat indicators include:

- Sediment
- Temperature
- Peak/Base Flow

Direct Effects and Indirect Effects

Potential effects associated with project elements of the Upper Clack Thinning Project are:

- Increased levels of fine sediment in local streams generated during road building, road obliteration, logging, and hauling.
- Increase in stream temperature caused by loss of streamside vegetative cover by thinning within Riparian Reserves.
- Increase in peak flows caused by removal of vegetative cover.

To determine potential effects to PETS species, each of the relevant habitat indicators was evaluated by proximity to the action area, probability that an effect would occur, and magnitude of the action, if needed.

COMPARISON OF ENVIRONMENTAL CONSEQUENCES BY ALTERNATIVE

Alternative A (No Action)

With Alternative A there would be no short-term effects to water quality or fisheries resources. Since there would be no ground disturbance from harvest activities such as timber falling, yarding, road construction/maintenance, road decommissioning, or log haul, there would be no potential for any increase in surface erosion or sedimentation. Since no timber harvest would occur within riparian reserves, there would be no change in streamside canopy cover that could reduce stream shade or increase solar radiation to the stream channel potentially increasing stream temperatures. Water temperatures within and downstream of the project area would remain in their present state with the no action alternative.

If no action were taken in riparian reserves, riparian stands would maintain their mid-seral structure for many decades not reaching the desired late-successional characteristics as quickly as thinned stands. There could potentially be negative long-term effects because stands would gradually become overcrowded, reducing the capability to produce the size and quantity of coarse woody debris sufficient to

sustain in-stream habitat complexity, stream bank stability, and overall health of the riparian reserves. Stands under this condition would be denser, less diverse (structurally), have smaller diameter trees, and less understory development compared to the action alternatives.

Action Alternative

Sediment

Sediment from Road Construction and Road Maintence Activities – Road construction and road maintenance activities have the potential to indirectly introduce fine sediment into stream channels. Road maintenance prior to log haul would help maintain the design drainage of the road surface which reduces the potential for larger sediment inputs to runoff that eventually enters stream courses. The action alternative proposes to re-open old temporary roads from previous entries and to temporarily re-open system roads that have been closed with berms or other devices. Additionally, Alternative B proposes to construct approximately 0.86 miles of new temporary road to access the stands. This road construction is comprised of 0.31 miles of new road on undisturbed surfaces and 0.55 miles of road that will be constructed on previously disturbed skid trails.

Maintenance of the existing system roads prior to hauling would include measures to upgrade the quality of the road bed and to improve road drainage. This includes the placement of new aggregate surfacing where necessary, blading, brushing out encroaching vegetation, removing berms, and ditch cleanout where needed. Aggregate road surfacing greatly minimizes the amount of fine sediment from road surfaces entering streams following log haul, especially during and following rainfall events. Additionally, deep patch repairs to the roadbed and converting asphalt to aggregate surface is proposed along some segments of the haul route.

Road related ground disturbing activities have been designed to minimize the risk of sediment being transported to streams from erosion or surface run-off. Road work would be restricted to the dry season between November 1 and May 31. This restriction would reduce the risk of any surface erosion due to ground disturbance.

With Alternative B, the proposed temporary roads are located on dry ground, would not cross stream channels, and would have no hydrologic link to any water source. As a result, there would be a very low probability of any sediment from temporary road surfaces reaching streams. These roads would be constructed along ridgetops, benches, or gentle slopes, where they would not cause an increase in the stream drainage network. Because of the distance of any proposed new or existing temporary roads to any water source, and the fact that these roads do not cross any perennial or intermittent streams, vegetative buffers would act as an effective barrier to any sediment being transported into stream channels by surface erosion or runoff.

All new temporary roads and reopened temporary roads would be obliterated and revegetated directly following completion of harvest operations to help reduce compaction, increase infiltration rates, and minimize surface erosion.

Road maintenance prior to log hauling also increases the risk of road related sediment entering streams near road crossing during rainfall events. This increase is associated primarily with aggregate and native surface roads although ditch cleaning associated with paved roads is a potential sediment source. Any fine sediment created by road maintenance activities would most likely be washed from the road surface in the first few precipitation events of the fall that are sufficient to cause runoff from the road surface. Although

there is a possibility of increased sediment entering streams due to these activities, most road related sediment would be trapped and stored in the ditches or on the forest floor below cross drains. In the event that sediment was to reach stream channels within the project area, most fine particles would likely be trapped and stored in the small tributary streams before they are able to reach any habitat where ESA listed fish species are found. Any impacts from the minimal amount of sediment generated during these activities would be for a short-term duration, and undetectable at a subwatershed (6^{th} field) or watershed (5^{th} field) scale. The probability of any impacts to water quality or fisheries resources caused by sedimentation due to road construction, reconstruction, maintenance, or road obliteration, is extremely low.

Decompacting the road surface during obliteration loosens the soil, thus making it more likely to be mobilized during the first significant run-off period unless the road is on relatively flat terrain, not near streams, or sufficient ground cover is provided. Project design criteria and associated BMPs for road decommissioning would reduce the risk of sediment entering any stream course. The impacts to water quality or fisheries resources caused by sedimentation due to road construction, reconstruction, maintenance, or road obliteration, if any, would be short-term and undetectable at the watershed or subwatershed scale. The risk of road related sediment input to streams would be greater for the action alternative.

Sediment from harvest activities – Thinning, particularly within riparian reserves, is a potentially ground disturbing activity that has the potential to cause a temporary reduction in water quality by allowing sediment to enter stream channels from surface erosion or run-off. Tree falling, ground-based yarding methods, and to some extent cable yarding methods (when full suspension isn't achieved) disturb soils that may result in minor sediment movement at the site level. Ground-based harvesting equipment and cable yarding does cause some direct soil displacement which would be mitigated through project design criteria. Most of the sediment produced from timber harvesting would travel short distances before being trapped by duff, woody materials, and other obstructions. The probability of overland surface runoff on uncompacted soil surfaces is also low for the soils in the project planning area.

Project design criteria would incorporate no-cut stream protection buffers a minimum of 100 ft. wide along all perennial streams that are adjacent to LFH. A minimum 50 ft. wide no-cut protection buffer would be established along all other perennial and intermittent streams within the project area. Buffer width design would take into account the stream influence zone, steepness of slope, size and location of trees, orientation of the site to the sun (aspect), slope stability, and stream bank stability. No-cut areas would include any buffer of hardwood vegetation occurring along the stream bank. No-cut buffers would generally be at the top of slope breaks on steeper ground and would circumvent all wet areas to maintain canopy cover along riparian areas.

To further reduce the risk of surface erosion entering streams as fine sediment, only low impact harvesting equipment such as, mechanical harvesters or skyline systems, which have minimal ground disturbance would be allowed within 50 feet of the stream protection buffers. Mechanical harvesting equipment would be required to operate on slash-covered paths and travel routes would be limited to one pass over a path whenever possible. Trees in this zone would be directionally felled away from the protection buffers to minimize the disturbance to the forest floor. These requirements would maintain the indicators for sediment, stream temperature, stream bank condition, and large woody material indicators.

These vegetative buffers would act as an effective barrier to any sediment being transported into stream channels by surface erosion or run-off and would minimize the risk of any channel or water quality impacts. The stream protection buffers on either side of the streams would likely retain any displaced and

eroded soil before it is transported to the stream channel. These buffer widths would allow soil infiltration between the unit and any water source. Surface roughness, vegetation, and duff in untreated buffers would filter most sediment coming off surfaces before reaching streams. The use of skyline or helicopter yarding systems on steeper ground within riparian reserves would minimize ground disturbance. Seasonal restrictions on ground-based operations would further reduce the risk of soil disturbance and run-off. Even if some soil movement occurred, the vegetated buffer strips along every perennial or intermittent channel would act as an effective barrier. The probability that measurable amounts of fine sediment would enter any stream within the project area as a direct result of logging activity is low.

Skyline yarding has the potential to cause some soil displacement and compaction because it is sometimes difficult to get full suspension of logs. Helicopter yarding rarely results in soil displacement because full suspension is achieved. Because of less ground disturbance, the chance of sediment reaching the stream channel is less likely. The probability that measurable amounts of fine sediment would enter any stream within the project area as a direct result of logging activity is low under all the proposed action alternative.

Sediment from log haul – (same effect for all action alternatives). Log hauling along aggregate surface or native surfaced roads has the potential to introduce sediment in small quantities to streams. Traffic breaks down surfacing material resulting in finer surface gradation and increased sediment transport from the road surface. Any fine sediment created by hauling traffic would more than likely be washed from the road surface in the first precipitation event that is sufficient to cause runoff from the road surface. Any input of sediment is expected to be minimal as the roads where there is a potential for surface run-off are asphalt or durable crushed rock. All native surfaced roads along the haul route are outside of riparian reserves, along ridge tops or gentle terrain, and have no hydrological connection to any streams. Road use however would be restricted to periods when road related runoff is not present and as such, little sediment is expected to leave the road bed while haul is occurring.

During the wet season, log haul would only be permitted on asphalt and rocked roads when conditions would prevent sediment delivery to streams. In periods of high rain-fall, the contract administrator would restrict log hauling when necessary to minimize water quality impacts. Haul would be stopped if there is rutting of the road surface or a noticeable increase in the turbidity of water draining to the road ditches or at stream crossings.

Log hauling would not measurably increase the amount of fine sediment in streams. The roads along the haul route are rocked or paved at stream crossings, and road ditches are well vegetated. Road maintenance prior to log haul would help maintain the design drainage of the road surface which reduces the potential for sediment to runoff into stream courses. The potential for sediment input into streams along the haul routes would further be minimized by permitting haul only when conditions would prevent sediment delivery to streams. Any sediment that could enter a stream during haul activities would be at crossings along aggregate surfaced roads. The majority of these crossings are at intermittent or small perennial streams that would have very little flow, during the normal season of operation (June 1 to October 31).

There are two aggregate surfaced stream crossings along the haul route that cross over LFH at Pinhead Creek and West Pinhead Creek. Both crossings are located along road 4680140. Pinhead Creek flows intermittent at one of the crossings during dry times of the year. The other crossing is located at West Fork Pinhead Creek and has a perennial flow regime. In order to reduce the risk of road related sediment from entering LFH, haul would not be allowed over these crossings when conditions exist (e.g. during intense or prolonged rainfall) that may cause generation of road related runoff to streams. All other stream crossings where LFH occurs are along asphalt surfaced roads therefore the probability of sediments

reaching the stream channels at these crossings is extremely rare. Any sediment that leaves the road surface due to run-off is expected to disperse over land or be stored within the smaller tributary streams along the haul route. If any sediment is transported downstream it would be during the beginning of the rainy season and would be diluted by a sufficient volume of water where it would be indistinguishable from background levels. It is very unlikely that any measurable amount of sediment produced during log haul would be transported to stream channels where listed fish species occur. If any sediment did enter stream courses from hauling activities, it would be in very small amounts and for a short-term duration. No adverse effect to water quality or fisheries resources is expected to occur from log hauling activities.

Stream Temperature

Project design criteria were developed to reduce any potential for adverse impacts to stream temperature as the result of thinning within riparian reserves, and to meet guidelines in the Northwest Forest Plan Temperature TMDL Implementation Strategy (2005). The no-cut stream protection buffers along perennial and intermittent streams are designed to meet stream temperature goals by avoiding harvest in the primary shade zone and retaining shade producing vegetation. The primary shade zone consists of vegetation that intercepts solar radiation between 1000 and 1400 hours, which is critical for providing stream shade and maintaining stream temperature.

The no-cut buffers would insure that the majority of shade producing vegetation would remain and there would be no measurable increase in solar radiation. In addition to protection buffers, project design criteria would maintain a conifer relative density (RD see Stand Health and Productivity section for more on relative density) value of at least 30 in the stand area located between the protection buffer and one site potential tree height (180 ft.) from the stream within stands that are adjacent to or within one mile of LFH. In stands adjacent to stream reaches that are greater than one mile upstream from LFH, an RD value of at least 30 would be maintained within 100 ft. from the stream. The thinning prescriptions within riparian reserves would maintain an average 50% canopy closure up to one site potential tree height from all streams in order to retain shade producing vegetation within the secondary shade zone. This design criterion is expected to maintain a canopy closure that provides adequate shade over streams and therefore is unlikely to alter water temperatures.

Since many of the streams that flow within proposed units are relatively small, and provide very little or no flow during the hottest time of the year, the designated stream protection buffers would provide adequate canopy cover to maintain existing shade components thus, maintaining stream temperatures. Streams adjacent to LFH within the project area have increased no-cut protection buffers of 100 ft. that would maintain the existing shade components along these larger streams. Stream temperatures are not expected to exceed the tolerance limits of resident or anadromous fish species or other aquatic organisms.

Protection buffers applied to the intermittent non-fish bearing streams in the project area would retain direct overhead shading. Intermittent streams within the project area only carry water during wet times of the year (winter and spring) when temperatures are cooler. Since these channels have little or no surface flow during the summer time when elevated stream temperatures are of concern no significant increase in stream temperature is expected downstream. No water quality effects are foreseen, and the low probability of effects would decrease, as the canopy and ground cover are re-established to pre-harvest conditions. Adherence to project design criteria would maintain the current canopy that provides shade over streams therefore, project implementation is unlikely to alter water temperatures. Any increase in stream temperatures would be immeasurable at the site or watershed scale. Current stream temperatures in all streams within and downstream of the project area are expected to be maintained.

Flow

For this proposal, the following actions have the potential to affect hydrologic recovery: actions that remove or kill trees to a level below 70% canopy cover are considered a watershed impact area. These actions would include thinning, landing creation, trees removed for skid trails or skyline corridors, trees removed for road construction, snag creation and felling trees for down wood. Other aspects of the proposed action such as road reconstruction or repair would not have a meaningful or measurable affect on hydrologic recovery because they do not alter canopy cover.

The action alternative involves the creation of variability in the stands. Portions of the stands in stream protection buffers and skips would be left un-thinned. Other portions of the stands would have gaps, temporary road construction, landings, helicopter landings, skid trails and skyline corridors that would be open. The rest of each stand would have variable density thinning. The average post thinning canopy cover for all stands would be between 42 and 57%.

Any potential increase in flow in the Project Area is not expected to be measurable at the downstream end of the Action Area due to the distance and relatively low probability of any potential flow increase. Current conditions in the project area indicate a low risk for peak flow enhancement. Since the proposed action will maintain all treated stands at no less than 42% crown closure, this proposal results in a very low probability of additional risk. The amount of the existing overstory vegetation that will be harvested within the units, will not likely cause a net reduction in the evapotranspiration rate within the affected drainages. Thus, there will be no increase in the volume of water available for transport by the stream network during early season precipitation events. There would be no increase in the drainage network due to roads as a result of the project since road segments proposed for construction have no hydrologic connection.

Cumulative Effects

Cumulative effects associated with the Upper Clack Thinning Project would focus around changes in the timing and/or magnitude of flow events resulting from past, present and future forest conditions. Past disturbances within the subwatersheds of the Upper Clackamas River include fire, timber harvest and road-building activities along with recreational use such as off-road vehicle usage.

The Mount Hood Forest Plan employs an analysis tool referred to aggregate recovery percentage (ARP) to assess the effect of harvested openings and roads on hydrologic recovery. An ARP value greater than 75% typically indicates hydrologic recovery based on an average tree diameter of 8 inches dbh and canopy closure of at least 70% in the stand. ARP values of less than 65% suggest a very high likelihood of increased magnitude and frequency of peakflows and subsequent channel degradation.

Analysis on past thinning projects has shown that there are little if any measurable impacts to hydrologic function at the subwatershed scale. Cumulatively, watershed conditions in the short-term may be slightly decreased by harvest activities, but would be improved in the long-term by improving the number, type and health of the trees and stands over the long-term. Negligible changes in the ARP values (<2%) will result from the implementation of this proposed action at the site scale. Implementation of the Upper Clack Thinning Project would maintain all riparian conditions at the 5th and 6th field watershed scales.

The Pacific Northwest has rapid hydrologic recovery in the first 10 years post-harvest, due to re-growth of vegetative cover. The ARP values in the subwatersheds associated with the Upper Clack Thinning Project have been steadily increasing since 1996, indicating an on-going trend in hydrologic recovery and a

reduction in cumulative effects over time. The past effects on peak flows from previous overstory forest harvesting are being reduced by continuous forest stand growth. All of the subwatersheds on Forest Service lands have ARP values that fall below the threshold of concern of 35% indicated in the Mt. Hood National Forest LRMP.

The ARP analysis shows that the action alternatives would have very little estimated effect on the hydrology (peak flows, channel stability) of these drainages. Comparing the action alternative to no action also shows little difference. The units of this project are well dispersed over a wide landscape; they overlap parts of 11 drainages. The proposed action would result in less than 1% change in ARP for these drainages even after thinning because the plantations are experiencing rapid growth and therefore rapid hydrologic recovery. No effects on low summer flows is expected as a result of thinning activities since the riparian areas immediately adjacent to streams will remain largely intact, with no replacement of riparian conifers with significant numbers of deciduous trees/shrubs. No-cut stream protection buffers along with silvicultural prescriptions that retain a 50% canopy closure within the secondary shade zone will reduce the magnitude of any changes to peak or base flows. Since the drainages are currently at 80 to 90% recovered, it is very unlikely that the proposed thinning activities would cause stream channel instability, earthflow instability or increases in peak flows during rain-on-snow events. The reduction in canopy closure is unlikely to significantly affect snow accumulation/melt in the proposed harvest units, or result in significantly lower soil moisture levels that result in small peak flow increases in the fall.

ESA Cumulative Effects

ESA cumulative effects are those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation [50 CFR section 402.02]. The project area is located completely within federal lands. There are private lands located within the Upper Clackamas River watershed. It is probable that there will be non-federal projects planned and implemented on these lands in the future. The private land in the Upper Clackamas River 5th field watershed is located upstream from the Action Area. Project effects could combine cumulatively (beneficially or detrimentally) downstream of the federal Action Area. It is expected that intensive timber management in privately owned portions of the Upper Clackamas River HUC 5th field watershed will continue in the future. It is also expected that activities on these lands will comply with county, state, and federal laws and regulations.

CONCLUSION

No Action Alternative
Under the No-action alternative (Alternative A), current management plans would continue to guide management of the project area. No timber harvest or other associated actions would be implemented. There would be **No Effect (NE)** to PETS species.

Action Alternative
The implementation of the action alternative proposed for the Upper Clack Thinning Project warrants a **"May Affect, Not Likely to Adversely Affect" (NLAA)** determination for Lower Columbia River steelhead, Upper Willamette River chinook, and Lower Columbia River coho salmon. The proposed project will have a **"No Effect" (NE)** determination for Lower Columbia River chinook, Upper Willamette River steelhead, Middle Columbia River steelhead, and Lower Columbia River Bull Trout as these species do not occur within or downstream of the project action area. A "**May impact individuals or habitat but will not likely contribute to a trend towards federal listing" (MIIH**) determination is warranted for the Columbian Dusky Snail, Barren Juga, Purple-lipped Juga, and Scott's Apatanian

Caddisfly. A **No Effect (NE)** determination is warranted for the action alternative to Interior Redband trout since they do not occur within or downstream of the project area.

These effects determinations are appropriate for the action alternative because of the proximity of the proposed project area to ESA species or suitable habitat, the relatively minor magnitude of effects in the Project Area, and of the low potential for impacts generated at the project area to be transported to downstream reaches. There is a low probability of any direct or indirect effects to any listed or proposed fish or aquatic species or their habitat within or outside of the designated action area.

Project design criteria was developed in the planning process to minimize or eliminate any adverse impacts the action alternative might have on have on water quality, fisheries, and aquatic resources. The analysis of potential effects has determined that the probability of any impact to fish species of concern or other PETS would be very low, of a short-term duration, and of a magnitude that would be immeasurable at the site-specific and watershed scale. There would be no measurable long-term effect to any habitat or watershed indicator where listed fish or PETS species occur.

This project was designed from its inception to avoid potential water quality related impacts by adhering to the following project design citeria:

1. No-cut buffers along streams, seeps, and springs.

2. Seasonal restrictions for ground-based operations.

3. Any new temporary roads needed to access the stands will be on relatively flat ground or along ridge tops with no hydrological link to any water source.

4. All new temporary roads would be closed and revegetated upon completion of the project.

5. Logging systems appropriate to the specific terrain of each unit were designed to avoid water quality impacts.

6. During unit and road placement, certain areas were avoided such as sensitive soil types and landforms. Harvest areas were dispersed across the landscape.

7. Road reconstruction along haul routes is designed to reduce erosion and repair damaged sections.

8. The use of cable yarding and/or helicopters on steeper ground, within Riparian Reserves.

9. Potential sediment delivery to streams during log transport will be minimized by restricting log haul to times when road related run-off is not present.

The use of project design criteria and adherence to General Best Management Practices (BMP's) will allow for very little, if any, erosion or sediment transport into the stream course, substantially reducing the impacts of soil disturbance and run-off on water quality.

DETERMINATION OF EFFECTS – DESIGNATED CRITICAL HABITAT

Critical habitat for twelve ESUs of West Coast salmon and steelhead listed under the Endangered Species Act of 1973 was designated on September 2. 2005. Critical habitat includes the stream channels within

the designated stream reaches, and includes a lateral extent as defined by the ordinary high-water line or bankfull elevation. Within these areas, the primary constituent elements essential for the conservation of these ESUs are those sites and habitat components that support one or more life stages, including: freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, estuarine areas, near-shore marine areas, and off-shore marine areas that support growth and maturation.

Primary constituent elements listed below, refer to freshwater habitat components. Nothing proposed in any alternative would have any affect on estuarine or marine habitat components, thus they are not discussed.

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.

2. Freshwater rearing sites with:

    a. Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;

    b. Water quality and forage supporting juvenile development; and

    c. Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

3. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions, and natural cover, such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

Designated critical habitat for Upper Willamette River chinook and LCR steelhead occurs within or downstream of the proposed project area in the mainstem Clackamas River, Pinhead Creek, and Last Creek. As of this time, critical habitat for LCR coho has yet to be designated but will likely correspond with the critical habitat designation UWR chinook since they utilize the same habitat within the Clackamas River Basin.

Project design criteria was developed to minimize or eliminate any potential affect that project elements of the action alternatives might have on have on water quality, fisheries, and aquatic resources. The analysis of effects has determined that the probability of any potential effect to designated critical habitat would be very low, of a short-term duration, and of a magnitude that would be immeasurable. There would be no measurable long-term effect to any habitat or baseline habitat indicators where ESA listed fish species occur. The implementation of this project would not have any long-term adverse effect to designated critical habitat. Therefore, an effects determination of **May Affect, not Likely to Adversely Affect (NLAA)** is warranted for designated critical habitat that occurs within or downstream of the project area.

DETERMINATION OF EFFECTS – ESSENTIAL FISH HABITAT

Essential Fish Habitat (EFH) established under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) includes those waters and substrate necessary to ensure the production needed to support a long-term sustainable fishery (i.e., properly functioning habitat conditions necessary for the long-term survival of the species through the full range of environmental variation). EFH includes all streams, lakes, ponds, wetlands, and other water bodies currently, or historically, accessible to salmon in

Washington, Oregon, Idaho, and California. Three salmonid species are identified under the MSA, chinook salmon, coho salmon and Puget Sound pink salmon. Chinook and coho salmon occur on the Mt. Hood National Forest in the Clackamas River, Hood River, and Sandy River basins. Chinook and coho salmon utilize the mainstem Clackamas River, Collawash River, Hot Springs Fork, and Lower Fish Creek for migration, rearing, and spawning habitat. The proposed project would not have any adverse effect on water or substrate essential to the life history of coho, chinook, or chum salmon that occur within any basin on the Mt. Hood National Forest.

Implementation of the Upper Clack Thinning Project would **Not Adversely Affect** essential fish habitat for chinook or coho salmon. This activity would not jeopardize the existence of any of the species of concern or adversely modify critical habitat and would not adversely affect Essential Fish Habitat as designated under the 1996 Amendment to the Magnuson-Stevens Act.

DESIGN CRITERIA AND BEST MANAGEMENT PRACTICES (BMPS)

An interdisciplinary team from the Clackamas River Ranger District has developed project design criteria for commercial thinning projects. These criteria were used to develop the proposed actions.

Soils: No operation of off-road ground-based equipment would be permitted between November 1 and May 31. This restriction applies to the ground-based portions of harvest units. It also applies to ground-based equipment such as harvesters or equipment used for fuels treatment, road construction, road reconstruction or landing construction. This restriction may be waived if soils are dry or frozen or if operators switch to skyline or other non-ground based systems.

Erosion: To reduce erosion from timber sale activities, bare soils would be revegetated. Grass seed and fertilizer would be evenly distributed at appropriate rates to ensure successful establishment. Mulch may be used on slopes greater than 20%. Effective ground cover would be installed prior to October 1 of each year.

Thinning in Riparian Reserves: Thinning in riparian reserves will emphasize the development of vegetative and structural diversity associated with mature old growth stand conditions. While thinning in the riparian reserve may have short-term effects, the thinning would contribute to maintaining or restoring the fifth-field watershed over the long term. Thinning in riparian reserves would increase tree size, adequately protect the zone of shade influence along streams, and minimize the potential for sediment delivery to streams. This prescription would maintain water temperature, large woody debris, disturbance regime, and riparian reserve indicators.

- **Perennial streams** – Establish a minimum 100 ft. no-cut buffer along the active channel of all streams that are adjacent to listed fish habitat (LFH) and a minimum 50 ft. no-cut buffer along the active channel of all other perennial streams. Larger buffer widths may be needed on a site-specific basis to prevent any increase in sediment delivery rates or a decrease in stream shading. Buffer width design would take into account the stream influence zone, steepness of slope, size and location of trees, orientation of the site to the sun (aspect), slope stability, and stream bank stability. Falling trees for skyline corridors would be avoided, but where necessary the material would be left as woody debris. Falling any trees within the no-harvest buffer would only be allowed if it would cause no increase to sediment or decrease in stream shading.

- **Intermittent streams** (as defined in NWP) – Establish a minimum 50 ft. no-cut buffer along the active channel of all intermittent streams. Smaller buffer widths would be allowed if it is determined

on a site specific basis that there would be no increase in sediment delivery rates or a decrease in stream shading which would alter stream temperatures. Buffer width design would take into account the stream influence zone, steepness of slope, size and location of trees, orientation of the site to the sun (aspect), slope stability, and stream bank stability. Falling trees or any equipment use within the no-harvest buffer would only be allowed if it would cause no increase to sediment or decrease in stream shading.

Within 50 feet of perennial or intermittent stream no-harvest buffers, only low impact harvesting equipment such as, but not limited to, mechanical harvesters or skyline systems, which have minimal ground disturbance would be allowed. Mechanical harvesting equipment would be required to operate on slash-covered paths. Trees in this zone would be directionally felled away from the no-harvest buffer to minimize the disturbance to the forest floor. These requirements would maintain the indicators for sediment, stream temperature, stream bank condition, and large woody material indicators.

Logging Systems

1. Avoid the use of ground based tractors or skidders on slopes generally greater than 30% and mechanical harvesters on slopes greater than 40% because of the risk of damage to soil and water resources.

2. Mechanical harvesters and forwarders would be required to work on a layer of residual slash and the operator would place slash in the harvester path prior to advancing the equipment.

3. In some units, ground-based logging is proposed for areas that have been previously harvested with ground-based systems. Existing temporary roads, landings and skid trails would generally be reused where feasible. There may be instances where it is not desirable to use an existing skid trail and in such cases, if a skid trail is needed in the area, a new skid trail would be located that minimizes the alteration of surface hydrology.

4. In some units, ground-based logging at the time of the original harvest has resulted in detrimental soil conditions that exceed Forest Plan standards. In these areas there is a greater urgency to reuse existing temporary roads, landings and skid trails. Some new skid trails might be needed as described above, but where detrimental soil conditions exceed 20%, only existing skid trails would be used and only those existing skid trails that do not alter surface hydrology.

5. Where existing detrimental soil conditions exceed Forest Plan standards, existing temporary roads and landings that are reused, would be obliterated and revegetated.

Roads

1. During the wet season, log haul would only be permitted on asphalt and rocked roads when conditions would prevent sediment delivery to streams.

2. If landings are needed in riparian reserves, they would be located on existing roadways that do not require expansion of the road prism or on existing landings that may require only minimum reconstruction (clearing vegetation, sloping for drainage, or surfacing for erosion control purposes) to be made suitable for use.

3. The re-opening of old temporary roads is encouraged over the construction of new roads if they are located in areas that would prevent sediment delivery to streams.

4. Newly constructed roads would not cross or be constructed parallel to stream channels. They would be built on ridge tops, benches, or gentle slopes and only where conditions would prevent sediment delivery to streams.

5. No road construction is proposed within riparian reserves.

6. Temporary roads would normally be constructed, used and obliterated in the same operating season. If this is not possible, due to fire season restrictions or other unforeseen delays, the road would be winterized prior to the end of the normal operating season by out-sloping, water-barring, effectively blocking the entrance, seeding, mulching and fertilizing.

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Figure 1. Units 1 – 5 Upper Clack Thin

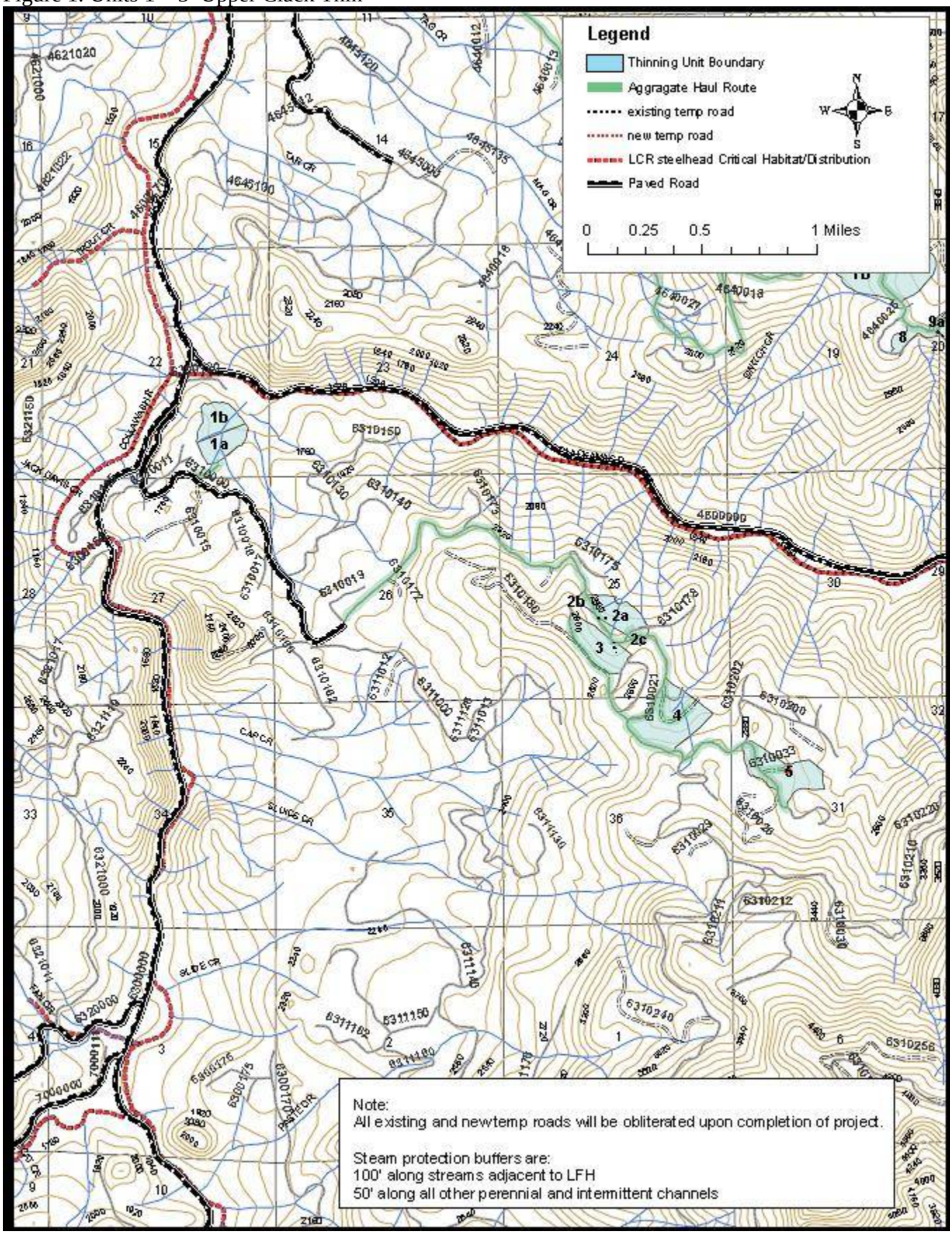

Figure 2. Units 6 – 9 Upper Clack Thin

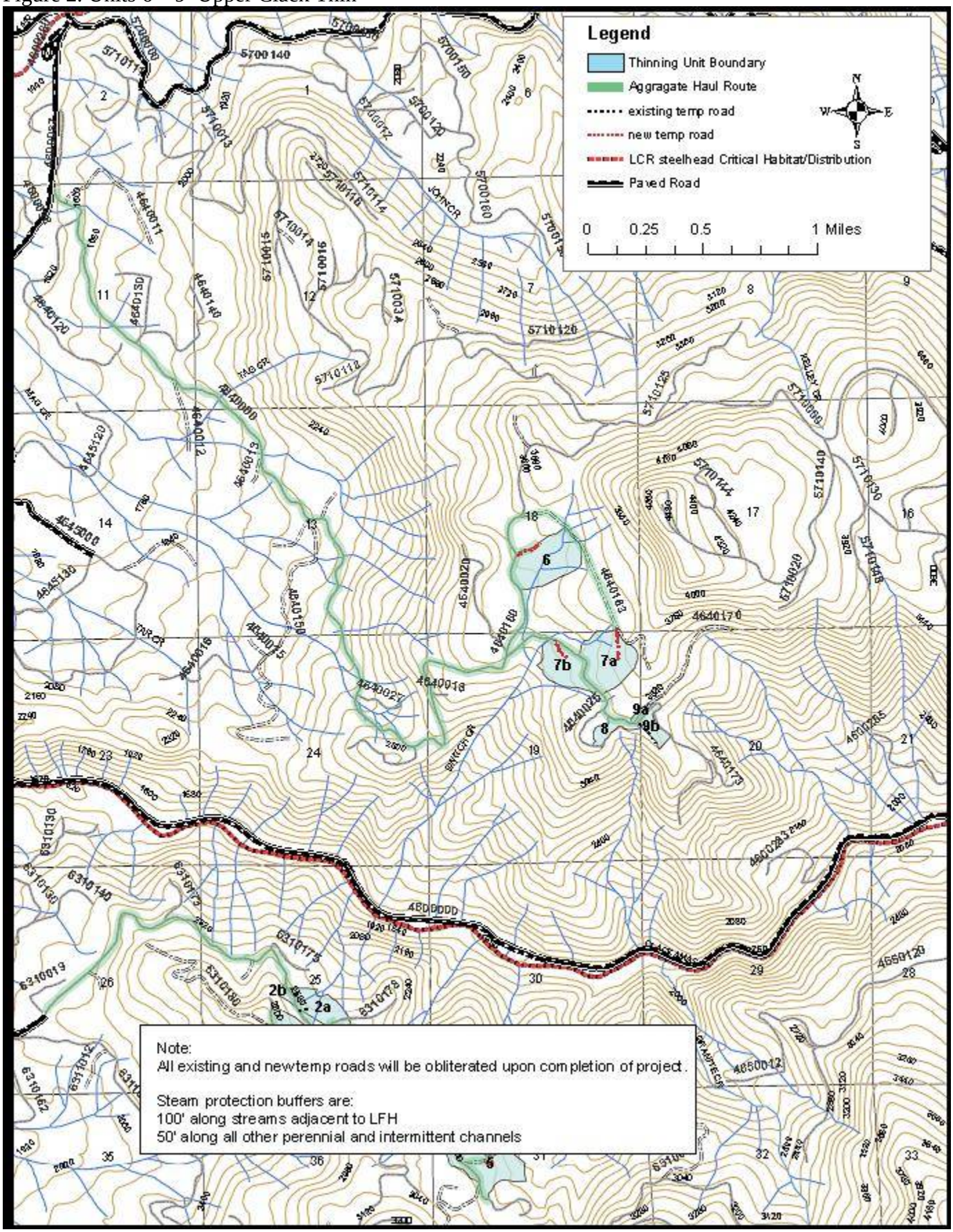

Figure 3. Units 10 - 11 Upper Clack Thin

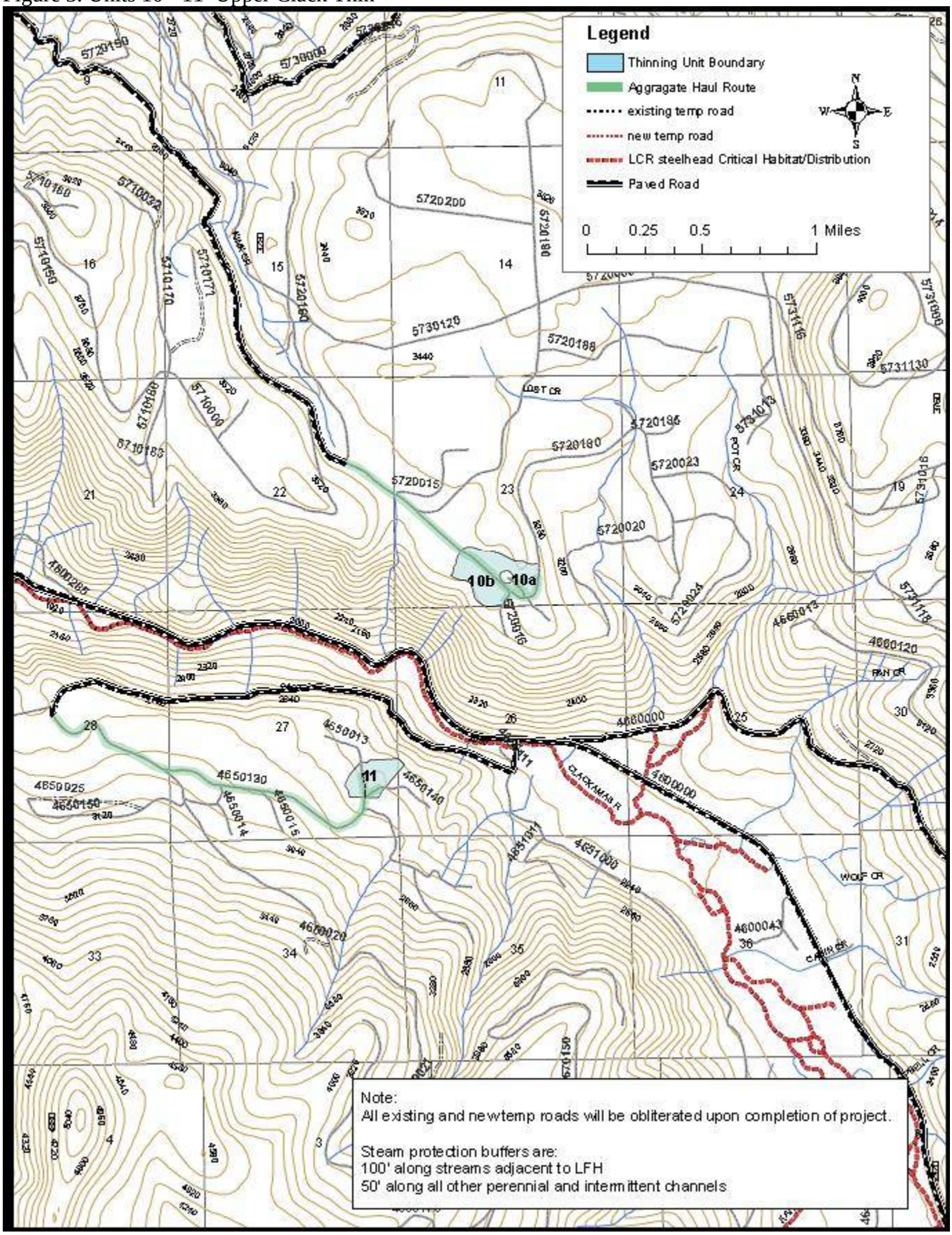

Figure 4. Units 15 - 20 Upper Clack Thin

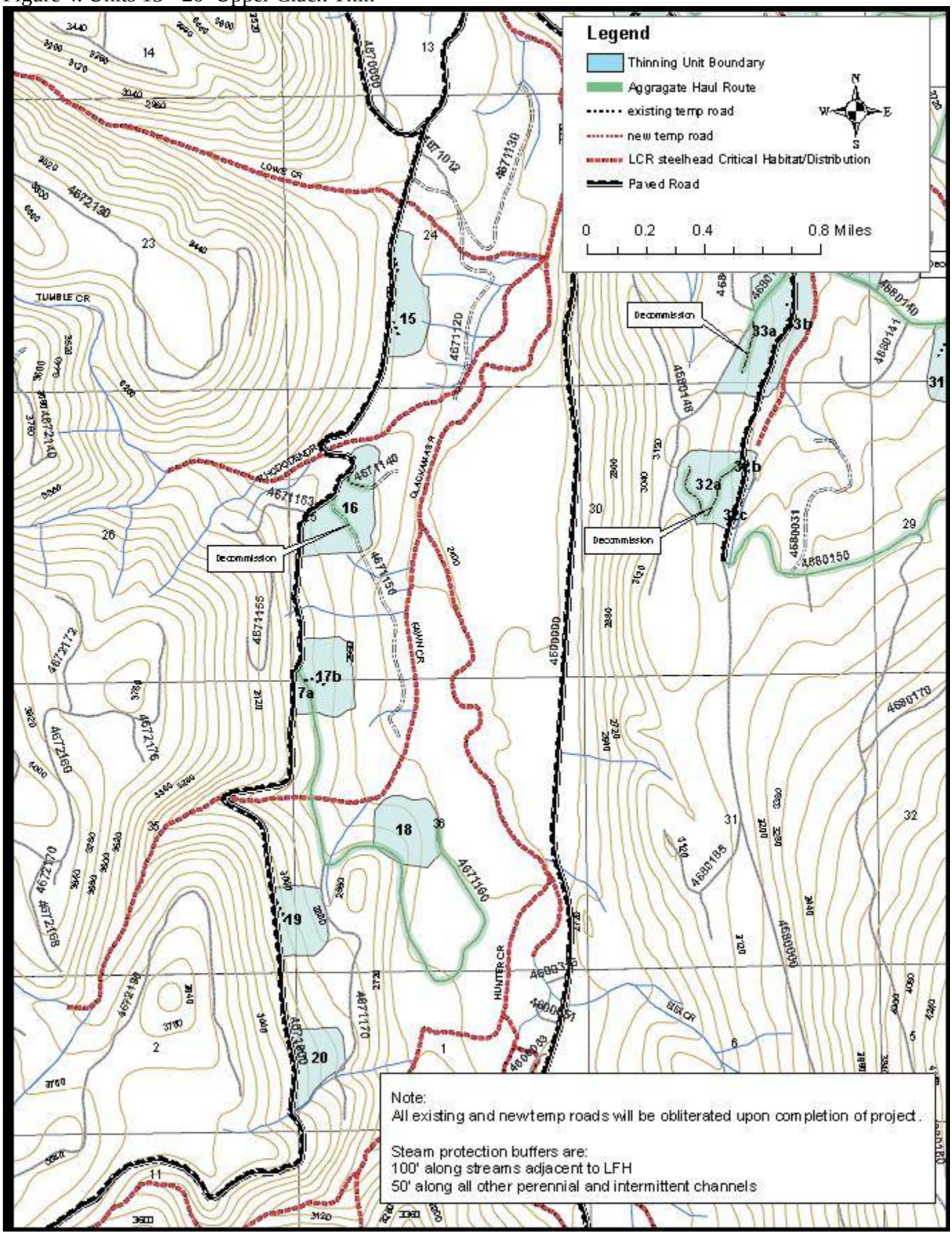

Figure 5. Units 14, 21 – 27, & 35-38 Upper Clack Thin

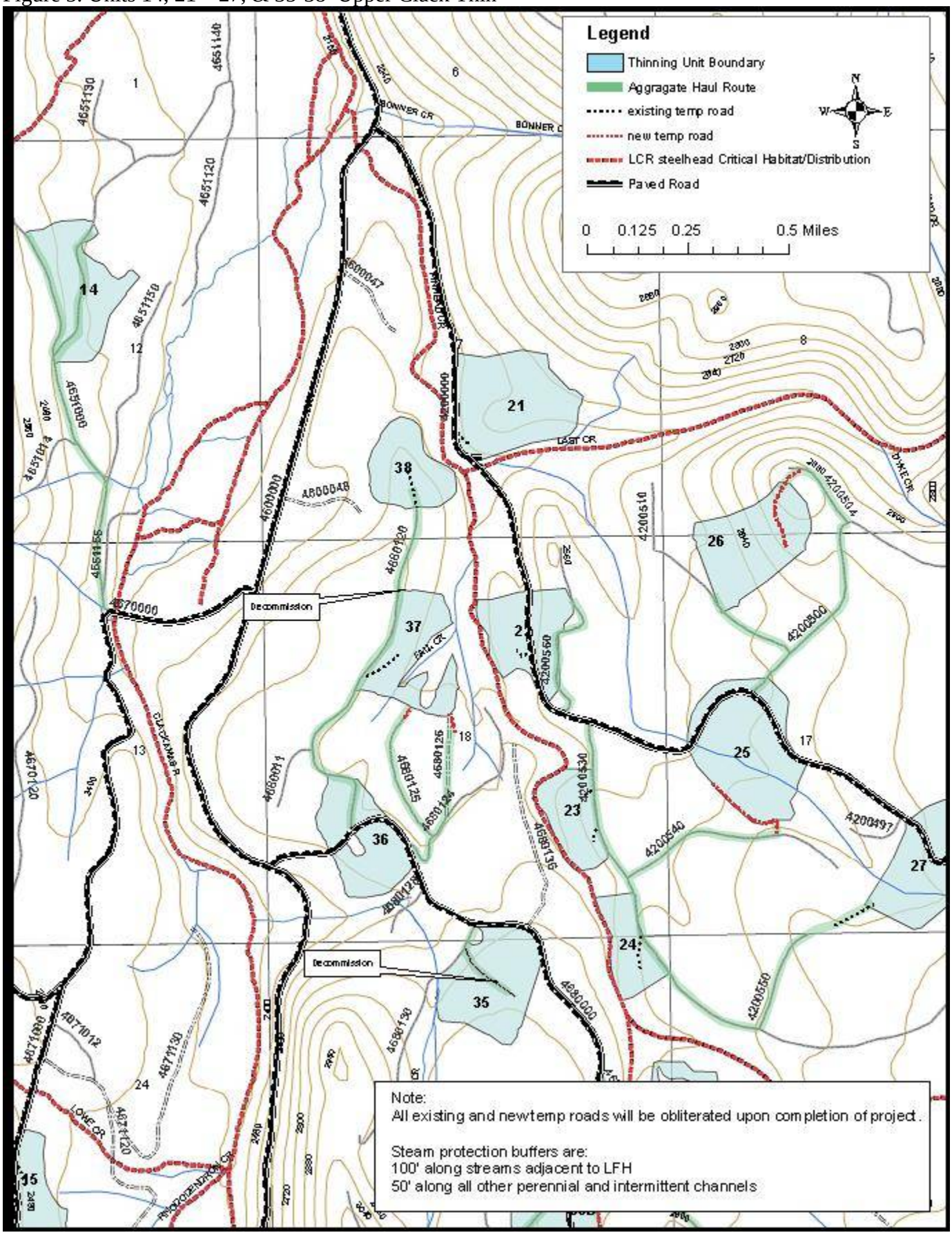

Figure 6. Units 21-38 Upper Clack Thin