Appendix E (Part 1): Fisheries Biological Assessment

Weaverville Watershed Analysis

- HUC-4: Trinity River
- HUC-5: Weaverville
- HUC-6: Weaver Creek

Weaverville Ranger District
Trinity River Management Unit
Shasta-Trinity National Forest
April 29, 2005

Prepared by:
Loren Everest – Fishery Biologist

Effects:

- May Affect, Likely to Adversely Affect Southern Oregon Northern California Coast (SONCC) Coho Salmon and their Designated Critical Habitat
- May Adversely Affect Essential Fish Habitat

I. Introduction

Purpose of the Assessment

The purpose of this Biological Assessment (BA) is to review the Browns Project (Project) in sufficient detail to determine if the action is likely to adversely affect any threatened, endangered, or proposed species, or designated or proposed critical habitat, or may adversely affect Essential Fish Habitat (EFH). This BA is prepared in accordance with legal requirements set forth under section 7 of the Endangered Species Act (ESA) (19 U.S.C. 1536 (c)), and follows the standards established in Forest Service Manual direction (FSM 2672.42).

A new analytical process for Endangered Species Act consultation for listed fish species was developed by an interagency group including the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), USDI-Bureau of Land Management (USDI-BLM), and the U.S. Forest Service (USDA-FS et al. 2004). The following biological assessment serves to clearly document the logic tracking and links of the project with watershed analysis (USDA-FS 2004), ESA Section 7(c), 50 CFR Section 402.12, Consultation Handbook Section 3.4 (USFWS and NMFS 1998), Streamlining Guidance (USDA-FS et al. 1999) and associated NEPA documentation.

Purpose and Need for Action

The Browns Project is being proposed as part of the Shasta-Trinity National Forest's Fuels Management and Timber Sale Program. The project area has had previous timber harvests including a large amount of timber removal from adjacent private timberlands since the year 2000. The activities being proposed involve commercial timber harvesting (within mixed conifer stands), management of roads, and watershed restoration activities. A Watershed Analysis (WA, USDA-FS 2004) was completed to identify management activities that would benefit the resources within the fire-prone watershed. Key findings and management opportunities resulting from the WA have led to the proposed actions affecting management actions and Riparian Reserves.

Summary of Proposed Action

Intermediate harvest is proposed on about 754 acres, including select Riparian Reserves, and group regeneration harvest on about 39 acres; yielding about 8.7 million board feet of timber. Intensive fuel treatment would be performed after harvest to meet project area objectives. Following timber harvest, site preparation and tree planting would occur in the regeneration units.

Associated Project activities include approximately 4.6 miles of road construction, approximately 2.7 miles of road reconstruction, and about 3.6 miles of temporary road construction. In addition, 28 miles of roads would be rehabilitated.

Implementation of the proposed Project is planned for the calendar years 2006-2010, and may involve multiple timber sale and service contracts to accomplish road construction, road reconstruction, timber harvesting, tree removal, fuels treatment and then restoration activities

Location of Proposed Action

The Project is located northeast of the town of Weaverville in Trinity County, California. The legal locations (all within Mt. Diablo Meridian in Trinity County) are as follows: T34N, R10W, Sections 27, 34, and 36; T33N, R10W, Section 1; T34N, R9W, Sections 16, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, and 34; and T33N, R9W, Section 6. The Project is located entirely within the 'Weaverville' watershed (HUC 1801021106000000) at 40 degrees 47minutes latitude and 122 degrees 54 minutes longitude.

Management Direction

The Project is situated within the Weaverville/Lewiston Management Area (Area 7) as identified in the LRMP. The LRMP Land Allocation further identifies the Project as being within an Adaptive Management Area (AMA), on Matrix Lands, and in a prescription VI area, which emphasizes wildlife habitat. The Browns project is not within a Key Watershed. Riparian Reserves are contained within all land allocations. Management direction, and standards and guidelines for Riparian Reserves override those of the surrounding land allocations. Complete management directions, management prescriptions, and standards and guidelines for each management area and allocation can be found in the appropriate section of the LRMP (Forest-wide, page 4-23; Riparian Reserve, page 4-53; Matrix Land, page 4-61; Wildlife Habitat, page 4-66; and AMA, page 4-69; USDA-FS 1995).

The STNF developed a LRMP that adopted standards and guidelines set forth in the Final Supplemental Environmental Impact Statement Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (ROD; USDA-FS and USDI-BLM 1994b).

ROD and Forest LRMP

The ROD evolved from the Forest Ecosystem Management Assessment Team (FEMAT) Report (1993) and Final Supplemental Environmental Impact Statement (USDA and USDI 1994a). Collectively, these documents are known as the Northwest Forest Plan. The standards and guidelines of the Forest's LRMP (USDA FS 1995) were amended by the ROD (USDA-FS and USDI-BLM 1994b).

In the Project area, Riparian Reserves have been designated based on guidelines in the ROD and on the Weaverville WA (USDA-FS 2004). Riparian Reserves of intermittent and ephemeral streams that display annual scour will have a minimum150 foot Riparian Reserve based upon the average maximum height of 200-year-old trees for the site.

Riparian Reserves of fish bearing streams that display annual scour will have a 300 foot Riparian Reserve based upon twice the average maximum height of 200-year-old trees for the site. There are no inner gorges or flood plains in the project area greater than 300 feet from the defined channel of fish bearing streams.

Monitoring

Monitoring direction comes from the ROD (Section E) and Appendix H of the LRMP. Monitoring will be conducted to determine if standards and guidelines are being followed (implementation monitoring), verify if they are achieving desired results (effectiveness monitoring), and determine if underlying assumptions are sound (validation monitoring). Some effectiveness and most validation monitoring will be accomplished by formal research.

Monitoring will be conducted at multiple levels and scales, with local information compiled and considered in a regional context. Monitoring will be coordinated among agencies and organizations to enhance effectiveness and usefulness. Baseline conditions have been measured on larger streams within the project area (East Weaver Creek. Rush Creek and Little Browns Creek) using Forest Service Region 5 Stream Condition Inventory (SCI) protocols. Reoccupation of SCI sites post Project may be useful to determine the effectiveness of stream protection measures.

The Regional Ecosystem Office is currently finalizing a framework that outlines short-, mid-, and long-term monitoring priorities and strategies, called *Interagency Framework for Monitoring the President's Forest Ecosystem Plan*. The Forest monitoring plan will tier to the interagency framework when completed, and will be modified or amended as necessary to be in compliance with that direction.

Watershed Analysis

The Project has been developed in response to management opportunities to meet desired conditions developed in the Weaverville WA (USDA-FS 2004).

Species and Habitats Covered under the ESA and Magnuson-Stevens Fishery Conservation Management Act (MSFCMA)

The USFWS provided a list on April 2, 2004 of Threatened, Endangered and Proposed species suspected to occur on the Forest. Of the eight fish species found on the quarterly species list, only the Southern Oregon/Northern California Coast (SONCC) coho salmon (*Oncorhynchus kisutch*) Evolutionarily Significant Unit (ESU) and its designated critical habitat are found in the Project area or may be influenced by the Project.

The MSFCMA, as amended by the Sustainable Fisheries Act of 1996 (public Law 104-297), requires all Federal agencies to consult with NMFS on all actions or proposed actions (permitted, funded, or undertaken by the agency) that may adversely affect EFH. EFH is defined as those waters and substrates necessary to fish for spawning, breeding, feeding, and growth to maturity. EFH consultation is being consolidated with this ESA consultation based upon the finding by NMFS that the ESA section 7 consultation process used by the Forest Service can satisfy the EFH consultation requirements. In this regard, the BA is also the EFH assessment of the action. EFH within the action area is the same for Chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*Oncorhynchus kisutch*).

Consultation and Project History

Level 1 team discussions between Loren Everest (Forest Service) and Karen Hans (NMFS) occurred in June of 2004. A general field inspection of the Project area occurred on June 23, 2004 with Ms. Hans, Mr. Everest and Bill Brock (Forest Service). A draft BA was sent electronically to Level 1 representative, Garwin Yip (NMFS) on November 29, 2004. A site visit occurred on December 14, 2004 with Mr. Yip, Clarence Hostler (NMFS) and Mr. Everest. Comments were received from Mr. Yip on December 13, 2004. An edited version of the BA was provided to Mr. Yip on February 25, 2005. Mr. Yip reviewed the draft BA and provided further comments to Mr. Everest on March 11, 2005. In addition, an interagency "Analytical Process" (AP) team reviewed the revised draft BA, and provided comments to Mr. Everest on March 10, 2005. Another revised draft BA was sent to Mr. Yip and the AP team for review on April 12, 2005. The BA was finalized and agreed upon with Level 1 on April 27, 2005.

II. Description of Proposed Action and ESA Action Area

Timber Harvest (Project Elements "Harvest" and "Fuels Treatment")

'Intermediate' harvesting (thinning from below) will occur on about 754 acres, while group regeneration harvesting will take place on about 39 acres, yielding approximately 8.7 million board feet of timber (Table 1 and Table 2). Within the intermediate harvest areas, the largest, most vigorous trees will not be harvested, while the less healthy understory-positioned trees will be harvested. The residual canopy closure objective will be about 40%. Within Riparian Reserves, the residual conifer canopy closure objective will be 60% where initially available. Riparian Reserve thinning will occur down to, but not within, the inner gorge of each channel. Trees will be removed by using tractor on slopes under 35% and cable yarding on slope steeper than 35%. Openings created from regeneration harvest will be used to pile and treat the activity fuel generated from whole tree yarding. Site preparation and tree planting will occur in small (less than 2.5-acre) openings and will follow regeneration harvest. Intensive fuel treatment will be performed after harvesting occurs to meet Project objectives (Table 1).

Table 1. Summary of Timber Harvest and Activity Fuels Treatment by watershed.

Timber Stand Activity:	East Weaver Creek (acres)	Little Browns Creek (acres)	Rush Creek (acres)
Intermediate Harvest (thin from below)	9.4	666.1	78.5
Tractor yarding	9.4	532.8	26.8
Cable yarding	0.0	133.3	51.7
Regeneration Harvest (total of group regeneration areas)	0.0	33.7	5.5
Tractor yarding	0.0	22.4	4.0
Cable yarding	0.0	11.3	1.5
Total timber volume proposed for harvest in millions of board feet (mmbf)	**8.7 mmbf**		

Treatment of Activity Fuels within Timber Harvest Areas:
Whole tree yard up to a 3-inch top. Remaining treetops, broken trees, bark, and limb wood would be lopped and scattered. Fuels within a 50-foot strip along the roadside would be hand piled and burned. All other fuels would be burned in concentrations. Dozer line construction would occur after harvesting for tractor units, and handline construction would occur around cable units. Fire lines will not be constructed in Riparian Reserves. Hand piles would be burned about one year after harvesting commenced. Concentrations would be burned at a rate of about 100 acres per year, and would begin about one year after harvesting commenced. Regeneration units would be broadcast burned.

Table 2. Individual Unit Harvest, Fuels Treatment and Log Haul detail.

Unit	Acres	Harvest Prescription	Yarding System	Fuels	Treatment	Slope Distance to Critical Habitat (mi.) Stream Name	Haul Route
2	5.9	Thinning	tractor	WTY	RS, BC, DL	0.6 East Weaver Creek	Hwy 3
3	47.9	Thinning	tractor	WTY	RS, BC, TP, DL	0.2 Little Browns Creek	34N95, 34N52Y
3B	19.1	Thinning	tractor	WTY	RS, BC, DL	300 Ft. Little Browns Creek	CO 232
3C	8.2	Thinning	tractor	WTY	RS, BC, TP, DL	0.1 Little Browns Creek	CO 232
3D	4.6	Thinning	tractor	WTY	RS, BC, DL	0.15 Little Browns Creek	CO 232
3E	1.5	Thinning	cable	WTY	RS, BC, HL	0.2 Little Browns Creek	34N95, 34N52Y
3F	2.8	Thinning	cable	WTY	RS, BC, HL	0.25 Little Browns Creek	34N95, 34N52Y
3G	11.2	Thinning	cable	WTY	RS, BC, HL	0.05 Little Browns Creek	34N95, 34N52Y
3H	5.6	Thinning	cable	WTY	RS, BC, HL	0.15 Little Browns Creek	34N95, 34N52Y
3I	7.9	Thinning	tractor	WTY	RS, BC, DL	1.5 Little Browns Creek	34N95, 34N52Y
3J	4.9	Thinning	cable	WTY	RS, BC, HL	1.2 Little Browns Creek	34N95
3K	11.9	Thinning	tractor	WTY	RS, BC, DL	1.1 Little Browns Creek	34N95
3L	27.7	Thinning	tractor	WTY	RS, BC, DL	0.8 Little Browns Creek	34N95, 34N52Y
5A	14.1	Thinning	cable	WTY	RS, BC, HL	1.15 Little Browns Creek	34N87A, 34N87, 34N77
5B	14.4	Thinning	tractor	WTY	RS, BC, DL	1.2 Little Browns Creek	34N87A, 34N87, 34N77
5C	13.3	Thinning	cable	WTY	RS, BC, HL	1.3 Little Browns Creek	34N87A, 34N87, 34N77
5D	58.8	Thinning	tractor	WTY	RS, BC, TP, DL	0.75 Little Browns Creek	34N87A, 34N87, 34N77
5F	16.5	Thinning	tractor	WTY	RS, BC, DL	1.35 Little Browns Creek	34N87A, 34N87, 34N77
5G	1.4	Thinning	cable	WTY	RS, BC, HL	1.0 Little Browns Creek	34N87, 34N77
5H	1.9	Thinning	cable	WTY	RS, BC, HL	1.1 Little Browns Creek	34N87, 34N77
7	14.6	Thinning	tractor	WTY	RS, BC, DL	0.75 Little Browns Creek	34N96
8	4.7	Thinning	tractor	WTY	RS, BC, DL	0.70 Little Browns Creek	34N96

Unit	Acres	Harvest Prescription	Yarding System	Fuels	Treatment	Slope Distance to Critical Habitat (mi.) Stream Name	Haul Route
9A	20.1	Thinning	cable	WTY	RS, BC, HL	0.25 Little Browns Creek	34N88, CO 230
9B	17.0	Thinning	cable	WTY	RS, BC, HL	1.2 Little Browns Creek	34N88, CO 230
9C	22.6	Thinning	tractor	WTY	RS, BC, TP, DL	0.1 Little Browns Creek	34N88, CO 230
9D	5.6	Thinning	cable	WTY	RS, BC, HL	0.6 Little Browns Creek	34N88, CO 230
9E	20.2	Thinning	cable	WTY	RS, BC, HL	1.4 Little Browns Creek	34N28, 34N28B
10A	15.2	Thinning	tractor	WTY	RS, BC, DL	0.5 Little Browns Creek	34N28
10B	1.1	Thinning	tractor	WTY	RS, BC, DL	0.6 Little Browns Creek	34N28, 34N28B
10C	5.8	Thinning	cable	WTY	RS, BC, HL	0.4 Little Browns Creek	34N28B
10D	6.8	Thinning	tractor	WTY	RS, BC, DL	0.45 Little Browns Creek	34N28B
10E	1.9	Thinning	cable	WTY	RS, BC, HL	0.75 Little Browns Creek	34N28B
10F	24.6	Thinning	tractor	WTY	RS, BC, DL	0.70 Little Browns Creek	34N28, 34N28B
10G	6.6	Thinning	cable	WTY	RS, BC, HL	0.3 Rush Creek	34N28, 34N28B
10H	6.6	Thinning	cable	WTY	RS, BC, HL	0.45 Rush Creek	34N28, 34N28B
10I	6.6	Thinning	cable	WTY	RS, BC, HL	0.25 Rush Creek	34N28, 34N28B
11	10.1	Thinning	tractor	WTY	RS, BC, DL	1.8 East Weaver Creek	34N95
12	23.7	Thinning	tractor	WTY	RS, BC, TP, DL	0.55 Rush Creek	34N42, 34N22
13	8.5	Thinning	cable	WTY	RS, BC, HL	0.45 Rush Creek	34N42, 34N22
14	8.3	Thinning	cable	WTY	RS, BC, HL	0.3 Rush Creek	34N42, 34N22
15A	5.0	Thinning	tractor	WTY	RS, BC, DL	0.3 Little Browns Creek	34N95, 34N52Y
15B	4.7	Thinning	tractor	WTY	RS, BC, DL	0.45 Little Browns Creek	34N95, 34N52Y, 34N52YA
15C	6.1	Thinning	tractor	WTY	RS, BC, DL	0.35 Little Browns Creek	34N95, 34N52Y, 34N52YA
15D	0.8	Thinning	cable	WTY	RS, BC, HL	0.45 Little Browns Creek	34N95, 34N52Y,34N52YA
15E	2.7	Thinning	cable	WTY	RS, BC, HL	0.45 Little Browns Creek	34N95,34N52Y, 34N52YA
15F	4.2	Thinning	cable	WTY	RS, BC, HL	0.3 Little Browns Creek	34N95, 34N52Y, 34N52YA
16	66.0	Thinning	tractor	WTY	RS, BC, TP, DL	1.6 Little Browns Creek	34N95, 34N52Y, 34N05Y
17	74.3	Thinning	tractor	WTY	RS, BC, TP, DL	1.65 Little Browns Creek	34N95, 34N52Y, 34N52YA, 34N05Y
100	26.1	RR Thinning	tractor	WTY	RS	1.75 Little Browns Creek	34N95, 34N52Y, 34N05Y
101	13.6	RR Thinning	tractor	WTY	RS	1.65 Little Browns Creek	34N95, 34N52Y, 34N52YA, 34N05Y
102	8.4	RR Thinning	tractor	WTY		0.2 Little Browns Creek	34N95, 34N52Y
103	6.8	RR Thinning	tractor	WTY		0.2 Little Browns Creek	34N95, 34N52Y
104	0.7	RR Thinning	cable	WTY		1.25 Little Browns Creek	34N95
105	2.5	RR Thinning	tractor	WTY		1.8 East Weaver Creek	34N95
106	4.2	RR Thinning	tractor	WTY	RS	100 ft. Little Browns Creek	CO 232
107	3.4	RR Thinning	tractor	WTY		150 ft. Little Browns Creek	Hwy 3
108	0.9	RR Thinning	tractor	WTY		0.8 East Weaver Creek	Hwy 3
109	3.1	RR Thinning	cable	WTY		0.4 Rush Creek	34N42, 34N22
110	1.2	RR Thinning	cable	WTY		1.1 Little Browns Creek	34N88, CO 230
111	2.5	RR Thinning	cable	WTY		0.35 Little Browns Creek	34N88, CO 230
112	3.3	RR Thinning	cable	WTY	RS	0.7 Little Browns Creek	34N28B
113	0.8	RR Thinning	tractor	WTY	RS	0.6 Little Browns Creek	34N28, 34N28B

Unit	Acres	Harvest Prescription	Yarding System	Fuels	Treatment	Slope Distance to Critical Habitat (mi.) Stream Name	Haul Route
114	1.4	RR Thinning	cable	WTY		0.45 Little Browns Creek	34N28B
115	1.0	RR Thinning	tractor	WTY	RS	0.55 Little Browns Creek	34N28
RR5G	0.7	RR Thinning	cable	WTY		1.2 Little Browns Creek	34N87, 34N77
R03A	2.1	Regen	tractor	WTY	BB,DL	1.5 Little Browns Creek	34N95, 34N52Y
R03B	1.8	Regen	tractor	WTY	BB,DL	1.25 Little Browns Creek	34N95, 34N52Y
R03C	1.8	Regen	tractor	WTY	BB,DL	1.4 Little Browns Creek	34N95, 34N52Y
R3C	2.2	Regen	tractor	WTY	BB,DL	.2 Little Browns Creek	CO 232
R5A	1.9	Regen	cable	WTY	BB,HL	1.25 Little Browns Creek	34N87A, 34N87, 34N77
R5C	2.0	Regen	cable	WTY	BB,HL	1.3 Little Browns Creek	34N87A, 34N87, 34N77
R5DA	0.9	Regen	tractor	WTY	BB,DL	1.2 Little Browns Creek	34N87A, 34N87, 34N77
R5DB	2.4	Regen	tractor	WTY	BB,DL	1.25 Little Browns Creek	34N87, 34N77
R9AA	1.7	Regen	cable	WTY	BB,HL	.4 Little Browns Creek	34N88, CO 230
R9AB	1.6	Regen	cable	WTY	BB,HL	.5 Little Browns Creek	34N88, CO 230
R9B	1.9	Regen	cable	WTY	BB,HL	.4 Little Browns Creek	34N88, CO 230
R9CB	1.5	Regen	tractor	WTY	BB,DL	.35 Little Browns Creek	34N88, CO 230
R10G	2.4	Regen	cable	WTY	BB,HL	.4 Rush Creek	34N28, 34N28B
R12A	1.9	Regen	tractor	WTY	BB,DL	.75 Rush Creek	34N22, 34N42
R12B	2.1	Regen	tractor	WTY	BB,DL	.75 Rush Creek	34N22, 34N42
R14	1.5	Regen	cable	WTY	BB,HL	.5 Little Browns Creek	34N22, 34N42
R16	1.6	Regen	tractor	WTY	BB,DL	2.4 Little Browns Creek	34N95, 34N52Y, 34N05Y
R17A	2.2	Regen	tractor	WTY	BB,DL	1.6 Little Browns Creek	34N95, 34N52Y, 34N05Y
R17B	1.8	Regen	tractor	WTY	BB,DL	1.7 Little Browns Creek	34N95, 34N52Y, 34N52YA
R17C	1.9	Regen	tractor	WTY	BB,DL	1.9 Little Browns Creek	34N95, 34N52Y
R17D	1.5	Regen	tractor	WTY	BB,DL	2.3 Little Browns Creek	34N95, 34N52Y, 34N05Y

Fuels Prescriptions

WTY: Whole Tree Yard
RS: Roadside pile/burn
BC: Burn Concentrations
TP: Tractor pile/burn
BB: Broadcast Burn
HL: Handline
DL: Dozerline

Road Construction, Reconstruction and Use (Project Elements "Road Construction" "Road Reconstruction" and "Hauling"____

Associated Project activities include about 4.6 miles of road construction (and subsequent decommissioning of 3.3 miles of the new road) and 3.6 miles of road reconstruction. Reconstructed roads will have hazard trees felled and be surfaced with crushed rock. Roads to be reconstructed cross three Riparian Reserves and new road construction will enter three. Log hauling activities will not occur during wet weather conditions. From November 15 to May 15, hauling will only occur when

soil conditions are such that the operations will not result in compaction or accelerated erosion. An earth scientist will be consulted prior to conducting activities during the time frame specified above.

Table 3. Summary of Road Management Activities.

Affected Transportation System (Road):	Activity	Length (mi.)	Length In Riparian Reserve	Minimum Slope Distance to Critical Habitat (mi.)
34N95	Reconstructed, surfaced, replace culvert (54")	1.9	200 ft.	1.1
34N77	Reconstructed and surfaced	1.1	.1	100 ft.
34N52Y	Reconstructed, surfaced, replace 2 culverts (54", 42")	.5	.1	1.5
34N52YA	Reconstructed and surfaced	.1	0	1.4
	Total miles of road reconstruction	3.6	0.24	
34N47	Constructed, then Decommissioned	.9	.1	.3
34N47A	Constructed, then Decommissioned	.3	0	.4
34N87	Constructed, then Restricted Use	1.3	.1	.8
34N87A	Constructed, then Decommissioned	.9	300 ft.	1.2
34N88	Constructed, then Decommissioned	1.2	0	.3
Total miles of new specified road construction		**4.6**	**0.25**	
U34N52YD	Use existing nonsystem as temp then obliterate	.6	.4	1.3
U34N05YB	Use existing nonsystem as temp then obliterate	.1	.1	1.7
U34N52YC	Use existing nonsystem as temp then obliterate	.5	.2	1.1
U34N52YB	Use existing nonsystem as temp then obliterate	.3	0	0.9
U232A	Use existing nonsystem as temp then obliterate	.4	0	0.1
U34N95H	Use existing nonsystem as temp then obliterate	.5	0	0.6
U3TRI03	Use existing nonsystem as temp then obliterate	.1	0	0.9
Unit 17	New temp construction then obliterate	.1	0	2.4
Unit 3H	New temp construction then obliterate	.2	0	0.3
Unit 10C	New temp construction then obliterate	.1	0	0.4
Unit 10F	New temp construction then obliterate	.1	0	0.5
Unit 9B	New temp construction then obliterate	.1	0	0.4
Unit 9C	New temp construction then obliterate	.1	0	0.3
Unit 9D	New temp construction then obliterate	.1	0	0.6
Unit 5B	New temp construction then obliterate	.1	0	1.3
Unit 5D (2seg)	New temp construction then obliterate	.1	0	1.0
Unit 12 (2seg)	New temp construction then obliterate	.1	0	0.6
Total Miles of Temp road		**3.6**	**0.7**	

Existing nonsystem roads used for this Project will be treated as temporary roads. Additional temporary roads will be constructed as needed to complete harvest in units 3, 5D, 9B, 9C, 10D, 12, and 17. About 3.6 miles of temporary roads will be needed and their location will be at the discretion of the sale administrator. However, the approximate locations of the temporary roads are displayed in Appendix B of this biological assessment. Two designated crossings are proposed in unit 16 and one is proposed in unit 17. Designated crossings are 1.7 miles slope distance or more away from critical

habitat. The designated crossing sites have been reviewed by the project fishery biologist and are located at areas of previous skid trail or road crossings that will require minimal ground disturbance. About 0.7 miles of existing nonsystem roads are located within Riparian Reserves in units 16 and 17. All temporary roads, including existing nonsystem roads, used for this Project will be obliterated after post harvest activities are complete. Access to temporary roads will be blocked after subsoiling.

Skid Trails and Landings (Project Element "Yarding")

Skid trails will be constructed and used as necessary for tractor yarding of units up to 35% slope. Skid trails may occupy up to 15% of any individual unit and will be located by the sale administrator on the ground during harvest activities. Mechanical harvesters and forwarders will be used on thinning units to reduce ground impacts and limit the number of mechanical equipment entries into units.

Eighty-nine landings are proposed for construction. Twenty-three landings are within regeneration units that will be used for piling and burning of treetops and slash generated from whole tree yarding. No landings are located within Riparian Reserves; however, several landings are adjacent to Riparian Reserves. Approximate locations of landings are displayed in Appendix B of this document.

To minimize the potential for erosion and to improve site productivity, skid trails, and landings (excluding the adjacent road corridor) will be subsoiled to a depth of 12 inches. Subsoiling will be performed with a winged-subsoiler, or forest cultivators and/or disks when the soils are not subject to compaction. Soil will be loosened across the entire treatment area to achieve a soil condition where 85% of the soil would pass through a 2" opening.

Waterbarring and outsloping skid trails is not necessary, as the intent of subsoiling is to loosen the soil and attain a permeable soil condition where runoff will not occur. Waterbarring of a skid trail should be avoided unless sections are so steep that there is a potential for surface runoff prior to revegetation.

Road Decommissioning and Obliteration (Project Element "Road Rehabilitation")

System roads that are not needed for long-term use (i.e., >20 years) will be decommissioned to improve soil and water quality conditions. Road decommissioning entails removing culverts, waterbarring, ripping and outsloping road surfaces, and 'tank trapping'. Other activities may occur depending on site conditions. The goal is to control or prevent surface runoff, erosion, and mass failure that could otherwise leave the roadbed unavailable for future use. Non-system roads will be obliterated. Road obliteration entails removal of all culverts, ripping and slope recontouring. The goal is to restore full hydrologic function and productivity. These roads will receive long-term Best Management Practices (BMP) effectiveness monitoring.

Table 4. Road decommissioning summary by subwatershed.

Subwatershed	Miles of decommissioning and obliteration	Minimum distance to Critical Habitat
Rush Creek	2.3	0.2 miles
Little Browns Creek	15.9	25 feet
East Weaver Creek	8.8	0.4 miles
Total	**27.0**	

Twenty-seven miles of road will be treated as part of this Project (Browns Project EIS Appendix C). This mitigation measure is critical in meeting Project objectives. Twenty-seven culverts will be removed with 0 to 750 yd^3 fill volumes (Table 5). The approximate locations of roads to be decommissioned are displayed in the EIS in Appendix C.

Table 5. Culverts to be removed as part of the Browns Project and distance to coho critical habitat/essential fish habitat.

Road Number	HUC 8	YD^3 of fill	Distance (mi) to coho CH	CH Stream
33N38F	1801021106040102	0	1.8	East Weaver Creek
33N38F	1801021106040102	150	1.8	East Weaver Creek
34N52Y	1801021106040301	750	.1	Little Browns Creek
34N52Y	1801021106040301	675	.1	Little Browns Creek
34N52Y	1801021106040301	650	.2	Little Browns Creek
34N89	1801021106040102	650	2.0	East Weaver Creek
34N89A	1801021106040102	200	2.1	East Weaver Creek
34N89A	1801021106040102	175	2.1	East Weaver Creek
34N95A	1801021106040105	450	1.25	Little Browns Creek
34N95A	1801021106040105	300	1.0	Little Browns Creek
34N95A	1801021106040105	325	1.0	Little Browns Creek
34N95A	1801021106040105	275	1.0	Little Browns Creek
34N95B	1801021106040301	550	1.2	East Weaver Creek
34N95B	1801021106040301	550	0.6	East Weaver Creek
34N96	1801021106010201	575	0.6	Rush Creek
34N96B	1801021106040301	180	1.0	Little Browns Creek
34N96B	1801021106040301	0	1.1	Little Browns Creek
34N96B	1801021106040301	325	1.15	Little Browns Creek
34N96B	1801021106040105	250	1.2	Little Browns Creek
34N96B	1801021106040105	275	1.25	Little Browns Creek
34N96C	1801021106040301	275	1.0	Little Browns Creek
34N96C	1801021106040301	500	1.1	Little Browns Creek
34N96C	1801021106040301	175	1.2	Little Browns Creek
U230A	1801021106040302	225	0.4	Little Browns Creek
U34N33YA	1801021106010201	275	0.3	Rush Creek
U34N33YA	1801021106010201	175	0.2	Rush Creek
U34N77C	1801021106040302	250	0.5	Little Browns Creek

Project Design Criteria

The following project design criteria have been provided by resource specialists and will be implemented on this Project.

Criteria Common to all Project Activities

Ground disturbing activity will not occur during wet weather conditions. From November 15 to May 15, activity will only occur when soils are dry down to 12 inches or conditions are such that the operations will not result in compaction or accelerated erosion. An earth scientist will be consulted prior to conducting activities during the time frame specified above.

Yarding

- Minimize soil erosion by water-barring all skid trails, mulching with straw or fine slash (achieve 75%+ cover) the last 50 feet of all skid trails where they enter landings or roads.
- Contour rip (with winged subsoiler up to 12 inches deep), seed, and mulch (straw) main skid trails, landings, and regeneration units to break up compaction. Include all identifiable skid trails in units 3, 16, and 17.
- Reuse existing primary skid trails and landings.
- All yarding requires one-end log suspension (leading end of log).
- Tractor skidding generally restricted to slopes <35%. Tractor skidding is allowed to exceed 35% for short pitches where negative environmental effects will not occur.
- Spread fine slash material (50% soil cover) on primary skid trails when they occur on >35% slopes.
- Designate/approve Riparian Reserve crossings. Skid trail grade shall not exceed 20% and shall be located to minimize ground and vegetative disturbance. Rehabilitate skid trail disturbed mineral soil within 50 feet (slope distance) of defined channel limits with available organic material, resulting in minimum 50-70% ground cover post-treatment.
- Dedicate no more than 15% of the unit to primary skid roads, trails, and landings. Skid trails should be outsloped and not located in swales, where waterbarring is not possible or requires deep cuts. The objective is to design a skidding pattern that best fits the terrain and limits the impact on the soil. Predesignated skid trails, felling to the lead, and end lining are methods that can be used to achieve this.

Fuels Treatment

- Retain existing down coarse woody debris (CWD) whenever possible providing the amount of logs does not exceed fuel management objectives.
- Maintain post-treatment soil cover to at least 50% with at least 50% cover as fine slash (<3 inch material).
- Keep prescribed fire as cool as possible and attain desired burn conditions.

Road Construction and Reconstruction

- Prevent road runoff from draining onto landings and skid trails.

Decommissioning

- Contour rip (with winged subsoiler up to 12 inches deep), seed, and mulch (straw) all temporary roads to break up compaction.

Erosion Control and Best Management Practices

- An erosion control plan is required by the Timber sale contract to be prepared by the contractor and approved by the Forest Service. Appendix B of the Browns Project EIS provides an example of areas covered, and the authorities for ensuring that BMP's are implemented.

ESA Action Area

For the purpose of ESA consultation the action area includes the Little Browns Creek subwatershed (HUC 18010211060403) down stream to Weaver Creek, the East Weaver Creek subwatershed (HUC 18010211060401) from the East Branch downstream to Weaver Creek, Weaver Creek from the confluence with East Fork Weaver Creek downstream to the Trinity River and the Rush Creek subwatershed (HUC 18010211060100) from the Highway 3 crossing downstream to the Trinity River.

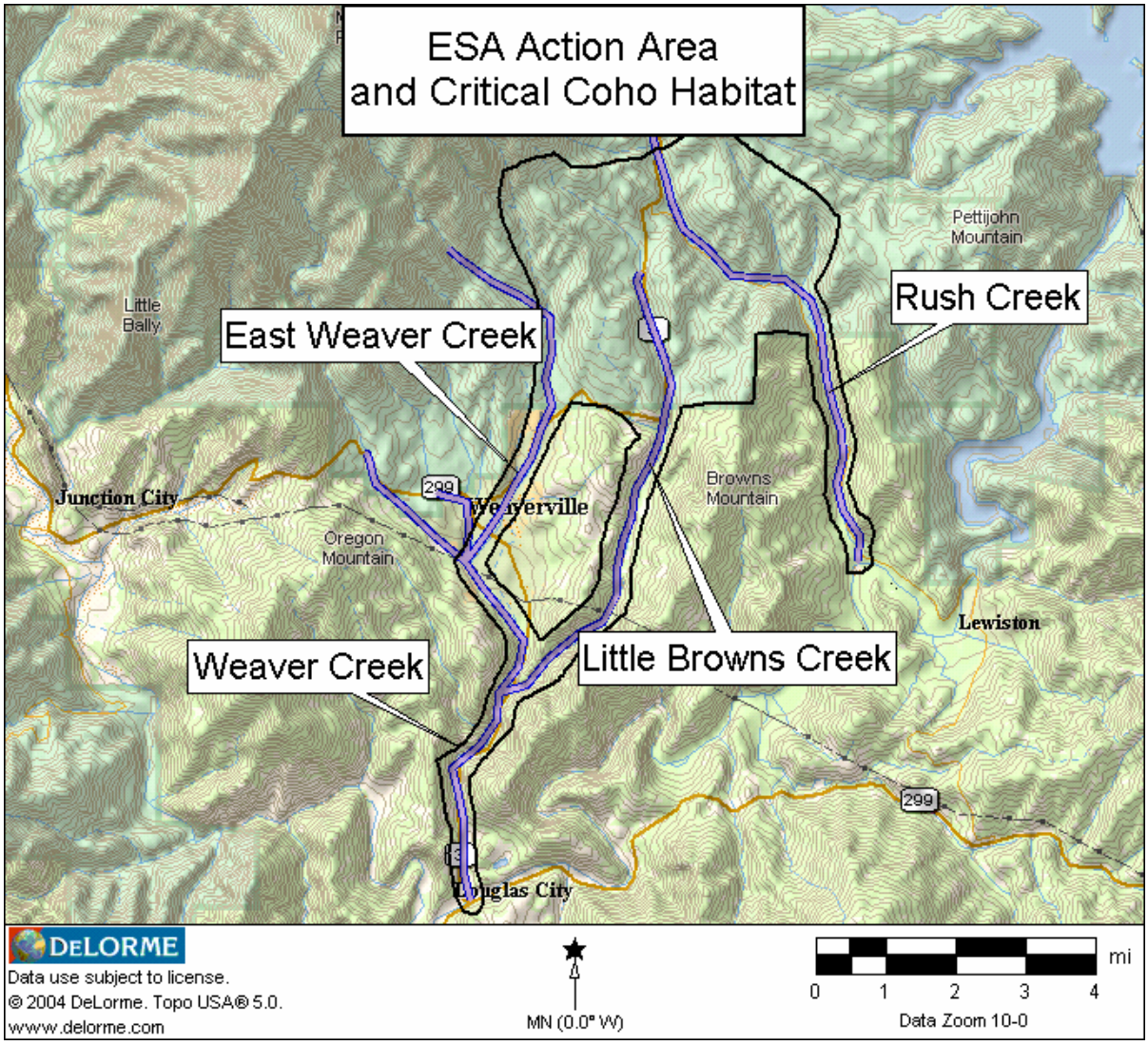

Figure 1. ESA Action area and Coho salmon Critical Habitat (in purple).

III. Description of Listed Species

SONCC Coho Salmon

Suitable Habitat Description

Structurally complex streams containing stones, logs, brush, and aquatic macrophytes support larger numbers of rearing coho salmon juveniles (Scrivener and Andersen 1982) than do streams that lack these structural features. The most productive coho salmon streams are small, rather than large, because small streams have the highest proportion of marginal slack water to midstream area. Insect drift in midstream of large streams is generally unavailable to juvenile coho salmon. The wider the stream is, the greater the loss of food (Sandercock 1991).

Natural History

Coho salmon were historically distributed throughout the North Pacific Ocean from central California to Point Hope, Alaska through the Aleutian Islands, and from the Anadyr River, Russia, south to Hokkaido, Japan. Historically, this species probably inhabited most coastal streams in Washington, Oregon and central and northern California (Brown and Moyle 1991).

In contrast to the life history patterns of other anadromous salmonids, coho salmon in the region under status review generally exhibit a relatively simple, 3-year cycle. SONCC coho salmon adults typically enter rivers in September and October. River entry is much later south of the Klamath Basin, occurring in November and December. Spawning in southern Oregon and northern California occurs typically in December. Depending on temperature, eggs incubate in redds for 1.5 to 4 months before hatching as alevins. Following yolk sac absorption, alevins emerge from the gravel as young juveniles or fry and begin actively feeding. They require cold water (10-15 degrees Celsius), deep pools, and abundant instream cover, especially fallen trees. Fry rear in fresh water for up to 15 months, then migrate to the ocean as smolts in the spring. Coho salmon typically spend two growing seasons in the ocean before returning to their natal stream to spawn as three-year-olds. Some precocious males called “jacks” return to spawn after only six months at sea. Coho salmon die after spawning. See “Status review of coho salmon from Washington, Oregon and California” (Weitkamp et al. 1995) for complete life history information and status review.

The SONCC coho salmon ESU encompasses coastal drainages between Cape Blanco in southern Oregon and Punta Gorda in northern California. Most information for the northern California region of this ESU was recently summarized by the California Department of Fish and Game (2002). It concluded that coho salmon in California, including hatchery stocks, could be less than 6% of their abundance during the 1940s, and have experienced at least a 70% decline in numbers since the 1960s. While limited data are available to assess population numbers or trends in the ESU, NOAA Fisheries has determined that all coho salmon stocks between Punta Gorda and Cape Blanco are depressed relative to their past abundance and conclude that coho salmon in this ESU are presently threatened.

Critical Habitat

Critical habitat is defined in Section 3(5)(A) of the ESA as "the specific areas within the geographical area occupied by the species ... on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection." Critical habitat was designated (64 FR 24049), May 5, 1999) to include all river reaches accessible to listed coho salmon between Cape Blanco, Oregon, and Punta Gorda, California. Critical habitat consists of the water, substrate, and adjacent riparian zones of estuarine and riverine reaches (including off-channel habitats). Accessible reaches are those within the historical range of the ESU that can still be occupied by any life stage of coho salmon. Inaccessible reaches are those above specific dams or above long-standing, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years).

In designating critical habitat, NOAA Fisheries considers the following requirements of the species: (1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing offspring; and, generally, (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species [see 50 CFR 424.12(b)]. In addition to these factors, NOAA Fisheries also focuses on the known physical and biological features (primary constituent elements) within the designated area that are essential to the conservation of the species and that may require special management considerations or protection. These essential features may include, but are not limited to, spawning sites, food resources, water quality and quantity, and riparian vegetation. Specifically, the adjacent riparian area is defined as the area adjacent to a stream that provides the following functions: shade, sediment, nutrient or chemical regulation, streambank stability, and input of large woody debris or organic matter.

The physical and biological features that create properly functioning salmonid habitat vary throughout the range of coho salmon and the extent of the adjacent riparian zone may change accordingly, depending upon the landscape under consideration. While a site-potential tree height can serve as a reasonable benchmark in some cases, site-specific analyses provide the best means to characterize the adjacent riparian zone because such analyses are more likely to accurately capture the unique attributes of a particular landscape. Knowing what may be a limiting factor to the properly functioning condition of a stream channel on a land use or land type basis and how that may or may not affect the function of the riparian zone will significantly assist Federal agencies in assessing the potential for impacts to listed coho salmon. On Federal lands within the range of the northern spotted owl, Federal agencies continue to rely on the ACS of the Northwest Forest Plan to guide their projects.

Within the range of SONCC coho salmon, the species' life cycle can be separated into five essential habitat types: (1) Juvenile summer and winter rearing areas; (2) juvenile migration corridors; (3) areas for growth and development to adulthood; (4) adult migration corridors; and (5) spawning areas. Within these areas, essential features of coho salmon critical habitat include adequate: (1)

substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions.

NOAA Fisheries believes that the current range of the species encompasses all essential habitat features and is adequate to ensure the species' conservation. Therefore, designation of habitat areas outside the species' current range is not necessary. It is important to note that habitat quality in this range is intrinsically related to the quality of riparian and upland areas and of inaccessible headwater or intermittent streams which provide key habitat elements (e.g., large woody debris, gravel, water quality) crucial for coho salmon in downstream reaches.

Rush and East Weaver Creeks contain Critical Habitat for coho salmon throughout the action area; Little Browns Creek contains Critical Habitat, coho salmon have been observed up to County Road 232 where poorly placed culverts block migration.

Local Population

Populations of coho salmon are present on the STNF in the watersheds of the Klamath and Trinity rivers. Coho salmon are known to inhabit the Weaver Creek drainage, including East Weaver Creek and Little Browns Creek. These populations are found sporadically in response to favorable tributary migration conditions. Coho salmon are frequently found in Rush Creek.

Chinook Salmon (*Oncorhynchus tshawytscha*)

Suitable Habitat Description

Chinook salmon require cool water, diverse and complex habitat and clean gravels to successfully reproduce. Habitat needs of Chinook salmon fry change rapidly from the time of emergence to time of smolting, but generally require cool water and instream cover. For a complete description of habitat requirements for Chinook salmon, see Bjornn and Reiser (1991).

Natural History

Chinook salmon historically ranged as far south as the Ventura River, California, and their northern extent reaches the Russian Far East. The predominant life history strategy for Chinook salmon in the coastal streams of North America is the "ocean-type" (September 16, 1999, 64 FR 50393). The ocean-type Chinook salmon migrate to the ocean within their first year. Ocean-type Chinook salmon tend to use estuaries within the first several weeks after emergence and prior to emigrating to the ocean. Residence in the Pacific Ocean is variable and complex with most fish returning to natal streams to spawn as adults between their third and fifth year (September 16, 1999, 64 FR 50393). Chinook salmon die after spawning.

Adult spawning runs begin in August and continue into January. Chinook salmon spawn in clean gravel of streams and river mainstems. Depending on water temperature, eggs incubate in redds from 1.5 to 4 months before hatching as alevins. Following yolk-sac absorption, alevins emerge from the gravel as fry and begin feeding. They require cold water, deep pools, and cover. Fry grow quickly and will emigrate from freshwater between 60 and 120 days after emergence (September 16, 1999, 64 FR

50393). For a complete life history description and status review, see "Status Review of Chinook Salmon from Washington, Idaho, Oregon and California" (Meyers et al. 1998).

Local Population

Populations of Chinook salmon are located throughout the STNF. Chinook salmon are rarely found in Weaver Creek or Rush Creek due to limited flows during the fall migration period. When early fall rain events overlap Chinook salmon arriving late to the adjacent Trinity River reach, then some spawning may occur in lower Weaver Creek and Rush Creek.

IV. Environmental Baseline

The Shasta Trinity National Forest Tributaries Matrix of Factors and Indicators (Appendix A of this document), was used to characterize the environmental baseline for the proposed action. Level 1 teams are permitted to revise indicator values to more biologically appropriate values for specific watersheds or basins (NMFS 1996, page 3). This concept is reinforced in the Analytical Procedures process paper (NOAAF et al. 2004, page 7) and the Streamlined Consultation Procedures handbook (USDA Forest Service et al. 1999, pages IV-A-1 and IV-B-1). The Shasta Trinity National Forest Tributaries Matrix of Factors and Indicators is functionally equivalent to the "Table of Population and Habitat Indicators for Use in the Northwest Forest Plan Area" provided in the Analytical Process, except for the "population characteristics" and "population and habitat" pathways. An ESA recovery plan for SONCC coho salmon has not been proposed or completed. Therefore, insufficient information exists to address the "population characteristics" and "population and habitat" pathways at this time.

Existing Habitat Conditions for SONCC Coho Salmon and Chinook Salmon

General Upland Conditions

Forest management activities that influence the quantity, quality, or timing of stream flows affect fish habitat primarily through changes in the natural levels of peak flows or low flows (Sullivan et al. 1987; Chamberlin et al. 1991). Water outflow from hillsides to streams is affected through changes in evapo-transpiration, soil water content, and soil structure. Timber management activities can allow more water to reach the ground, altering water infiltration into forest soils. Less water is therefore absorbed by tree roots, or the soil may become saturated faster, thereby increasing surface flow. Road systems, skid trails, and landings where the soils become compacted will also increase surface runoff. Roads and ditches concentrate surface runoff and intercept subsurface flow, bringing it to the surface (Chamberlin et al. 1991; Furniss et al. 1991).

Increases in the magnitude of peak flows or the frequency of channel forming flows can increase channel scouring or accelerate bank erosion. Changes in peak flow and sediment yield directly related to the removal of vegetation will typically persist for only a few years and tend to decrease over time

as the watershed recovers and new vegetation grows. Changes associated with roads persist indefinitely as roads are maintained or abandoned without treatment. Stream channel responses can take decades or centuries to recover (Chamberlin *et al.* 1991; Furniss *et al.* 1991). Road construction likely causes the greatest impact to stream systems relative to increases in sediment delivery and changes in peak flows. The relationship of road density to stream degradation has been documented in literature (Wemple 1994).

Fire suppression has long- and short-term effects to aquatic habitats and species. It has been documented that a natural fire regime like that within the action area reduced the occurrence of catastrophic fires because fuels did not accumulate on the ground, and fire-tolerant conifers dominated the overstory (Agee 1993). Transformation of forest type from mixed-conifer to true fir is largely due to fire suppression and could result in microclimate alteration in riparian areas. Fire suppression, commencing in earnest around 1910, has altered the plant and animal species composition and stand densities of forests in the Trinity River Basin. Historically, there was a short 'return interval' fire regime from 5 - 35 years in the terrain surrounding the action area (USDA FS 2004). Fire scar analyses in mixed conifer stands on the Klamath National Forest, which are similar to mid-elevation stands in the action area, indicate an average fire return interval of approximately 8 years (Skinner and Chang 1996). Fires were caused by lightning, and Native Americans burned to improve hunting and gathering opportunities. As a result of fire suppression, many forest stands which naturally grew approximately 50 large fire-tolerant trees per acre are now over-stocked with hundreds of small, mostly fire intolerant trees per acre. Stands which historically experienced low intensity understory burns now are prone to high intensity crown fires with corresponding high percent mortality in large, normally fire-tolerant trees. The threat from catastrophic fire to aquatic species and their habitat is increasing and multiple high intensity wildland fires in a given watershed can lead to a decline of ESA listed salmon and or degradation of their critical habitat.

General Instream Conditions

Anadromous fish use about 300 miles of stream and river habitat on the STNF (USDA FS 1995). There are about 30 miles of habitat accessible to anadromous fishes in the Weaverville watershed.

The Weaverville watershed is the most heavily impacted tributary within the Trinity River watershed. Historic photos document hydraulic mining, timber harvest and residential activity, starting in the mid-1850s and continuing through present times. These activities loaded local creeks with much more sediment than could be transported, resulting in braided channels with cobble and gravel substrate, few pools, little shade and little large woody debris.

Mining in the Trinity River basin began prior to the establishment of the STNF and has persisted to the present day. Widespread stream channel disturbance had already resulted from activities that occurred prior to 1940. This disturbance altered the dynamic equilibrium of the mainstem Trinity River and most of its tributaries, many of which are still responding to that disturbance. There has been a limited amount of commercial mining since the end of World War II. There has been a rise, however, in the level of small-scale mining by suction dredging and panning since the 1970's.

Water diversions have fragmented anadromous fish habitat and altered hydrographs throughout the basin. Initial diversions were localized for irrigation and mining; these began in the mid 1800s, and those for irrigation and domestic use persist today. The Weaverville Community Service District withdraws significant amounts of water from West and East Weaver Creek for domestic and irrigation purposes. Rush Creek Subdivision uses water from Rush Creek resulting in very low late-summer flows. Trinity Dam was completed in 1963, eliminating over 100 miles of anadromous fish habitat. This facility changed the hydrograph and temperature regime for the remaining portion of the river that was available to anadromous fish by diverting up to 90 percent of the river's flow to the Sacramento River (USFWS and Hoopa Valley Tribe 1999). Degraded habitat from the lack of river flow is the single greatest limiting factor to anadromous fish populations in the Trinity River.

Local Surveys

Fish habitat surveys have been performed periodically since the early 1980s for most streams (1963 for Rush Creek) in the action area. Many surveys note poor habitat conditions. From 1986 to 1992, most streams had habitat improvement structures installed. In confined channels such as Little Browns Creek, some well-constructed structures still persist and provide complex habitats. In streams with less confinement and high bedload transport, the structures were less successful.

Water quality is generally very high in streams of the Weaverville watershed. Surveyed streams have had dissolved oxygen levels from 11 to 12 ppm, pH from 7 to 7.5, and temperatures in the 60° F range.

The seventh field sub-watershed has been chosen as the best scale to analyze effects of the Project within the ESA action area. The following provides a brief description of fish use and describes the functional condition of each indicator for each subwatershed (7th field as appropriate) and the Weaverville watershed (5th field) based on Stream Condition Inventory data, California Department of Water Resources hydrological station data, other data on file at the Weaverville Ranger District and personal observations. The matrix of pathways and indicators was modified by the Shasta Trinity National Forest Level 1 team in June of 2004 (Appendix A of this biological assessment).

Rush Creek

Anadromous fishes have access to about 9.5 miles of stream habitat before steep bedrock falls block passage. Chinook salmon are found only during years of early fall rain that creates suitable migration conditions. Low fall flows generally prevent anadromous fishes from using Rush Creek until late November. Spawning surveys for salmon and steelhead have been conducted on sections of Rush Creek intermittently since 1964. Counts have varied widely according to year and survey effort, but have ranged from zero to one Chinook salmon, zero to 32 coho salmon, and five to 439 steelhead.

The very first fish habitat surveys in Rush Creek noted excessive bedload and recommended that measures be taken to improve habitat. During the 1980s a Coordinated Resource Management Planning group was formed, composed of state and federal agencies to address habitat needs in Rush Creek. The group recommended placing instream structures, 32 of which were built in 1988 and 1989. Surveys in 2002 and 2004 showed that only 40% of the structures remain and less than 20% are

still functioning. A 2002 Stream Condition Inventory (SCI) found that most of the large woody debris was less than 1 foot in diameter, pools averaged 2.4 feet deep and 68% of the stream banks were unstable.

Baseline conditions for Rush Creek

Unless otherwise noted all baseline information for Rush Creek is from Stream Condition Surveys conducted in 2002 by the Forest Service (USDA-FS 2002).

- **Temperature** - Maximum Temperatures in this 4th order stream are 70 – 71.5 degrees Fahrenheit. *At Risk*. Data from USGS Stream gage.
- **Turbidity** - Rush Creek becomes turbid quickly after precipitation events, but usually clears within two days. *At Risk*. Data from USGS Stream gage.
- **Chemical/Nutrient Contamination** - Rush Creek has low levels of contamination from agriculture, industrial, and other sources; no excess nutrients. *Properly Functioning*.
- **Physical Barriers** - Rush Creek has no man-made barriers. *Properly Functioning*.
- **Substrate** - Fine sediment in pool-tails is 9%. *Properly Functioning*.
- **Large Woody Debris** - Rush Creek has 31 pieces of Large Wood per mile of stream. *At Risk*.
- **Pool Frequency** - Rush Creek has 1 pool every 5.4 channel widths and over half of the pools are greater than 36 inches deep. *At Risk*.
- **Off-channel Habitat** - Rush Creek has backwaters with cover, and low energy off-channel areas. *Properly Functioning*.
- **Refugia (important remnant habitat for sensitive aquatic species)** - Rush Creek has habitat at "At Risk" or better levels, but low summer water flows limit the usefulness of Rush Creek as a refugia. *At Risk*.
- **Width/Depth Ratio** - Rush Creek is a Rosgen "B" type channel. The width to depth ratio of 39 is appropriate for the channel type however, some braiding has occurred in the area below the Hwy 3 Bridge. *At Risk*.
- **Streambank Condition** - 68% of stream banks are unstable. *Not Properly Functioning*.
- **Floodplain Connectivity** - Rush Creek has areas that are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions and riparian vegetation. *Properly Functioning*.
- **Change in Peak/Base Flows** - Rush Creek has a Watershed Condition Class (WCC) (see glossary for a full description of Watershed Condition Class) of three and exhibits low geomorphic, hydrologic, and biotic integrity relative to its natural potential condition, and the Equivalent Roaded Area (ERA) increases downstream (Figure 1). The headwaters of Rush Creek drain wilderness and are in WCC one (exhibits high geomorphic, hydrologic, and biotic integrity relative to its natural potential condition). The project area is in WCC two (exhibits moderate geomorphic, hydrologic, and biotic integrity relative to its natural potential condition), and the Threshold of Concern (TOC) is exceeded in the lower portion (private lands) of the subwatershed (Table 6). *At Risk*. Data from the Hydrology Specialist Report for the Browns Project.

- **Increase in Drainage Network** - Rush Creek has moderate increases in active channel length due to the road network and timber harvest activities within the drainage. *At Risk*. Data from the Hydrology Specialist Report for the Browns Project.
- **Road Density and Location** - The Rush Creek subwatershed has 4.4 miles per square mile of roads, with one county road located in the valley bottom. *Not Properly Functioning*. Data from the Hydrology Specialist Report for the Browns Project.
- **Disturbance History** - The CWE model shows that the Rush Creek subwatershed is at 81% of the TOC. *At Risk*. Data from the Hydrology Specialist Report for the Browns Project.
- **Riparian Reserves** - The Riparian Reserves of Rush Creek have a moderate loss of connectivity and function (shade, LWD recruitment, etc) due to historic mining and the current road system. Ground cover is good and riparian timber stands are recovering from past disturbance. *At Risk*. Personal observations of Loren Everest TRMU Fishery Biologist.

Table 6. Existing ERA for Rush Creek.

HUC8	Name	Drainage Area (acres)	Forest Plan TOC (%)	Existing ERA (%)
1801021106010101	Headwaters Rush Creek	2860	16	1
1801021106010102	Upper Rush Creek	2997	16	9
1801021106010201	Baxter Gulch	3470	16	13
1801021106010202	Lower Rush Creek	2676	16	24
1801021106010203	Snow Gulch	2384	16	20
	Rush Creek (all)	**14,388**	**16**	**13**

Little Browns Creek

Little Browns Creek has approximately 0.9 miles of habitat accessible to anadromous fishes on Forest lands. Culverts on County Road 232 present a complete barrier to migrating fishes. Juvenile steelhead and coho salmon have been observed in the action area with limited spawning observed. Little Browns Creek flows intermittently during the dry season in the lower portions of the creek, (from the project area downstream to the confluence with Weaver Creek) and is often completely dry during summer months upstream of the Highway 3 crossing.

Highway 3, County Roads 230, 232 and 807, and FS road U34N77A closely parallel Little Browns Creek within the action area. Little Browns Creek has been channelized and its habitat greatly simplified. Large woody debris is lacking, pools are shallow, and the stream banks are vulnerable to erosion (2003 stream condition inventory). Six habitat improvement structures were installed in 1992. Several of the structures still exist and provide valuable habitat.

Baseline conditions for Little Browns Creek

Unless otherwise noted all baseline information for Little Browns Creek is from Stream Condition Surveys conducted in 2003 by the Forest Service (USDA-FS, 2003a).

- **Temperature** - Maximum water temperatures recorded in this 3rd order stream have been 68 degrees Fahrenheit. *At Risk*.

- **Turbidity** - Little Browns Creek is slow to clear after precipitation events. *Not Properly Functioning*. Personal observation of Loren Everest TRMU Fishery Biologist.
- **Chemical/Nutrient Contamination** - Water quality tests conducted during SCI surveys did not indicate any chemical contamination or nutrient problems. *Properly Functioning*.
- **Physical Barriers** - Culverts on County Road 229 serve as a complete barrier to migrating fishes. *Not Properly Functioning.* Personal observation of Loren Everest TRMU Fishery Biologist.
- **Substrate** - Pool Tail Fines are 6%. *Properly Functioning*.
- **Large Woody Debris** - Little Browns Creek has 30 pieces of wood per mile but the size is small and recruitment is poor due to the locations of roads near the creek. *Not Properly Functioning*.
- **Pool Frequency** - There is one pool every 4.8 channel widths however pools are very shallow (avg. 1.3 feet deep). *Not Properly Functioning*.
- **Off-channel Habitat** - There are no backwater or off channels areas. *Not Properly Functioning*.
- **Refugia**- Adequate habitat refugia do not exist. *Not Properly Functioning*. Personal observation of Loren Everest TRMU Fishery Biologist.
- **Width/Depth Ratio** - Stream width/depth ratio has been constrained by Hwy 3. *At Risk.*
- **Streambank Condition** - Twenty three percent of stream banks are classed as "unstable." *Not Properly Functioning*.
- **Floodplain Connectivity** - Floodplain and off channel habitats have been severely reduced by roads. There is little flood plain habitat for the stream to connect to. *Not Properly Functioning*.
- **Change in Peak/Base Flows** - Little Browns Creek has a WCC of three (Figure 1). Smaller than the other two 7th field watersheds, the ERA is 94% of the TOC (Table 7). The road network, rate of timber harvest and urban development are the main causes of the high ERA. *Not Properly Functioning*. Data from the Hydrology Specialist Report for the Browns Project.
- **Increase in Drainage Network** - There is a large increase in drainage density due to roads. *Not Properly Functioning*. Data from the Hydrology Specialist Report for the Browns Project.
- **Road Density and Location** - The Little Browns Creek subwatershed has 6.2 miles per square mile of roads, Highway 3 has impacted stream channel stability significantly near the stream crossing where the highway occupies ¾ of the original channel width. *Not Properly Functioning*. Data from the Hydrology Specialist Report for the Browns Project and Personal observation of Loren Everest TRMU Fishery Biologist.
- **Disturbance History** - CWE modeling shows Little Browns subwatershed is very close to the TOC (Table 6). *Not Properly Functioning*. Data from the Hydrology Specialist Report for the Browns Project.
- **Riparian Reserves** - The Riparian Reserves of Little Browns Creek have been impacted by Hwy 3. The eastern half of the Riparian Reserve is occupied by Hwy 3. The western half is recovering with vegetation still adequate to provide >70% stream shade and adequate duff

layer to provide and effective sediment filter strip. *Not Properly Functioning*. Personal observation of Loren Everest TRMU Fishery Biologist.

Table 7. Existing ERA for Little Browns Creek.

HUC8	HUC Name	Drainage Area (acres)	Forest Plan TOC (%)	Existing ERA (%)
1801021106040301	Upper Little Browns Creek	2151	16	15
1801021106040302	Long Gulch	2838	16	15
Little Browns Creek (all)		**4989**	**16**	**15**

East Weaver Creek

East Weaver Creek has approximately 0.5 miles of habitat accessible to anadromous fishes on STNF lands. The diversion dam for the Weaverville Community Service District blocks migration .25 miles above the East Weaver Campground. Juvenile coho salmon and steelhead have been observed near East Weaver Campground but adult spawning has not been observed.

Baseline conditions for East Weaver Creek

Unless otherwise noted all baseline information for East Weaver Creek is from Stream Condition Surveys conducted in 2003 by the Forest Service (USDA-FS 2003b).

- **Temperature** - Temperature measurements in this 3rd order stream near the Forest Boundary have been 67 degrees Fahrenheit or less. *Properly Functioning*.
- **Turbidity** - Turbidity is low and clears quickly after precipitation events. *Properly Functioning*. Personal observation of Loren Everest TRMU Fishery Biologist.
- **Chemical/Nutrient Contamination** - Water quality tests conducted during SCI surveys did not indicate any chemical contamination or nutrient problems. *Properly Functioning*.
- **Physical Barriers** - The diversion dam for the Weaverville Community Service District blocks migration .25 miles above the East Weaver Campground. *Not Properly Functioning*.
- **Substrate** - Fine sediment at pool tails is 10%. *Properly Functioning*.
- **Large Woody Debris** - East Weaver Creek has 40 pieces of wood per stream mile but the recruitment potential is somewhat reduced by roads and development near the Riparian Reserve. *At Risk*.
- **Pool Frequency** - Pools are frequent but average only 18 inches deep. *At Risk*.
- **Off-channel Habitat** - There are few backwaters. *Not Properly Functioning*.
- **Refugia** - Areas that may have historically provided refugia for anadromous fishes now have barriers that prevent fish use. *Not Properly Functioning*. Personal observation of Loren Everest TRMU Fishery Biologist.
- **Width/Depth Ratio** - East Weaver Creek is a Rosgen "B" channel type. The width/depth ratio is appropriate for the channel type. *Properly Functioning*.
- **Streambank Condition** - Stream bank are 28% unstable. *Not Properly Functioning*.
- **Floodplain Connectivity** - Reduced linkage of wetland, floodplains, and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by

moderate degradation of wetland function, riparian vegetation/succession. *At Risk.* Personal observation of Loren Everest TRMU Fishery Biologist.

- **Change in Peak/Base Flows** - East Weaver Creek has a WCC of two, however, one of the subwatersheds (1801021106040102) is in WCC three (Figure 1). The headwaters of East Weaver Creek drain wilderness and have a WCC of one. The ERA increases downstream; urban development is the main cause of the high ERA (Table 8). *At Risk*. Hydrology Specialist Report for the Browns Project.
- **Increase in Drainage Network** - East Weaver Creek has moderate levels of road and urban development. *At Risk*. Hydrology Specialist Report for the Browns Project.
- **Road Density and Location** – The East Weaver Creek subwatershed has 5.0 miles per square mile of roads. *Not Properly Functioning*. Data from the Hydrology Specialist Report for the Browns Project.
- **Disturbance History** - CWE modeling shows that the upper East Weaver subwatershed is over TOC, while the overall condition is less than 80% of the TOC. *At Risk.* Hydrology Specialist Report for the Browns Project.
- **Riparian Reserves** - Riparian Reserves on STNF lands are moderately functional however much of the riparian areas are privately managed and are greatly reduced in width. *At Risk.* Personal observation of Loren Everest TRMU Fishery Biologist.

Table 8. Existing ERA for East Weaver Creek

HUC8	HUC Name	Drainage Area (acres)	Forest Plan TOC (%)	Existing ERA (%)
1801021106040101	Headwaters East Weaver Creek	2148	16	1
1801021106040102	Upper East Weaver Creek	1567	16	17
1801021106040103	East Branch East Weaver Creek	2291	16	10
1801021106040105	Lower East Weaver Creek	2886	16	12
	E Weaver Creek (all)	**8892**	**16**	**10**

Watershed (5th field) baseline

Weaver Creek has 5.7 miles of habitat available to anadromous fishes below the confluence of East and West Weaver Creeks. The community of Weaverville is located entirely within the watershed and heavily impacts the watershed through domestic water use and disruption of peak and base flows. The riparian areas of Weaver Creek have shown some recovery from those pictured in early photos when both bucket dredge and hydraulic mining occurred in and near the community. Culverts and concrete lined ditches gave no provision for fish passage. Migration barriers are slowly being modified and upgraded to allow fish to reach areas that have been blocked for many years. Coho salmon are now commonly seen in town during November and December when flows are suitable for migration.

Baseline conditions for Weaver Creek

Baseline conditions for Weaver Creek are based on the personal observation of Loren Everest TRMU Fishery Biologist unless otherwise noted.

- **Temperature** - Maximum temperatures in this 4th order stream are often > 73.0 degrees F *Not Properly Functioning*. Data from USGS Stream gage.
- **Turbidity** - Weaver Creek becomes turbid quickly and remains turbid through precipitation events. *Not Properly Functioning*.
- **Chemical/Nutrient Contamination** - Weaver Creek has low levels of contamination from agriculture, industrial, and other sources; no excess nutrients. *Properly Functioning*.
- **Physical Barriers** - Man-made barriers are present in the watershed. *Not Properly Functioning*.
- **Substrate** - Fine sediment levels are somewhat elevated in pool tails and spawning areas. *At Risk*.
- **Large Woody Debris** - Large woody debris are often recruited by bank cutting during high flow events but are often removed from the channel. *At Risk.*
- **Pool Frequency** - Pools are infrequent and generally shallow. *Not Properly Functioning*.
- **Off-channel Habitat** - Some side channels and backwater areas exist at high flow. *At Risk.*
- **Refugia** - Adequate habitat refugia do not exist. *Not Properly Functioning*.
- **Width/Depth Ratio** - Width/depth ratio is suitable for a "C" type channel, some braiding occurs due to excessive sediment in the channel. *At Risk*.
- **Streambank Condition** - Many banks are actively eroding. *Not Properly Functioning*.
- **Floodplain Connectivity** - Floodplains have been greatly reduced by Hwy 299 in some areas. *Not Properly Functioning*
- **Change in Peak/Base Flows** - Pronounced changes in peak and base flow is evident in Weaver Creek. *Not Properly Functioning*.
- **Increase in Drainage Network** - The drainage network has been significantly increased at the watershed level due to urban development. *Not Properly Functioning*.
- **Road Density and Location** - There are over 3 miles of road per square mile of watershed, many valley bottom roads. *Not Properly Functioning*.
- **Disturbance History** - The Weaver Creek watershed has had a long history of mining and urban development that has significantly disrupted watershed function, *Not Properly Functioning*.
- **Riparian Reserves** - Riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitat and refugia for sensitive aquatic species, however it has shown some recovery over time. *Not Properly Functioning*.

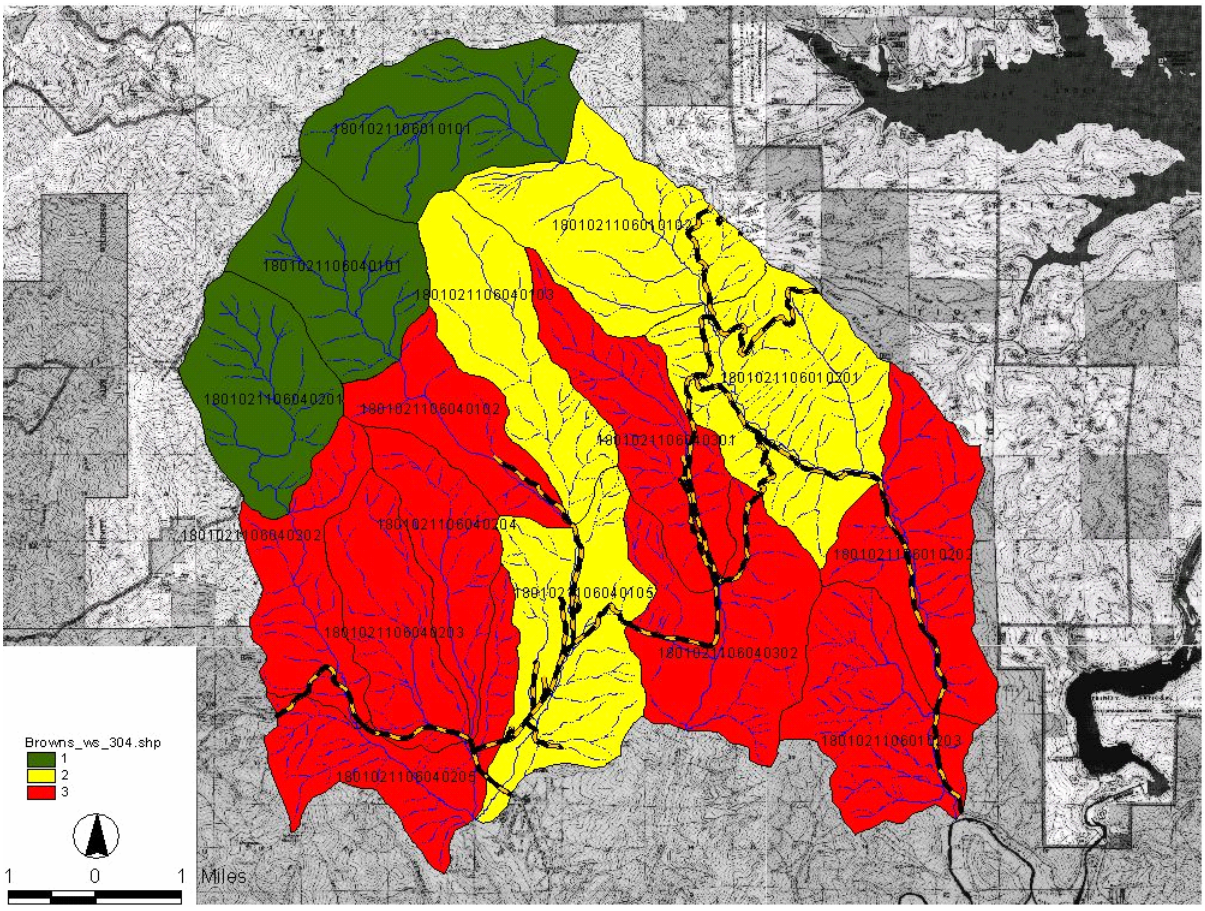

Figure 2. Watershed Condition Class by subwatershed in the Weaverville watershed (Green areas are WCC one, Yellow areas are in WCC two, Red areas WCC three).

V. Effects of the Proposed Action

The Shasta Trinity National Forest Tributaries Matrix of Factors and Indicators (Appendix A of this document), was used to assist in the analysis of effect for the proposed action. Level 1 teams are permitted to revise indicator values to more biologically appropriate values for specific watersheds or basins (NMFS 1996, page 3). This concept is reinforced in the Analytical Procedures process paper (NOAAF et al. 2004, page 7) and the Streamlined Consultation Procedures handbook (USDA Forest Service et al. 1999, pages IV-A-1 and IV-B-1). The Shasta Trinity National Forest Tributaries Matrix of Factors and Indicators is functionally equivalent to the "Table of Population and Habitat Indicators for Use in the Northwest Forest Plan Area" provided in the Analytical Process, except for the "population characteristics" and "population and habitat" pathways. An ESA recovery plan for SONCC coho salmon has not been proposed or completed. Therefore, insufficient information exists to address the "population characteristics" and "population and habitat" pathways at this time.

The analytical process contains efficiency measures to limit duplicative analysis. Project elements that have similar effects (or no causal mechanism) to an indicator may be grouped for analysis.

Indicators that address similar habitat characteristics (such as substrate and turbidity) may be grouped for analysis since they are similarly affected by project elements.

Direct effects to coho salmon are not expected to occur. There are no aspects of the Project that will occur where fish are present.

Indirect effects to SONCC coho salmon and its critical habitat, and EFH for SONCC coho salmon and KMP Chinook salmon will be analyzed by evaluating the expected effect of the Project elements on habitat indicators as described above.

For evaluating effects, the Project is divided into Project Elements as described below:

Harvest

1. Intermediate Thinning Harvest.
2. Regeneration Harvest.

Yarding

1. Tractor Yarding.
2. Cable Yarding.
3. Development of a skid trail system on less than 15% of unit area.
4. Construction of 89 landings to be used only for this Project and then rehabilitated.

Fuels Treatment

1. Whole Tree Yard
2. Lop and Scatter
3. Hand Pile
4. Burn Piles
5. Burn Concentrations
6. Broadcast Burn
7. Fire Line Construction

Hauling

1. Log haul on the Transportation System.

Road Construction

1. System Road Construction of 4.7 miles (and subsequent decommissioning of 3.3 miles of new road).
2. Temporary Road Construction of 3.6 miles, to be used only for this Project and then obliterated

Road Reconstruction

1. System Road Reconstruction of 4.4 miles of existing system roads (including rocking, grading, culvert upgrade or drainage repair).
2. Hazard tree mitigation.

Road Rehabilitation

1. Decommissioning or obliteration of 28 miles of existing system and nonsystem road including culvert removal, outsloping, ripping, waterbarring, slope stabilization and revegetation.

Each of the Project elements is analyzed for its effect on habitat indicators that are used to characterize the health of aquatic habitat. Changes to an indicator are evaluated using factor analysis to determine if there is an effect to individuals of the species or critical habitat.

Water Temperature

Harvest

- **Proximity** - Intermediate thinning will occur in Riparian Reserves adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232. Other thinning and regeneration units are at least 500 feet (0.10 miles) from critical habitat.
- **Probability** – There is low probability that reducing conifer canopy closure by 1% to 34% on one side of Little Browns Creek outside of the inner gorge would result in a change in water temperature. There is no probability that thinning of RR's of intermittent tributaries would result in a change in water temperature, because the intermittent streams go dry before water temperatures in critical habitat become limiting to fish.
- **Magnitude** – Conifer canopy cover will be reduced to 60% in the RR but outside of the inner gorge along one side of Little Browns Creek in units 106 and 107. The inner gorge provides approximately 100 feet of undisturbed canopy between the thinning area and Little Browns Creek. Steinblums (1977) found that leaving a buffer of 100 feet would not change stream shade. If stream shade is unaffected than water temperature will not change as a result of this project element.
- **Element Summary** - This project element would have a neutral (0) effect on water temperature.

Yarding

- **Proximity** – Yarding will occur adjacent to critical habitat in units 107 and 107 and in RR units that are upstream of critical habitat.
- **Probability** – There is no probability that Yarding would result in a change in water temperature because there is no causal mechanism. Yarding does not remove shade canopy over streams.
- **Element Summary** - This project element would have a neutral (0) effect on water temperature.

Fuels Treatment

- **Proximity** – Fuels treatment will occur in Units 106 and 107 that are adjacent to critical habitat. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat and will have fuels treated.

- **Probability** - All "100" series have fuels treated through whole tree yarding and hand piling along roads. Fuels treatment does not remove shade canopy over streams. There is no causal mechanism because fuels to be treated are harvest generated fuels.
- **Element Summary** - This project element would have a neutral (0) effect on water temperature.

Hauling

- **Proximity** – Hauling will cross critical habitat in Little Browns Creek, Rush Creek, and East Weaver Creek on the bridges of Hwy 3 and County road 204.
- **Probability** - There is no probability that this element would have any effect on water temperature because there is no mechanism for removing stream shade.
- **Element Summary** - This project element would have a neutral (0) effect on water temperature.

Road Construction

- **Proximity** - Specified road construction of 34N47 and 34N47A will cross Riparian Reserves of two intermittent channels. These crossings are .25 and .37 miles away from critical habitat. U232A is the closest temporary road to critical habitat; it is about 0.10 mile away from Little Browns Creek and is separated by an existing county road.
- **Probability** - Tree removal will be required at the channel crossings resulting in some canopy reduction that may reduce stream shade.
- **Magnitude** - Due to the intermittent nature of the streams and limited amount of canopy removal, road construction will not result in changes to stream temperature that can be meaningfully measured.
- **Element Summary** - This project element would have insignificant negative (-) effects on water temperature.

Road Reconstruction

- **Proximity** – Road 34N77 is about 100 feet away from critical habitat in Little Browns Creek. All other roads to be reconstructed are 0.10 mile or more away from critical habitat.
- **Probability** – It is probable that some hazard trees will be fell during road reconstruction that may result in reductions in stream shade. There is low probability that tree removal for road reconstruction will result in water temperature changes.
- **Magnitude** – Changes to stream shade resulting from removing individual hazard trees will be so small that no water temperature change will result.
- **Element Summary** - This project element would have a neutral (0) effect on water temperature.

Road Rehabilitation

- **Proximity** – Twenty-eight miles are proposed for rehabilitation. Roads range from 25 feet to over 2 miles away from critical habitat. Road U34N77A is located on the flood plain of Little Browns Creek. Several other roads including U34N77A-1, U34N77AA, U3TRI02, U3TRI01, U3TRI01A and U3TRI03F are located within one site tree distance (150 feet) of Little Browns Creek. Road rehabilitation in Rush and East Weaver Creek subwatersheds is at least 0.2 miles from critical habitat.
- **Probability** - Road rehabilitation will not result in the loss of any canopy cover of any stream; therefore, there is no causal mechanism to change water temperature.
- **Element Summary** - This project element would have a neutral (0) effect on water temperature.

Water Temperature Indicator Summary

The Project would have insignificant negative (-) effects on water temperature due to canopy loss resulting from road construction.

Turbidity and Substrate

These indicators are grouped since they are affected similarly by project elements. Turbidity is used as an indicator of fine sediment suspended in the water, and substrate is an indicator of fine sediment that settles onto the streambed.

Harvest

- **Proximity** - Intermediate thinning will occur in Riparian Reserves adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All “100” series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232. Other thinning and regeneration units are at least 500 feet (0.10 miles) from critical habitat.
- **Probability** - There is no probability that harvest would affect turbidity or substrate because harvest units are not located on unstable or potentially unstable soils. There is no other mechanism in which this PE could affect turbidity or substrate.
- **Element Summary** - This project element would have a neutral (0) effect on turbidity or substrate.

Yarding

- **Proximity** – Tractor yarding will occur in Riparian Reserves adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All “100” series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns

Creek but is separated from the RR by county road 232. Tractor yarding will occur in Riparian Reserves down to the inner gorge of ephemeral and intermittent streams. Mechanical harvesters and forwarders will be used to limit the number of trips that vehicles will make into the Riparian Reserves. Three designated channel crossing sites are in units 16 and 17. These crossings are on intermittent channels and are 1.75 miles or more from critical habitat. Cable yarding will occur in seven RR thinning units. These units are 0.35 miles or more away from critical habitat. Proposed landings are all located outside of RR's, the closest landing to critical habitat is in unit 107 and is about 300 feet away. Landings in unit 3B are just outside the RR (300 feet) but are hydrologically separated from Little Browns Creek by County Road 232.

- **Probability** – Cable yarding, tractor yarding, and landing use have the potential to cause ground disturbance that may lead to an increase in turbidity or change in substrate.
- **Magnitude** – Mechanical yarding in units directly adjacent to critical habitat (106,107) will occur on relatively flat ground, outside of the inner gorges and any runoff would have to pass through the duff-litter, forbs and shrubs of the inner gorge. The filtering effects of the duff-litter, forbs and shrubs of the inner gorge and the use of project design criteria, proper erosion control and BMP's will limit increases in turbidity or change in substrate of adjacent critical habitat to levels that cannot be meaningfully measured. Tractor yarding in RR thinning units away from critical habitat will have similar effects to units 106 and 107 except where channel crossings occur. Projects design criteria call for mulching with organic material for 50 feet on each side of the crossing to provide at least 50% ground cover and filter any runoff that occurs. Implementation of project design criteria for channel crossings will limit increases in turbidity or change in substrate in critical habitat to levels that cannot be meaningfully measured. Due to the limited amount of ground disturbance and adherence to project design criteria, proper erosion control and BMP's the negative effect of cable yarding throughout the project on turbidity and substrate in critical habitat is insignificant.
- **Element Summary** - This project element would have insignificant negative (-) effects on turbidity and substrate due to yarding of trees from units directly adjacent to critical habitat.

Fuels Treatment

- **Proximity** – Fuels treatment will occur in all harvest units including RR thinning adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232. Hand and dozer lines will be constructed where necessary but will not be constructed in Riparian Reserves.
- **Probability** –The whole tree yarding fuels prescription does not have any mechanism to cause an increase in turbidity or change in substrate. Due to the location outside of RR's, implementation of project design criteria and meeting ground cover requirements there is no probability of broadcast burning, burning concentrations, hand fireline construction and dozer

fireline construction increasing turbidity or changing substrate. Roadside piling and burning will occur along system roads within RR's and will result in small areas of exposed mineral soil.

- **Magnitude** – The nearest to critical habitat that roadside piling and burning will only occur near critical habitat in unit 106 next to county road 232. Other RR units with roadside piling and burning are at least 0.7 miles from critical habitat. Ground cover, including duff, litter and shrubs in riparian reserves is adequate to effectively filter most sediment that leaves burn piles through overland flow resulting in negative effects to critical habitat that cannot be meaningfully measured.
- **Element Summary** - This project element would have insignificant negative (-) effects on turbidity and substrate resulting from fuel treatments, especially roadside piling and burning in Unit 106.

Hauling

- **Proximity** – Hauling will cross critical habitat in Little Browns Creek, Rush Creek, and East Weaver Creek on the bridges of Hwy 3 and County Road 204. Hauling will occur on Forest roads that cross streams draining into critical habitat and enter RR's.
- **Probability** –Hauling on Hwy 3 and County Roads 204 and 230 has no probability of affecting turbidity or substrate in critical habitat. Hwy 3 and County Roads 204 and 230 are paved roads suitable for all season use. Hauling on Forest Roads and County Road 232 has a low probably of affecting turbidity or changing substrate in critical habitat due to restrictions on wet weather operation and improved road drainage and rocked surfaces from reconstruction of main haul roads.
- **Magnitude** – Hauling on Forest Roads and County Road 232 will result in negative effects that cannot be meaningfully measured or detected to turbidity and substrate in critical habitat due to wet weather operation restrictions and improved road drainage and rocked surfaces from reconstruction of main haul roads.
- **Element Summary** - This project element would have insignificant negative (-) effects on turbidity and substrate as a result of hauling on native and aggregate surfaced roads.

Road Construction

- **Proximity** - Specified road construction of 34N47 and 34N47A will cross RR's of two intermittent channels in units 102 and 103. These crossings are .25 and .37 miles away from critical habitat. U232A is the closest temporary road to critical habitat, it is about 0.10 mile away from Little Browns Creek and is separated by an existing county road. Other temporary roads in unit 100 and 101 are located in the RR but are over 1 mile away from critical habitat.
- **Probability** – Specified road construction will create some ground disturbance near intermittent channels that drain to critical habitat. There is a low probably that ground disturbance will cause some localized increase in turbidity or change in substrate in the intermittent channels due to the timing of work outside of the wet season and adherence to all

project design criteria and BMP's. Timing of the road work during the dry season will allow disturbed surfaces to stabilize before rain events, project design criteria for roads requires that landings and skid trails drain away from new construction and proper erosion control measures be followed.

- **Magnitude** – Negative effects (-) to turbidity and substrate in critical habitat resulting from road construction cannot be meaningfully measured due to the timing of road work, the adherence to project design criteria and the distance from critical habitat. The further the disturbance is located from critical habitat the greater the likelihood that any individual effect is diluted or overwhelmed by background levels of turbidity.
- **Element Summary** – Road Construction will have insignificant negative (-) effects on turbidity and substrate resulting from the road construction causing some soil disturbance.

Road Reconstruction

- **Proximity** - Road 34N77 is about 100 feet away from critical habitat. All other roads to be reconstructed are 1.10 miles or more away from critical habitat. All culverts being replaced are more than 1.0 mile away from critical habitat.
- **Probability** - The probability for road reconstruction activities (which includes ditch cleaning, culvert inlet cleanout, constructing rocked water dips, and replacing culverts in non-fish streams) to negatively (-) affect coho salmon is low because of timing of sediment movement and because of the limited amount of sediment that could reach critical habitat. The likelihood that this project element would positively (+) affect (reduce) turbidity or improve substrate in critical habitat under winter stream flow conditions is also low because relatively few road miles would be reconstructed compared to total road miles in the watershed.
- **Magnitude** – Road reconstruction would have a short-term negative (-) effect, as well as a slight long-term positive (+) effect on the indicator. The slight negative effects of road reconstruction on turbidity and substrate in critical habitat would be difficult to detect and would not measurably affect critical habitat. Project design criteria would be used to minimize the amount of soil that moves off-site. In addition, any soil that is flushed downstream at the beginning of the rainy season would be immediately diluted by the much greater volume of water in critical habitat and would become indistinguishable from the elevated levels of sediment entering channels from all sources at that time.

  The slight positive (+) effect for this element will occur for reducing road-related stream sediment in the long term. Positive effects will occur as a result of better cross drains moving water off the road surface, rock surfacing to reduce erosion from the running surface and larger culverts to reduce the risk of catastrophic failure.
- **Element Summary** – Road reconstruction will have insignificant short-term negative (-) effects to turbidity and substrate due to soil disturbance and long-term positive (+) effects resulting from better road drainage and lower risk of culvert failure.

Road Rehabilitation

- **Proximity** – Twenty-eight miles are proposed for rehabilitation. Roads range from 25 feet to over 2 miles away from critical habitat. Road U34N77A is located on the flood plain of Little Browns Creek. Several other roads including U34N77A-1, U34N77AA, U3TRI02, U3TRI01, U3TRI01A and U3TRI03F are located within one site tree distance (150 feet) of Little Browns Creek. Road rehabilitation in Rush and East Weaver Creek subwatersheds is at least 0.2 miles from critical habitat. Culverts to be removed range from 0.1 to 2.1miles from critical habitat.
- **Probability** – There is high probability that road rehabilitation will have short-term (-) negative effects on turbidity and substrate in critical habitat and a long-term positive (+) effect in the Little Browns subwatershed. There is low probability that that road rehabilitation will have short-term (-) negative effects on turbidity and substrate in critical habitat and a long-term positive (+) effect in the Rush and East Weaver Creek Little subwatersheds.
- **Magnitude** - Road rehabilitation would have short-term negative (-) effects, as well as a slight long-term positive (+) effect on the habitat indicator. The negative effects of road rehabilitation related turbidity and substrate would be evident in Little Browns Creek for a short distance (1/4 mile) downstream. An unknown amount of sediment will be mobilized into critical habitat. If spawning fish were present there may be enough sediment entering the stream to affect emergence of fry from redds. Because of the distance of road rehabilitation activities from critical habitat, in addition to implementing project design criteria and BMP's effects in Rush and East Weaver Creeks could not be meaningfully measured.

  The long-term positive (+) effect of this element for reducing road-related turbidity and decreasing fine sediment in the substrate in the long-term would be reducing the density of roads in the Little Browns Creek subwatershed by one third. Rush and East Weaver Creek subwatersheds would have positive effects that could not be meaningfully measured.
- **Distribution** - The greatest negative effect to critical habitat would occur in Little Browns Creek from the Hwy 3 crossing downstream ¼ mile. Some effects could occur in intermittent tributaries to Little Browns Creek but it is unlikely that effects to turbidity or substrate would be significant by the time it reached critical habitat. Positive effects would occur in the Little Browns Creek subwatershed as rehabilitated roadbeds revegetate over time.
- **Frequency** – Negative effects to Little Browns Creek would occur during precipitation events. Positive effects of road rehabilitation would occur continuously over time.
- **Duration** – Negative effects to Little Browns Creek would occur with the first precipitation event and diminish in following events. It is likely that negative effects would occur for a period of 2 to 3 years, until disturbed areas become stabilized. Positive effects of road rehabilitation would occur in perpetuity.
- **Timing** - Negative effects in Little Browns Creek would be coincidental with adult fish migration, spawning, egg incubation and emergence. Long-term positive effects will occur year-round and may affect all freshwater life stages of coho salmon.

- **Nature** –If spawning were to occur near and downstream of the Project area, increased fine sediment levels could cause a reduction in emergence of hatched coho salmon due to fine sediment infiltrating a redd. Road rehabilitation will also provide long-term positive effects to the watershed by decreasing compacted surfaces, increasing infiltration, decreasing the drainage network and revegetating bare surfaces that are prone to erosion.
- **Element Summary** - Road rehabilitation will have effects great enough to negatively (-) affect coho salmon and their habitat in Little Browns Creek due to increases in turbidity and changes in substrate as a result of road obliteration in the floodplain. Road rehabilitation will have insignificant short-term negative (-) effects due to ground disturbance well away from critical habitat in Rush and East Weaver Creeks. Road rehabilitation will have long-term positive (+) effects to turbidity and substrate in Little Browns Creek due to decreasing compacted surfaces, increasing infiltration, decreasing the drainage network and revegetating bare surfaces that are prone to erosion and insignificant long-term positive effects in Rush and East Weaver Creeks.

Turbidity and Substrate Indicator Summary

For Rush and East Weaver Creeks the Project would have insignificant negative (-) effects on turbidity and substrate from several project elements. The additive effects are still expected to be insignificant because of the small amount of harvest and road rehabilitation that will occur in those subwatersheds. In the Little Browns Creek subwatershed, the additive effects of all project elements are expected to result in slightly elevated turbidity levels for a period of two to three years. One element (road rehabilitation) is likely to result in negative (-) effects to turbidity and substrate in Little Browns Creek that may impact coho salmon. Long-term positive (+) effects will occur in Little Browns Creek due to decreasing compacted surfaces, increasing infiltration, decreasing the drainage network and revegetating bare surfaces that are prone to erosion.

Chemical Contamination/Nutrients

- Harvest
- Yarding
- Fuels Treatment
- Hauling
- Road Construction
- Road Reconstruction
- Road Rehabilitation

All Project elements have a common analysis for Chemical Contamination/Nutrients because the mechanism with potential to cause effects is the same. All equipment fueling sites will be located at landings well away from any watercourses and have appropriate spill containment (Browns Project Appendix B). Chemical contamination in the form of a spill of petroleum products due to a motorized vehicle accident (log truck, tractor, and yarder) is, of course, not expected as part of the Project. Reinitiation of consultation will be initiated, as appropriate, if such an accident occurs.

No project elements have a causal mechanism to affect the nutrient loading in any way.

Chemical Contamination/Nutrients Indicator and Element Summary

The Project will have neutral (0) effects on Chemical Contamination/Nutrients.

Physical Barriers _____

- Harvest
- Yarding
- Fuels Treatment
- Hauling
- Road Construction
- Road Reconstruction
- Road Rehabilitation

The Project neither corrects nor creates any fish passage barriers. There is no causal mechanism associated with the proposed Project to affect the indicator.

Physical Barriers Indicator and Element Summary

The Project will have neutral (0) effects on Physical Barriers.

Large Woody Debris (LWD) _____

Harvest

- **Proximity** - Intermediate thinning will occur in Riparian Reserves adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232. Other thinning and regeneration units are at least 500 feet (0.10 miles) from critical habitat.
- **Probability** – There is no probability that thinning will have negative (-) effects on LWD levels in critical habitat because only two units are located adjacent to critical habitat and the diameter of trees being removed does not meet the minimum size requirements (>16"dbh) for LWD. Any standing dead snags will be retained for future recruitment. Thinned stands will have increased growth rates for long-term positive (+) effects on LWD levels in critical habitat.
- **Magnitude** – Thinning will have slight positive (+) effect on LWD recruitment because increased growth will occur in only two stands (4.2 acres) thinned that are adjacent to critical habitat.
- **Element Summary** - Harvest will have insignificant long-term positive (+) effects on LWD levels due to increased growth rates in 4.2 acres of Riparian Reserve thinning.

- Yarding
- Fuels Treatment
- Hauling

These project elements are not directly related with any tree removal and therefore do not have any causal mechanism by which to affect LWD.

- **Element Summary** - Yarding, Fuels Treatment, Hauling and Road Rehabilitation will have neutral (0) effects on LWD.

Road Rehabilitation

- **Proximity** - Twenty-eight miles are proposed for rehabilitation. Roads range from 25 feet to over 2 miles away from critical habitat. Road U34N77A is located on the flood plain of Little Browns Creek. Several other roads including U34N77A-1, U34N77AA, U3TRI02, U3TRI01, U3TRI01A and U3TRI03F are located within one site tree distance (150 feet) of Little Browns Creek. Road rehabilitation in Rush and East Weaver Creek subwatersheds is at least 0.2 miles from critical habitat.
- **Probability** – There is high probability that road rehabilitation may result in long-term positive effects to LWD due to revegetation.
- **Magnitude** – Road rehabilitation will have a slight positive effect on LWD levels in critical habitat because only a small portion of Riparian Reserve is affected.
- **Element Summary** – Road Rehabilitation will have insignificant long-term positive (+) effects on LWD levels due to revegetation of rehabilitated road areas.

- Road Construction
- Road Reconstruction

- **Proximity** - Road 34N77 is about 100 feet away from critical habitat. All other roads to be reconstructed are 1.10 miles or more away from critical habitat. Specified road construction of 34N47 and 34N47A will cross RR's of two intermittent channels in units 102 and 103. These crossings are .25 and .37 miles away from critical habitat. U232A is the closest temporary road to critical habitat, it is about 0.10 mile away from Little Browns Creek and is separated by an existing county road. Other temporary roads in unit 100 and 101 are located in the RR but are over 1 mile away from critical habitat.
- **Probability** – There is no probability that trees of sufficient size to be recruited to critical habitat for LWD will be removed during road construction or road reconstruction. Hazard trees within RR's along roads to be reconstructed will be dropped and left in place. Trees of sufficient size to be LWD will be removed from 0.25 acres of RR's in units 102 and 103 where new construction will occur. Removing trees from RR's in units 102 and 103 will have insignificant negative effects because of the small amount of area affected.
- **Element Summary** - Road Construction and Road Reconstruction will have insignificant negative effects on large woody debris.

Large Woody Debris Indicator Summary

Harvest will have insignificant long-term positive (+) effects on LWD levels due to increased growth rates in 4.2 acres of Riparian Reserve thinning. Road Rehabilitation will have insignificant long-term positive (+) effects on LWD due to conversion of road into vegetated area. Yarding, Fuels Treatment and Hauling will have neutral (0) effects on LWD. Road Construction and Road Reconstruction will have insignificant negative effects on LWD.

Pool Frequency

Project elements do not directly change pools but may alter processes that affect pool frequency and depth. This analysis focuses on sediment supply as related to pool filling and LWD as related to pool forming structures.

Harvest

- **Proximity** - Intermediate thinning will occur in Riparian Reserves adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232. Other thinning and regeneration units are at least 500 feet (0.10 miles) from critical habitat.
- **Probability** – There is no probability that Harvest will affect pool frequency because harvest units and prescriptions have been designed to avoid unstable areas that could cause mass failures and lead to increased sediment supply and there are no changes in LWD expected from Harvest.
- **Element Summary** – Harvest will have neutral (0) effects on pool frequency.

Yarding

- **Proximity** - Tractor yarding will occur in Riparian Reserves adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232. Tractor yarding will occur in Riparian Reserves down to the inner gorge of ephemeral and intermittent streams. Mechanical harvesters and forwarders will be used to limit the number of trips that vehicles will make into the Riparian Reserves. Three designated channel crossing sites are in units 16 and 17. These crossings are on intermittent channels and are 1.75 miles or more from critical habitat. Cable yarding will occur in seven RR thinning units. These units are 0.35 miles or more away from critical habitat. Proposed landings are all located outside of RR's, the closest landing to critical habitat is in unit 107 and is about 300 feet away. Landings in unit 3B are just outside the RR (300 feet) but are hydrologically separated from Little Browns Creek by County Road 232.

- **Probability** - Cable yarding, tractor yarding, and landing use cause ground disturbance that may lead to erosion and changes in sediment supply, an important factor in pool frequency.
- **Magnitude** – **Mechanical yarding** in units directly adjacent to critical habitat (106,107) will occur on relatively flat ground, outside of the inner gorges and any runoff would have to pass through the duff-litter, forbs and shrubs of the inner gorge. The filtering effects of the duff-litter, forbs and shrubs of the inner gorge and the use of project design criteria, proper erosion control and BMP's will limit increases (negative effects) in sediment supply to adjacent critical habitat to less than detectable levels. Tractor yarding in RR thinning units away from critical habitat will have similar effects to units 106 and 107 except where channel crossings occur. Projects design standards call for mulching with organic material for 50 feet on each side of the crossing to provide at least 50% ground cover and filter any runoff that occurs. Implementation of project design criteria for channel crossings will limit increases in sediment supply (negative effects) in critical habitat to levels that cannot be meaningfully measured.

  Due to the limited amount of ground disturbance and adherence to project design criteria, proper erosion control and BMP's, cable yarding will have neutral (0) effect on pool frequency in critical habitat do to an increase in sediment supply.
- **Element Summary** – Yarding will have insignificant negative (-) effects on pool frequency due to some ground disturbance by tractor yarding.

Fuels Treatment

- **Proximity** – Fuels treatment will occur in all harvest units including RR thinning adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232.
- **Probability** – The whole tree yarding fuels prescription does not have any mechanism to cause a change in pool frequency. Due to the location outside of RR's, implementation of project design criteria and meeting ground cover requirements, there is no probability of broadcast burning, burning concentrations, hand fireline construction and dozer fireline construction changing pool frequency. Roadside piling and burning will occur along system roads within RR's and will result in small areas of exposed mineral soil.
- **Magnitude** – Roadside piling and burning will only occur near critical habitat in unit 106 next to county road 232. Other RR units with roadside piling and burning are at least 0.7 miles from critical habitat. Ground cover, including duff, litter and shrubs in riparian reserves is adequate to effectively filter most sediment that leaves burn piles through overland flow resulting in negative effects to critical habitat that cannot be meaningfully measured.
- **Element Summary** – Fuels treatment will have insignificant negative (-) effects to pool frequency as a result of roadside piling and burning in unit 106.

Hauling

- **Proximity** – Hauling will cross critical habitat in Little Browns Creek, Rush Creek, and East Weaver Creek on the bridges of Hwy 3 and County Road 204. Hauling will occur on Forest roads that cross streams draining into critical habitat and enter RR's.
- **Probability** – Hauling on Hwy 3 and County Roads 204 and 230 has no probability of affecting pool frequency in critical habitat. Hwy3 and County Roads 204 and 230 are paved roads suitable for all season use. Hauling on Forest Roads and County Road 232 has a low probably of affecting pool frequency, through changes in sediment supply, in critical habitat due to restrictions on wet weather operation and improved road drainage and rocked surfaces from reconstruction of main haul roads.
- **Magnitude** – Hauling on Forest Roads and County Road 232 will result in negative effects to sediment supply that are not great enough to meaningfully detect. Pool frequency in critical habitat due to wet weather operation restrictions and improved road drainage and rocked surfaces from reconstruction of main haul roads will not change due to hauling.
- **Element Summary** - This project element would have insignificant negative (-) effects on pool frequency as a result of hauling on native and aggregate surfaced roads.

Road Construction

- **Proximity** - Specified road construction of 34N47 and 34N47A will cross RR's of two intermittent channels in units 102 and 103. These crossings are .25 and .37 miles away from critical habitat. U232A is the closest temporary road to critical habitat; it is about 0.10 mile away from Little Browns Creek and is separated by an existing county road. Other temporary roads in unit 100 and 101 are located in the RR but are over 1 mile away from critical habitat.
- **Probability** – Specified road construction will create some ground disturbance near intermittent channels that drain to critical habitat. There is a low probably that ground disturbance will cause some localized increase in sediment supply in intermittent channels due to the timing of work outside of the wet season and adherence to all project design criteria and BMP's.
- **Magnitude** – Negative effects (-) to sediment supply in critical habitat resulting from road construction will be small enough to not be meaningfully measured due to the timing of road work, the adherence to project design criteria and the distance from critical habitat. Timing of the road work during the dry season will allow disturbed surfaces to stabilize before rain events, project design criteria for roads requires that landings and skid trails drain away from new road construction and proper erosion control measures be followed.
- **Element Summary** – Road Construction will have insignificant negative (-) effects on pool frequency as a result of ground disturbance and insignificant sediment mobilization and delivery during construction.

Road Reconstruction

- **Proximity** - Road 34N77 is about 100 feet away from critical habitat. All other roads to be reconstructed are 1.10 miles or more away from critical habitat. All culverts being replaced are more than 1.0 mile away from critical habitat.
- **Probability** – There is no probability that road reconstruction could have an effect in Rush or East Weaver Creek because all road reconstruction occurs in the Little Browns Creek subwatershed. The probability for road reconstruction activities (which includes ditch cleaning, culvert inlet cleanout, constructing rocked water dips, and replacing culverts in non-fish streams) to negatively (-) affect pool frequency is low because of the limited amount of sediment that could reach critical habitat. The likelihood that this project element would positively (+) affect (reduce) sediment supply in critical habitat under winter stream flow conditions is also low because relatively few road miles would be reconstructed compared to total road miles in the watershed.
- **Magnitude** – Road reconstruction would have a short-term negative (-) effect, as well as a slight long-term beneficial (+) effect on the indicator. The slight negative effects of road reconstruction on sediment supply and therefore pool frequency in critical habitat would be undetectable and would not measurably affect critical habitat. Project design criteria would be used to minimize the amount of soil that moves off-site.

  The slight positive (+) effect for this element will occur for reducing road-related stream sediment in the long term. Positive effects will occur as a result of better cross drains moving water off the road surface to reduce erosion, rock surfacing to reduce erosion from the running surface and larger culverts to reduce the risk of catastrophic failure.
- **Element Summary** – Road reconstruction will have insignificant short-term negative (-) effects as a result of ground disturbance during construction and long-term positive (+) effects to pool frequency in Little Browns Creek due to better road drainage and reduced risk of culvert failure.

Road Rehabilitation

- **Proximity** – Twenty-eight miles are proposed for rehabilitation. Roads range from 25 feet to over 2 miles away from critical habitat. Road U34N77A is located on the flood plain of Little Browns Creek. Several other roads including U34N77A-1, U34N77AA, U3TRI02, U3TRI01, U3TRI01A and U3TRI03F are located within one site tree distance (150 feet) of Little Browns Creek. Road rehabilitation in Rush and East Weaver Creek subwatersheds is at least 0.2 miles from critical habitat. Culverts to be removed range from 0.1 to 2.1 miles from critical habitat.
- **Probability** – There is high probability that road rehabilitation will have (-) negative short-term effect on sediment supply that could change pool frequency in critical habitat and a positive (+) long-term effect in the Little Browns subwatershed. There is no probability that road rehabilitation will affect pool frequency in Rush or East Weaver Creeks because roads that will be rehabilitated are not located close to streams.

- **Magnitude** - Road rehabilitation would have short-term negative (-) effects, as well as a slight long-term beneficial (+) effect on the habitat indicator. The negative effects of road rehabilitation related to sediment supply would be evident in Little Browns Creek for a short distance downstream. An unknown amount of sediment will be moved within very close proximity to critical habitat and may be deposited in pools as high flows recede.

  The positive (+) effect of this element for reducing road-related sediment in the long-term would be reducing the density of roads in the Little Browns Creek subwatershed by one third.
- **Distribution** - The greatest negative effect to critical habitat would occur in Little Browns Creek from the Hwy 3 crossing downstream ¼ mile. Some effects could occur in intermittent tributaries to Little Browns Creek but it is unlikely that effects to sediment supply would be significant by the time it reached critical habitat. Positive effects would occur in the Little Browns Creek subwatershed over time as rehabilitated roadbeds revegetate over time.
- **Frequency** – Negative effects to Little Browns Creek would occur during each precipitation event with the first precipitation event bringing the greatest effects. Positive effects of road rehabilitation would occur continuously over time.
- **Duration** – Negative effects to Little Browns Creek would occur with the first precipitation event and diminish in following events. It is likely that negative effects would occur for a period of two to three years. Positive effects of road rehabilitation would occur in perpetuity.
- **Timing** - Negative effects in Little Browns Creek would be coincidental with adult fish migration, spawning, egg incubation and emergence. Long-term positive effects will occur year-round and may affect all freshwater life stages of coho salmon.
- **Nature** – Increased fine sediment levels could cause a slight reduction (negative effect) in pool volume that newly emerged coho salmon would use for rearing. Long-term positive effects would be a reduction in sediment supply and an increase in pool frequency (increasing rearing habitat) over time.
- **Element Summary** - Road rehabilitation will have insignificant short-term negative (-) effects in Rush and East Weaver Creeks. Road rehabilitation is likely to result in negative (-) effects to substrate that may in turn affect pool frequency in critical habitat in Little Browns Creek.

Pool Frequency Indicator Summary

The Project will have short-term negative (-) effects on pool frequency and depth in Little Browns Creek by slightly increasing sediment supply. The Project will have neutral (0) effects on these pool characteristics in Rush and East Weaver Creeks. The Project is also expected to have long-term positive (+) effects to pool frequency through a reduction in sediment supply.

Off-channel Habitat

- Harvest
- Yarding
- Fuels Treatment
- Hauling
- Road Construction
- Road Reconstruction
- Road Rehabilitation

- **Proximity** - Due to the well-confined nature of the channels of Little Browns Creek and East Weaver Creek off-channel habitat does not exist. Off-channel habitat exists in Rush Creek but the location is upstream of any possible Project influences. There is no causal mechanism associated to affect this indicator.

Off-Channel Habitat Indicator and Element Summary

Due the location of off-channel habitat the Project will have neutral (0) effects on this indicator.

Refugia

- Harvest
- Yarding
- Fuels Treatment
- Hauling
- Road Construction
- Road Reconstruction
- Road Rehabilitation

There are no areas of refugia within the action area. There is no causal mechanism associated with the proposed Project to affect the indicator.

Refugia Indicator and Element Summary

Due the lack of refugia habitat the Project will have neutral (0) effects on this indicator.

Width/Depth Ratio

- Harvest
- Yarding
- Fuels Treatment
- Hauling
- Road Construction
- Road Reconstruction
- Road Rehabilitation

There is no causal mechanism associated with the proposed Project to affect the indicator. All stream sections within the action area have very narrow valleys and are not capable of changing width/depth ratios. East Weaver Creek and Little Browns Creek are artificially confined by roads and Rush Creek is confined by bedrock and mine tailings.

Width/Depth Ratio Indicator and Element Summary

Due the nature of the stream channels in the action area the Project will have neutral (0) effects on this indicator.

Streambank Condition

Harvest

- **Proximity** - Intermediate thinning will occur in Riparian Reserves adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232. Other thinning and regeneration units are at least 500 feet (0.10 miles) from critical habitat.
- **Probability** - The mechanism that may cause streambank condition to be degraded is direct physical disturbance. Harvest will not occur on stream banks, however even with directional falling it is possible that a tree felled in a Riparian Reserve thinning unit along an intermittent stream may hit a stream bank, however it is extremely unlikely to occur. The probability that effects will occur from direct disturbance is discountable (negative effect).
- **Element Summary** - Harvest will have discountable negative (-) effects on streambank condition.

Fuels Treatment

- **Proximity** - Fuels treatment will occur in all harvest units including RR thinning adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232.
- **Probability** – There mechanism by which the Project may cause streambank condition to be degraded is direct physical disturbance. Fuels treatment will not occur on stream banks, there is no probability that effects will occur from direct disturbance. Changes in flow would occur from compacted surfaces and increases in drainage network. Fuels treatment has no probability (neutral effect) of further increasing peak stream flows in the action area.
- **Element Summary** - Fuels treatment will have neutral (0) effects on streambank condition.

Hauling

Hauling only occurs on existing road systems and therefore has no causal mechanism to affect streambank condition.

- **Element Summary** – Hauling will have neutral (0) effects on streambank condition.

- Yarding
- Road Construction
- Road Reconstruction
- Road Rehabilitation
- **Proximity** – Tractor yarding will occur in Riparian Reserves adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232. Tractor yarding will occur in Riparian Reserves down to the inner gorge of ephemeral and intermittent streams. Mechanical harvesters and forwarders will be used to limit the number of trips that vehicles will make into the Riparian Reserves. Three designated channel crossing sites are in units 16 and 17. These crossings are on intermittent channels and are 1.75 miles or more from critical habitat. Cable yarding will occur in seven RR thinning units. These units are 0.35 miles or more away from critical habitat. Proposed landings are all located outside of RR's, the closest landing to critical habitat is in unit 107 and is about 300 feet away. Landings in unit 3B are just outside the RR (300 feet) but are hydrologically separated from Little Browns Creek by County Road 232.

  Specified road construction of 34N47 and 34N47A will cross RR's of two intermittent channels in units 102 and 103. These crossings are .25 and .37 miles away from critical habitat. U232A is the closest temporary road to critical habitat; it is about 0.10 mile away from Little Browns Creek and is separated by an existing county road. Other temporary roads in unit 100 and 101 are located in the RR but are over 1 mile away from critical habitat.

  Road 34N77 is about 100 feet away from critical habitat. All other roads to be reconstructed are 1.10 miles or more away from critical habitat. All culverts being replaced are more than 1.0 mile away from critical habitat.

  Twenty-eight miles of road are proposed for rehabilitation. Roads range from 25 feet to over 2 miles away from critical habitat. Road U34N77A is located on the flood plain of Little Browns Creek. Several other roads including U34N77A-1, U34N77AA, U3TRI02, U3TRI01, U3TRI01A and U3TRI03F are located within one site tree distance (150 feet) of Little Browns Creek. Road rehabilitation in Rush and East Weaver Creek subwatersheds is at least 0.2 miles from critical habitat. Culverts to be removed range from 0.1 to 2.1 miles from critical habitat.
- **Probability** –Three designated crossings for tractor yarding are more than 1.75 miles from critical habitat. Crossing stream channels 1.75 miles away from Critical Habitat will have no probability of affecting stream banks of critical habitat.

- There are no culverts to be replaced or removed within Critical Habitat. Streambank disturbance at a culvert removal or replacement site is a localized effect and will not affect streambanks (neutral effect) of Critical Habitat downstream.
- **Element Summary** – Yarding, Road Construction, Road Reconstruction and Road Rehabilitation will have neutral (0) effects on streambank condition.

Streambank Indicator Summary

The Project will have neutral (0) effects on streambank condition in critical habitat.

Floodplain Connectivity

- Harvest
- Yarding
- Fuels Treatment
- Hauling
- Road Construction
- Road Reconstruction

- **Proximity** – None of the above PE's will occur on floodplains.
- **Probability -** There is no probability that any of these elements would affect floodplain connectivity because there is no mechanism for any of them to influence the habitat indicator.
- **Element Summary** – Harvest, Yarding, Fuels Treatment, Hauling, Road Construction and Road Reconstruction will have neutral (0) effects on floodplain connectivity.

Road Rehabilitation

- **Proximity** – Road U34N77A is located within the floodplain of Little Browns Creek.
- **Probability** – There is high probability that the floodplain connectivity will be affected by rehabilitating Road U34N77A.
- **Magnitude** – Floodplain connectivity will be fully reestablished.
- **Distribution** – The effect would occur on about 0.15 mile of stream below the Hwy.3 crossing.
- **Frequency** – The effect would occur once when road rehabilitation is complete.
- **Duration** – The effect would be permanent.
- **Timing** – The floodplain will be reconnected during high winter flows, during the migration period of coho salmon.
- **Nature** – Reconnecting the floodplain will allow for increased health of the riparian area and reestablish some wetland function in a small section of Little Browns Creek. The effect of reconnecting the floodplain is not likely to be large enough to directly affect fish populations but may contribute to some improvement in fish habitat in Little Browns Creek.
- **Element Summary** – Road rehabilitation will have positive (+) effects on floodplain connectivity by removing a road that is on the floodplain.

Floodplain Connectivity Indicator Summary

The project will have positive (+) effects on floodplain connectivity by removing a road that is on the floodplain.

Change in Peak/Base Flow and Increase in Drainage Network___

The Flow/Hydrology indicators of Change in Peak/Base Flow and Increase in Drainage Network are related because changes in the drainage network affect peak and base flows. Both indicators are analyzed in the CWE analysis using the Equivalent Roaded Area model (Haskins 1986) and the magnitude of expected changes is derived from model results. The Project is modeled in its entirety; hence, PE's that may have an effect on these indicators have a common analysis.

- Harvest
- Yarding
- Fuels Treatment
- Road Construction
- Road Reconstruction
- Road Rehabilitation

- **Proximity -** Intermediate thinning will occur in Riparian Reserves adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232. Other thinning and regeneration units are at least 500 feet (0.10 miles) from critical habitat.

  Tractor yarding will occur in Riparian Reserves adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232. Tractor yarding will occur in Riparian Reserves down to the inner gorge of ephemeral and intermittent streams. Mechanical harvesters and forwarders will be used to limit the number of trips that vehicles will make into the Riparian Reserves. Three designated channel crossing sites are in units 16 and 17. These crossings are on intermittent channels and are 1.75 miles or more from critical habitat. Cable yarding will occur in seven RR thinning units. These units are 0.35 miles or more away from critical habitat. Proposed landings are all located outside of RR's, the closest landing to critical habitat is in unit 107 and is about 300 feet away. Landings in unit 3B are just outside the RR (300 feet) but are hydrologically separated from Little Browns Creek by County Road 232.

  Fuels treatment will occur in all harvest units including RR thinning adjacent to critical habitat (Little Browns Creek) in unit 106 and unit 107. All "100" series units occur within Riparian Reserves of intermittent tributaries and are located 0.2 to 1.75 miles upstream of critical

habitat. Unit 3B is the closest non RR unit, it is located 300 feet away from critical habitat in Little Browns Creek but is separated from the RR by county road 232.

Specified road construction of 34N47 and 34N47A will cross RR's of two intermittent channels in units 102 and 103. These crossings are .25 and .37 miles away from critical habitat. U232A is the closest temporary road to critical habitat; it is about 0.10 mile away from Little Browns Creek and is separated by an existing county road. Other temporary roads in unit 100 and 101 are located in the RR but are over 1 mile away from critical habitat.

Road 34N77 is about 100 feet away from critical habitat. All other roads to be reconstructed are 1.10 miles or more away from critical habitat. All culverts being replaced are more than 1.0 mile away from critical habitat.

Twenty-eight miles of road are proposed for rehabilitation. Roads range from 25 feet to over 2 miles away from critical habitat. Road U34N77A is located on the flood plain of Little Browns Creek. Several other roads including U34N77A-1, U34N77AA, U3TRI02, U3TRI01, U3TRI01A and U3TRI03F are located within one site tree distance (150 feet) of Little Browns Creek. Road rehabilitation in Rush and East Weaver Creek subwatersheds is at least 0.2 miles from critical habitat. Culverts to be removed range from 0.1 to 2.1 miles from critical habitat.

- **Probability** –Activities proposed in the Project directly affect conditions (compacted soils, increased drainage network) that change peak/base flow. There is high likelihood that changes will occur as a result of this project.
- **Magnitude** – The Project is designed to maintain or improve watershed condition in the long term. Due to the sequencing of road construction, road reconstruction, timber harvesting, tree removal, fuels treatment and then restoration activities the impact of the Project will vary over the life of the Project. The mitigation measures are designed to minimize the short-term impacts of timber harvest and road building and improve long-term watershed condition. The mitigation measures applicable to reducing peak flood flows are focused on disconnecting the road network from the stream channel by reducing road-stream crossing diversion and improving road drainage. In addition, disturbed areas (landings, temp roads and skid trails) will be decompacted to improve infiltration and vegetation recovery at the watershed scale.

  Road Construction, Harvest, Yarding, and Fuels Treatment will result in short term negative effects to Peak/Base flow through increases in compaction and increasing the drainage network. Short term increases (negative effect) on the drainage network will occur as a result of road construction. The mitigation measures developed by the interdisciplinary team will limit the negative impacts to a level that cannot be meaningfully measured.

  Road Reconstruction and Road Rehabilitation will result in insignificant short-term and insignificant long-term positive effects on peak/base flows and drainage network by decompacting problem areas and removing roads that interfere with the drainage network.

Table 8. CWE model results

7th Field HUC Watershed Name	Drainage Area (acres)	Forest Plan TOC (%)	Existing ERA (%)	Post Project ERA (%)	WCC (existing)	WCC (post project)
Rush Creek	14,388	16	13.0	13.0	3	3
E Weaver Creek	8892	16	9.8	9.6	2	2
L Browns Creek	4989	16	14.8	12.5	3	2

Modeling of the post project subwatershed condition (Table 8) shows no significant change from the current conditions in the Rush Creek and East Weaver Creek subwatersheds. Modeling of the post project condition of the Little Browns Creek subwatershed shows some improvement and a change in watershed condition class (positive effect), however a change of 2.3 % in the model is too small to result in actual measurable change on the ground.

- **Element Summary** - Hydrological modeling shows that the Project will have insignificant short-term negative effects (-) on peak/base flow and drainage network from road construction, harvest, yarding, and fuels treatment; and insignificant short- and long-term positive effects (+) from road reconstruction and road rehabilitation. Over the long term, the Project will result in neutral (0) effects to peak/base flow and drainage network in Rush and East Weaver Creeks and insignificant positive (+) effects in Little Browns Creek. All positive and negative effects to peak flows are so small as to be immeasurable where critical habitat is found and are therefore insignificant.

Hauling

There is no causal mechanism by which Hauling can affect Change in Peak/Base flow and Increase in Drainage Network indicators.

- **Element summary** - Hauling will have neutral (0) effects on Increase in Peak/base Flow and Increase in Drainage Network indicators because there is no causal mechanism.

Change in Peak/Base Flow and Increase in Drainage Network Indicator Summary

Hydrological modeling shows that the Project will have insignificant short-term negative effects (-) on peak/base flow and drainage network from road construction, harvest, yarding and fuels treatment; and short- and long-term positive effects (+) from road reconstruction and road rehabilitation. Over the long term, the Project will result in neutral (0) effects to peak/base flow and drainage network in Rush and East Weaver Creeks and insignificant positive (+) effects in Little Browns Creek. Hauling will have neutral (0) effects on Increase in Peak/base Flow and Increase in Drainage Network indicators because there is no causal mechanism. All positive and negative effects to peak flows are so small as to be immeasurable where critical habitat is found and are therefore insignificant.

Road Density & Location

Current road density is high for all subwatersheds (Table 9) in the action area and all subwatersheds have roads that are located at the valley bottoms. The project will result in a short-term (3years) increase (negative effect) in road density followed by a long-term reduction (positive effect). Post project road density will still be at the not properly functioning level for all subwatersheds.

Table 9. Road density by subwatershed.

Subwatershed	Pre Project Density (mi./mi.^{2})	Mid Project Density (mi./mi.^{2})	Post Project Density (mi./mi.^{2})
Little Browns Creek	6.2	6.7	3.7
East Weaver Creek	5.0	5.0	4.3
Rush Creek	4.4	4.4	4.3

New road construction will cross three Riparian Reserves for a total distance of .25 miles(short-term negative effects); all crossings will be subsequently decommissioned. Road rehabilitation will remove crossings at 3 locations in Rush Creek, 5 locations in East Weaver Creek and 9 locations in Little Browns Creek, in addition 1.3 miles of road located in the Riparian Reserve will be rehabilitated in Little Browns Creek (Positive Effects).

The location of new road construction is well away from critical habitat. Some roads that are being rehabilitated are located very close to critical habitat or to intermittent streams that drain into critical habitat. Removing roads that are located close to critical habitat will have positive effects.

Road Density & Location Indicator Summary

The Project will result in a short term increase [negative (-) effect] in road density, The Project will have positive (+) long-term effects on Road Density and Location, but effects will not be of sufficient magnitude to change the road density baseline category as provided in Appendix A of this document.

Disturbance History

Cumulative Watershed Effect Modeling for the Weaverville watershed shows that some 7th field subwatersheds are at or near the TOC and some of the 8th field subwatersheds are well over TOC (Table 10). Two subwatersheds (shaded gray in Table 10) are significantly over TOC. The Lower Rush Creek and Snow Gulch subwatersheds are privately owned and have experienced high intensity fire (Browns Fire) and salvage logging. Field surveys support the results of the CWE modeling in that all subwatersheds show high ERA and degraded fish habitat.

Table 10. Summary of HUC8 CWE analysis results. Shading indicates those HUC 8 subwatersheds that are well over the TOC.

HUC8	HUC Name	Drainage Area (acres)	Forest Plan TOC (%)	Existing ERA (%)	Post Project ERA (%)
1801021106010101	Headwaters Rush Creek	2860	16	1	1
1801021106010102	Upper Rush Creek	2997	16	9	9
1801021106010201	Baxter Gulch	3470	16	13	13
1801021106010202	Lower Rush Creek	2676	16	24	24
1801021106010203	Snow Gulch	2384	16	20	20
	Rush Creek (all)	14,388	16	13	13
1801021106040101	Headwaters East Weaver Creek	2148	16	1	1
1801021106040102	Upper East Weaver Creek	1567	16	17	15
1801021106040103	East Branch East Weaver Creek	2291	16	10	10
1801021106040105	Lower East Weaver Creek	2886	16	12	12
	E Weaver Creek (all)	8892	16	10	10
1801021106040301	Upper Little Browns Creek	2151	16	15	9
1801021106040302	Long Gulch	2838	16	15	15
	L Browns Creek (all)	4989	16	15	13

This Project will not result in any subwatersheds exceeding TOC relative to existing conditions. Each watershed will be maintained or improved through this project. Modeling of the post project condition of the Little Browns Creek subwatershed shows some improvement [positive (+) effect], however a change of 2% in the model is too small to result in actual measurable change on the ground.

Disturbance History Indicator Summary

CWE modeling shows that at the watershed scale the projects maintain (neutral effects) or insignificantly improve (+) disturbance history in the action area.

Riparian Reserves

The Project will directly affect 80.6 acres of Riparian Reserves by thinning conifer trees down to minimum of 60% canopy closure. Project design criteria will reduce negative effects to Riparian Reserves by limiting wet weather operations, maintaining ground cover, designating all crossings and limiting grade of crossings to minimize disturbance that may result from harvest and yarding. There are no landings located in Riparian Reserves. Fuels treatment will be limited to hand piling along roads where crossings occur. About 0.7 miles of existing nonsystem road in Riparian Reserves will be used as part of the temporary road system and then 1.3 miles of existing nonsystem road will be rehabilitated. Harvest, yarding and temporary road use will have some insignificant negative effects related to ground disturbance on the Riparian Reserves. Long-term positive effects will occur because thinned timber stands in the Riparian Reserve will be healthier and have increased growth and obliterating nonsystem roads will result in less erosion and more productive ground. Road obliteration

on the flood plains of Little Browns Creek will allow some recovery of Riparian Reserves directly adjacent to critical habitat. Riparian Reserves outside of Riparian Reserve thinning units and road rehabilitation areas should not be affected (neutral effects) by the Project.

Riparian Reserves Indicator Summary

The Project will have insignificant negative (-) short-term effects due to physical disturbance from Riparian Reserve thinning and road obliteration and insignificant long-term positive effects on Riparian Reserve tree growth and floodplain connectivity from road obliteration.

VI. Element Summary

Harvest

- Harvest will have neutral (0) effect on Water Temperature, Turbidity, Substrate, Chemical Contamination/Nutrients, Physical Barriers, Pool Frequency, Off-Channel Habitat, Refugia, Width/Depth Ratio, Streambank Condition and Floodplain Connectivity.
- Harvest will have insignificant long-term positive (+) effects on Large Woody Debris levels due to increased growth rates in 4.2 acres of Riparian Reserve thinning.
- Hydrological modeling shows that the Project will have short-term negative effects (-) on peak/base flow and drainage network from road construction, harvest, yarding, and fuels treatment.

Yarding

- Yarding will have neutral (0) effect on Water Temperature, Chemical Contamination/Nutrients, Physical Barriers, Large Woody Debris, Pool Frequency, Off-Channel Habitat, Refugia, Width/Depth Ratio, Streambank Condition and Floodplain Connectivity.
- Yarding will have insignificant negative (-) effects on turbidity and substrate due to yarding of trees from units directly adjacent to critical habitat.
- Hydrological modeling shows that the Project will have short-term negative effects (-) on peak/base flow and drainage network from road construction, harvest, yarding, and fuels treatment.

Fuels Treatment

- Fuels Treatment will have neutral (0) effect on Water Temperature, Chemical Contamination/Nutrients, Physical Barriers, Large Woody Debris, Pool Frequency, Off-Channel Habitat, Refugia, Width/Depth Ratio, Streambank Condition and Floodplain Connectivity.
- This project element would have insignificant negative (-) effects on turbidity and substrate from roadside piling and burning in Unit 106.

- Fuels treatment will have insignificant negative (-) effects to pool frequency due to roadside piling and burning in unit 106.
- Hydrological modeling shows that the Project will have short-term negative effects (-) on peak/base flow and drainage network from road construction, harvest, yarding, and fuels treatment.

Hauling

- Hauling will have neutral (0) effect on Water Temperature, Chemical Contamination/Nutrients, Physical Barriers, Large Woody Debris, Pool Frequency, Off-Channel Habitat, Refugia, Width/Depth Ratio, Streambank Condition, Floodplain Connectivity, Increase in Peak/base Flow and Increase in Drainage Network.
- This project element would have insignificant negative (-) effects on turbidity and substrate as a result of hauling on native and aggregate surfaced roads.
- This project element would have insignificant negative (-) effects on pool frequency as a result of hauling on native and aggregate surfaced roads.

Road Construction

- Road construction will have neutral (0) effect on Water Temperature, Chemical Contamination/Nutrients, Physical Barriers, Off-Channel Habitat, Refugia, Width/Depth Ratio, Streambank Condition and Floodplain Connectivity.
- Road Construction will have insignificant negative (-) effects on turbidity and substrate because road construction will cause some soil disturbance.
- Road Construction will have insignificant negative (-) effects on pool frequency as a result of ground disturbance during construction.
- Road Construction will have insignificant negative (-) effects on large woody debris as result of removing 0.25 acres of trees from Riparian Reserves of intermittent streams during construction.
- Road reconstruction will have insignificant short-term negative (-) effect as a result of ground disturbance during construction and long-term positive (+) effects to pool frequency due to better road drainage and reduced risk of culvert failure.
- Hydrological modeling shows that the Project will have short-term negative effects (-) on peak/base flow and drainage network from road construction, harvest, yarding, and fuels treatment.

Road Reconstruction

- Road Reconstruction will have neutral (0) effect on Water Temperature, Chemical Contamination/Nutrients, Physical Barriers, Off-Channel Habitat, Refugia, Width/Depth Ratio, Streambank Condition and Floodplain Connectivity.

- Road Reconstruction will have insignificant short-term negative (-) effects to turbidity and substrate due to soil disturbance and long-term positive (+) effects resulting from better road drainage and lower risk of culvert failure.
- Road Reconstruction will have insignificant short-term negative (-) effects to large woody debris because hazard trees in riparian reserves will be felled and left in place.
- Hydrological modeling shows that the Project will have short- and long-term positive effects (+) from road reconstruction and road rehabilitation. Over the long term, the Project will result in neutral (0) effects to peak/base flow and drainage network in Rush and East Weaver Creeks and insignificant positive (+) effects in Little Browns Creek.

Road Rehabilitation

- Road Rehabilitation will have neutral (0) effect on Water Temperature, Chemical Contamination/Nutrients, Physical Barriers, Large Woody Debris, Off-Channel Habitat, Refugia, Width/Depth Ratio and Streambank Condition.
- Road rehabilitation will have insignificant short-term negative (-) effects to turbidity and substrate in Rush and East Weaver Creeks due to ground disturbance well away from critical habitat and insignificant long-term positive effects as a result of decreasing compacted surfaces, increasing infiltration, decreasing the drainage network and revegetating bare surfaces that are prone to erosion. Road Rehabilitation will have effects great enough to negatively (-) affect coho salmon and their habitat in Little Browns Creek due to road obliteration on the floodplain. Road rehabilitation will have long-term positive (+) effects to turbidity and substrate in Little Browns Creek due to decreasing compacted surfaces, increasing infiltration, decreasing the drainage network and revegetating bare surface that are prone to erosion.
- Road rehabilitation will have insignificant short-term negative (-) effects and insignificant long-term positive effects to pool frequency in Rush and East Weaver Creeks. Road rehabilitation is likely to result in negative (-) effects to substrate that may in turn affect pool frequency in critical habitat in Little Browns Creek. Road rehabilitation will have long-term positive (+) effects to sediment supply that affects pool frequency in Little Browns Creek.
- Road rehabilitation will have positive (+) effects on floodplain connectivity by removing a road that is on the floodplain.
- Hydrological modeling shows that the Project will have short- and long-term positive effects (+) from road reconstruction and road rehabilitation. Over the long term, the Project will result in neutral (0) effects to peak/base flow and drainage network in Rush and East Weaver Creeks and insignificant positive (+) effects in Little Browns Creek.

VII. Indicator Summary

"Population Characteristics" and "Species and Habitat" Pathway indicators are not addressed in this document, since insufficient information exists to allow for their evaluation. A species recovery plan has not been drafted for SONCC coho salmon.

Water Temperature Indicator Summary

The Project will have insignificant negative (-) effects on water temperature due to canopy loss resulting from road construction.

Turbidity and Substrate Indicator Summary

One project element (road rehabilitation) is likely to result in significant negative (-) effects to substrate in Little Browns Creek that may impact coho salmon. Long-term positive (+) effects will occur in Little Browns Creek due to decreasing compacted surfaces, increasing infiltration, decreasing the drainage network and revegetating bare surface that are prone to erosion. The additive effects of all project elements in the Little Browns Creek subwatershed area expected to result in slightly elevated turbidity levels for a period of two to three years. The Project would have insignificant negative (-) effects on turbidity and substrate from several other project elements. The additive effects in Rush and East Weaver Creeks are still expected to be insignificant because of the small amount of harvest and road rehabilitation that will occur in those subwatersheds. Road rehabilitation work in Rush and East Weaver Creek subwatersheds will result in insignificant long-term positive (+) effects.

Chemical Contamination/Nutrients Indicator and Element Summary

The Project will have neutral (0) effects on Chemical Contamination/Nutrients.

Physical Barriers Indicator and Element Summary

The Project will have neutral (0) effects on Physical Barriers.

Large Woody Debris Indicator Summary

Harvest will have insignificant long-term positive (+) effects on LWD levels due to increased growth rates in 4.2 acres of Riparian Reserve thinning and rehabilitation of road segment in the Riparian Reserve. Road Construction and reconstruction will have insignificant short term negative effects by removing trees in 0.25 acres Riparian Reserves and falling hazard trees. Yarding, Fuels Treatment, Hauling, will have neutral (0) effects on LWD.

Pool Frequency Indicator Summary

The Project will have short-term negative (-) effects on pool frequency and depth in Little Browns Creek by slightly increasing sediment supply. The Project will have neutral (0) effects on these pool

characteristics in Rush and East Weaver Creeks. The Project is also expected to have long-term positive (+) effects to pool frequency through a reduction in sediment supply.

Off-Channel Habitat Indicator and Element Summary

Due the lack of off-channel habitat in the action area, the Project will have neutral (0) effects on this indicator.

Refugia Indicator and Element Summary

Due the lack of refugia habitat in the action area, the Project will have neutral (0) effects on this indicator.

Width/Depth Ratio Indicator and Element Summary

Due the nature of the stream channels in the action area the Project will have neutral (0) effects on this indicator.

Streambank Indicator Summary

The Project will have neutral (0) effects on streambank condition in critical habitat.

Floodplain Connectivity Indicator Summary

The project will have positive (+) effects on floodplain connectivity by removing a road that is on the floodplain.

Change in Peak/Base Flow and Increase in Drainage Network Indicator Summary

Hydrological modeling shows that the Project will have short-term negative effects (-) on peak/base flow and drainage network from road construction, harvest, yarding and fuels treatment; and short- and long-term positive effects (+) from road reconstruction and road rehabilitation. Over the long term, the Project will result in neutral (0) effects to peak/base flow and drainage network in Rush and East Weaver Creeks and insignificant positive (+) effects in Little Browns Creek. Hauling will have neutral (0) effects on Increase in Peak/base Flow and Increase in Drainage Network indicators because there is no causal mechanism.

Road Density & Location Indicator Summary

The Project will result in a short term increase [negative (-) effect] in road density, The Project will have positive (+) long-term effects on Road Density and Location, but effects will not be of sufficient magnitude to change the road density baseline category in Appendix A of this document.

Disturbance History Indicator Summary

CWE modeling shows that at the watershed scale the project maintains (neutral effects) or insignificantly improves (+) disturbance history in the action area.

Riparian Reserves Indicator Summary

The Project will have insignificant negative (-) short-term effects due to physical disturbance from Riparian Reserve thinning and road obliteration and long-term positive effects on Riparian Reserve tree growth and floodplain connectivity from road obliteration.

VIII. ESA Effect Determination

Project Effects Determination Key for Species and Designated Critical Habitat

1) Do any of the indicator summaries have a positive (+) or negative (-) conclusion?

   Yes – Go to 2

   No – No Effect

2) Are the indicator summary results only positive?

   Yes – NLAA

   No – Go to 3

3) If any of the indicator summary results are negative, are the effects insignificant or discountable?

   Yes – NLAA

   No – LAA, fill out Adverse Effects Form

Direct effects to coho salmon are not expected to occur. There are no aspects of the Project that will occur where fish are present.

Analysis of the effects of the Project Elements on the habitat indicators has found that negative effects that are of sufficient probability (not discountable) and magnitude (not insignificant) to affect SONCC coho salmon and its critical habitat will occur. One project element (road rehabilitation) is likely to result in negative (-) effects to substrate and negative (-) effects on pool frequency (including depth) in Little Browns Creek that may impact coho salmon. Because of the adverse effects on substrate and pool frequency sediment, this Project is likely to adversely affect SONCC coho salmon and its critical habitat.

VIII. Aggregated Federal Effects

There is no other LAA Federal land management activity proposed in the Weaverville HUC 5 watershed.

IX. ESA Cumulative Effects

There are no known timber harvest plans currently under review within the Browns Project action area. Road building and residential construction are occuring in the action area. The Weaverville Community Service District withdraw significant amounts of water from East Weaver Creek for domestic and irrigation purposes. These activities manifest effects downstream and/or down slope as net increases in sediment delivery to channels; higher turbidities; alterations to riparian habitat including riparian canopy removal; increased water temperatures; and decreases in available fish habitat.

X. Essential Fish Habitat Determination

A description of the proposed action appears in Part II of this Biological Assessment.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), in concordance with the Sustainable Fisheries Act of 1996 (Public Law 104-267) designated Essential Fish Habitat (EFH) for coho and Chinook salmon (Federal Register, Vol. 67, No. 12). The MSA defined EFH as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (Federal Register, Vol. 67, No. 12)." EFH for coho salmon and Chinook salmon in the Action Area is identical to coho critical habitat displayed in Appendix D of this document.

Analysis of the effects of the Project Elements on the habitat indicators has found that negative effects that are of sufficient probability (not discountable) and magnitude (not insignificant) to affect essential fish habitat will occur. One project element (road rehabilitation) is likely to result in negative (-) effects to substrate and negative (-) effects on pool frequency (including depth) in Little Browns Creek that may impact coho salmon and Chinook salmon. Because of the negative impacts to substrate and pool frequency this proposed Project may adversely affect Essential Fish Habitat.

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XIII. Glossary of Terms Commonly Used in Forest Service Land Management

Activity Fuels - Fuels generated by any number of timber harvesting methods.

Adaptive Management Area - Landscape units designed for development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives.

Basal Area - The cross-sectional area of a stand of trees measured a 4.5 feet above the ground, expressed in square feet.

Broadcast Burning - A type of burning that occurs inside defined boundaries, and may be several acres in size. Broadcast burning would only occur when weather and air quality permits, and a burn plan would be written and approved prior to its implementation. This form or burning under prescribed parameters is beneficial for reducing hazardous fuels, and restoring fire's natural role into the ecosystem.

Burn Concentrations - See Jackpot burning.

Cable Logging (yarding) - A harvest technology where cut logs are partially or fully suspended above the ground and transported to a landing.

Canopy - The more or less continuous cover of leaves and branches collectivity formed by the crowns of adjacent trees in a stand forest.

Canopy Closure - The degree to which the canopy blocks sunlight or obscures the sky.

Decommissioned Road - These roads are not needed for future use and are taken off the FS transportation system once the decommissioning activities have been implemented and earth berm barriers installed. However, the roads are still tracked by the database. The goal is to remove those elements of a road that reroute hillslope drainage and present slope stability hazards by re-establishing natural drainage to the extent practicable.

Dozer Line - To rearrange, gather and push aside fuels with a bulldozer. This provides a break in the continuity of fuels, which helps prevent fire from spreading outside of the unit. Some fuels and the duff layer would remain on the forest floor in these areas.

Duff Layer - The layer of loosely compacted debris underlying the litter layer on the forest floor.

Equivalent Road Acre (ERA) - A unit of measure used in cumulative watershed impact analyses, which represents the equivalent disturbance of one acre of roaded area. Disturbances primarily include soil exposure and compaction.

Erosion Hazard Rating - A relative rating of the potential for the loss of soil due to sheet and rill erosion from a specific site. Commonly used to address erosion response expected from a given land management activity. Ratings are the result of a cumulative analysis of soil type, topography, climate, and vegetative and protective factors.

Fuel Break - A strip of land strategically placed where hazardous fuels have been replaced with less burnable materials. Fuel breaks divide fire-prone areas into smaller parcels for easier fire control and provide access for firefighting.

Fuel - Any material capable of sustaining or carrying a forest fire, usually natural material both live and dead.

Fuel Loading - The amount of combustible material present per unit of area.
Fuel Management Zone - A specified area of land where natural fuels are either removed of manipulated in order to help slow or stop the spread of wildfire.
Green Tree Retention (GTR) - The practice of retaining live, growing trees on a site during a regeneration harvest as a future source of trees and snags for wildlife. An average of six to twelve trees per acres that exceed the average stand diameter are retained as biological legacies within the harvest unit to provide habitat components over the next management cycle.
Hand Line - To cut and remove understory vegetation to bare mineral soil to a width of six to eight feet. This width can be determined on site during a wildfire or before hand in project planning, and is based on current and expected fire behavior. Trenches are constructed on the down hill side of the unit on steep slopes to prevent rolling material from crossing fire lines.
Hand pile - Piling of fuel using only human laborers.
Helicopter Logging (yarding) - Use of helicopters to transport logs from where they are felled to a landing.
Jackpot Burning - A technique of applying fire to target fuels, which ignites only concentrations of burnable materials within the unit being treated.
Landing - Any place on or adjacent to a logging site where logs are assembled for further transport.
Lop and Scatter - Cutting, lopping and scattering residual vegetation. Usually to a height of less than 18 inches above the ground.
Management Direction - A statement of goals and objectives and the associated management prescriptions and standards and guidelines for attaining them.
Mass Wasting - A general term for the dislodgement and downslope transport of soil and rock material under the direct application of gravity.
Mastication - To mechanically grind up forest fuels such as brush, branches and small diameter trees into small pieces, which are then left on site. This would occur on slopes < 35% inside plantations and fuel buffers.
Matrix - Federal lands outside of reserves, withdrawn areas, managed late-successional reserves, and adaptive areas.
Obliteration - Road removal where no presence of the road remains. All drainage structures are removed and the road is returned to the natural slope.
Overstory - That portion of trees in a forest, with more than one roughly horizontal layer of foliage, which forms the upper or uppermost layer.
Overstory Removal - A timber cutting method applied to stands with two or more distinct age or size classes, the older (or larger) of which is merchantable and is removed. The removal leaves an adequately stocked stand of understory trees.
Regeneration Harvest - Applies to the logging stands of rotation age or greater; and of stands below rotation age which cannot economically be held any longer because of poor stocking, health, thrift, quality, or composition. These cuttings are intended to replace the existing stands with a new stand. See also green tree retention.
Residual Stand - Trees that remain standing after some event such as thinning.

Riparian Reserve - A land designation where riparian-dependant resources receive primary emphasis and where special standards and regulations apply.
Sanitation/Salvage - The removal of dead or damaged trees, or trees susceptible to insect and disease attack such as intermediate and suppressed trees, essentially to prevent the spread of pest or pathogens and to promote forest health.
Silviculture - The science of cultivating forest crops.
Silvicultural Prescription - A professional plan for controlling the establishment, composition, constitution, and growth of forests.
Silvicultural System - Establishing, growing, and tending of forests.
Skid Trail - A path created to drag logs to a landing.
Skyline - See cable logging.
Snag - A standing dead tree from which the leaves and most of the branches have fallen.
Stand - A community of trees occupying a specific area sufficiently uniform in composition, age arrangement and condition distinguishable as a silvicultural or management unit.
Stocking Level - In a forest, a subjective indication of the number of existing trees as compared to the desirable number for maximum productivity of wood.
Temporary Road - Roads authorized by contract, permit, lease, and/or emergency operation. These roads are not part of the FS transportation system, nor maintained for long-term use. Temporary road removal and site stabilization is required after approved use prior to the rainy season each year or when the facility is no longer needed, whichever is earliest.
Thinning - Harvest made in an immature stand in order primarily to maintain or accelerate the diameter increment (annual growth) of the residual trees but also, by suitable selection, to improve the average form of the trees that remain, without damaging the canopy.
Tractor Pile - Piling fuels by the use of a bulldozer, most often equipped with a brush rake to minimize the amount soil incorporated into piles.
Tractor Logging (Yarding) - Moving cut trees to a landing by dragging behind a ground based rubber tired or tracked skidder equipped with grapples.
Understory - The lower layer of trees and shrubs under the forest canopy.
Watershed Condition Class - The Forest Plan LMP established Thresholds of Concern for 5th field watersheds and defines Watershed Condition Class (WCC) (USDA Forest Service, 1994). The WCC are defined as follows:

- Watershed Condition Class I: ERA less than 40 percent TOC;
- Watershed Condition Class II: ERA between 40 and 80 percent TOC; and
- Watershed Condition Class III: ERA greater than 80 percent TOC.

The following summarizes the FSM 2521.1 – Watershed Condition Classes. The ERA evaluates watershed condition and assigns one of the following three classes:

1. **Class I Condition**. Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. The drainage network is generally stable. Physical, chemical, and biologic conditions suggest that soil, aquatic, and riparian systems are predominantly functional in terms of supporting beneficial uses.

2. **Class II Condition**. Watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Portions of the watershed may exhibit an unstable drainage network. Physical, chemical, and biologic conditions suggest that soil, aquatic, and riparian systems are at risk in being able to support beneficial uses.
3. **Class III Condition**. Watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. A majority of the drainage network may be unstable. Physical, chemical, and biologic conditions suggest that soil, riparian, and aquatic systems do not support beneficial uses.

Whole Tree Yard - The removal of a whole tree (including its bole, limb wood, branches and bark) to the landing, except for where the top of the tree is determined to be 3-inches in diameter, which is lopped off and left on site. Whole tree yarding does not remove broken limb wood, bark sloughing, and broken boles. Once at the landing, the tree is delimbed and cut into logs at specified lengths.

Yarding - Moving logs from the stump to a central concentration area or landing.

Yarding of Unmerchantable Material (YUM) - Moving unmerchantable portions of trees from the stump to a central location.

Appendix A. Fisheries Biological Assessment

Shasta-Trinity National Forest Tributaries Matrix of Factors and Indicators

This matrix shows criteria used to determine baseline conditions in 7th and 5th field watersheds. Modifications agreed to at the June 2004 Level 1 meeting by Karen Hans and Loren Everest

The Matrix, as designed, suggests values to determine a level of functioning for anadromous fish bearing streams.

Factors	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Water Quality:	***Temperature (1)***			
	1st - 3rd Order Streams [instantaneous]	67 degrees F or less	> 67 to 70.0 degrees F	> 70.0 degrees F
	4th-5th Order Streams [7 Day Maximum]	70.0 degrees F or less	> 70.0 to 73.0. degrees F	> 73.0 degrees F
	Turbidity (2)	Turbidity Low	Turbidity Moderate	Turbidity High
	Chemical/Nutrient Contamination (3)	Low levels of contamination from agriculture, industrial, and other sources; no excess nutrients.	Moderate levels of contamination from agriculture, industrial, and other sources; some excess nutrients.	High levels of contamination from agriculture, industrial, and other sources; high levels of nutrients.
Habitat Access:	Physical Barriers (3)	Any man-made barriers present in watershed allow upstream and downstream passage at all flows.	Any man-made barriers present in watershed do not allow upstream and/or downstream passage at base/low flows.	Any man-made barriers present in watershed do not allow upstream and/or downstream passage at a range of flows.
Habitat Elements:	Substrate (4)	Less than 15% fines (<2 mm) in spawning habitat (pool tail-outs, low gradient riffles, and glides) and cobble embeddedness less than 20%.	15% to 20% fines (<2 mm) in spawning habitat (pool tail-outs, low gradient riffles, and glides) and/or cobble embeddedness is 20% or greater.	Greater than 20% fines (<2 mm) in spawning habitat (pool tail-outs, low gradient riffles, and glides) and cobble embeddedness greater than 25%.
	Large Woody Debris (5)	More than 40 pieces of large wood (>16 inches in diameter and > 50 feet in length) per mile AND current riparian vegetation condition near site potential for recruitment of large woody debris.	40 pieces or less of large wood (>16 inches in diameter and > 50 feet in length) per mile OR current riparian vegetation condition below site potential for recruitment of large woody debris.	Less than 20 pieces of large wood (>16 inches in diameter and > 50 feet in length) per mile AND current riparian vegetation condition well below site potential for recruitment of large woody debris.

Factors	Indicators	Properly Functioning	At Risk	Not Properly Functioning
	Pool Frequency (4)	At least 1 pool every 3 to 7 bankfull channel widths. These pools should occupy at least 50% of the low-flow channel width and all have a maximum depth of at least 36 inches.	At least 1 pool every 3 to 7 bankfull channel widths. These pools should occupy at least 50% of the low-flow channel width. At least half of the pools have a maximum depth of at least 36 inches.	Less than 1 pool every 7 bankfull channel widths and/or less than half of the pools have a maximum depth of at least 36 inches.
	Off-channel Habitat (3)	Backwaters with cover, and low energy off-channel areas (ponds, oxbows, etc.).	Some backwaters and high energy side channels.	Few or no backwaters or off-channel ponds.
	Refugia (important remnant habitat for sensitive aquatic species) (3)	Habitat refugia exist and are adequately buffered (eg. by intact riparian reserves); existing refugia are sufficient in size, number and connectivity to maintain viable populations or sub-populations.	Habitat refugia exist but are not adequately buffered (eg. by intact riparian reserves); existing refugia are insufficient in size, number and connectivity to maintain viable populations or sub-populations.	Adequate habitat refugia do not exist.
Channel Condition and Dynamics:	Width/Depth (W/D) Ratio (6)	W/D ratio < 12 on all reaches that could otherwise best be described as 'A', 'G', and 'E' channel types. W/D ratio > 12 on all reaches that could otherwise best be described as 'B', 'F', and 'C' channel types. No braided streams formed due to excessive sediment loads	More than 10% of the surveyed reaches are outside of the ranges given for Width/Depth ratios for the channel types specified in "Properly Functioning" block. Braiding has occurred in some alluvial reaches because of excessive aggradation due to high sediment loads.	M ore than 25% of the reaches are outside of the ranges given for Width/Depth ratios for the channel types specified in "Properly Functioning" block. Braiding has occurred in many alluvial reaches as a result of excessive aggradation due to high sediment loads
	Streambank Condition (3)	> 90% stable; ie., on average, < 10% of banks are actively eroding.	80 - 90% stable	< 80% stable
	Floodplain Connectivity (3)	Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation, and succession.	Reduced linkage of wetland, floodplains, and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function, riparian vegetation/succession.	Severe reduction in hydrologic connectivity between off-channel, wetland, floodplain, and riparian areas; wetland area drastically reduced and riparian vegetation/succession altered significantly.

Factors	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Flow / Hydrology:	Change in Peak/Base Flows (7)	Use Equivalent Roaded Area (ERA) model to estimate risk of change in flow. Watershed hydrograph indicates peak flow, base flow, and flow timing characteristics comparable to an undisturbed watershed of similar size, geology, and geography. Condition Class I watershed.	Use ERA model to estimate risk of change in flow. Some evidence of altered peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology, and geography. Condition Class II Watershed	Use ERA model to estimate risk of change in flow. Pronounced changes in peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology, and geography. Condition Class III watershed.
	Increase in Drainage Network (3)	Zero or minimum increases in drainage network density due to roads.	Moderate (5%) increases in drainage network density due to roads.	Significant (20-25%) increases in drainage network density due to roads.
Watershed Conditions:	Road Density and Location (3)	Less than 2 miles per square mile, no valley bottom roads.	Two to three miles per square mile, some valley bottom roads.	Over 3 miles per square mile, many valley bottom roads.
	Disturbance History (8)	Cumulative watershed effects (CWE) model indicator values are not above .80. Clarify and verify conditions and risk through field reviews and/or other available info, as available.	CWE model indicator values are above threshold of .80 and 1.0. Clarify and verify conditions and risk through field reviews and/or other available info, as available.	CWE model indicator values are above threshold of 1.0. Clarify and verify conditions and risk through field reviews and/or other available info, as available.
	Riparian Reserves (hydrologic) (3)	The riparian reserve system provides adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatersheds, and buffers or includes known refugia for sensitive aquatic species (> 80% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/composition > 50%.	Moderate loss of connectivity or function (shade, LWD recruitment, etc) of riparian reserve system, or incomplete protection of habitat and refugia for sensitive aquatic species (approx. 70-80% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/composition 25-50% or better.	Riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitat and refugia for sensitive aquatic species (approx. less than 70% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/composition is 25% or less.

Footnotes to Trinity River tributaries matrix of factors and indicators

(1) Stream Order according to Strahler (1957). Proper Functioning criterion for $4^{th}/5^{th}$ Order streams derived from temperature monitoring near the mouth of streams considered to be pristine or nearly pristine (North Fork Trinity and New Rivers - 5^{th} order, East Fork North Fork Trinity and New Rivers near East Fork- 4^{th} order (Data on file at the Weaverville Ranger District). 7 day maximum temperatures as high as 71.8 degrees F have been recorded on these streams, however, the average is just less than 70 degrees F. At Risk criterion for $4^{th}/5^{th}$ order streams derived from monitoring in streams that support populations of anadromous fish, although temperatures in this range (70 to 73.0 degrees F) are considered sub-optimal. Not Properly Functioning is sustained temperatures above 73.0 degrees F that cause cessation of growth and approach lethal temperatures for salmon and steelhead.

Properly Functioning criterion for 1st - 3rd order streams is derived from Proper Functioning criterion for 3^{rd} order streams derived from temperature monitoring near the mouth of streams considered to be pristine or nearly pristine (Devils Canyon Creek, East Fork New River, Slide Creek, Virgin Creek). At Risk and Not Properly Functioning are assigned on a temperature continuum with values given for $4^{th}/5^{th}$ order streams, with the maximum instantaneous temperature of At Risk of 1^{st} - 3^{rd} order streams coinciding with the minimum 7 day maximum of $4^{th}/5^{th}$ order At Risk streams. Similarly for the Not Properly Functioning category.

(2) Properly Functioning: Water clarity returns quickly (within several days) following peak flows.

At Risk: Water clarity slow to return following peak flows.

Not Properly Functioning: Water clarity poor for long periods of time following peak flows. Some suspended sediments occur even at low flows or baseflow.

(3) Criteria unchanged from the National Marine Fisheries Service (NMFS) matrix (NMFS 1996).

(4) Properly Functioning criterion from Klamath Land and Resource Management Plan EIS p 3-68 (USDA 1995a). At Risk and Not Properly Functioning criteria defined through professional judgment.

(5) Properly Functioning LWD criteria derived from stream surveys of 25 stream reaches on the Trinity River Management Unit. The reaches from which the properly functioning criteria were derived have not been “cleaned” or had extensive mining activity that removed LWD and support anadromous fish (or historically did). The Properly Functioning criterion is clearly defined, whereas the At Risk and Not Properly functioning criteria are ambiguously defined based on professional judgment of the Shasta-Trinity Level 1 team.

(6) Width to depth (W/D) ratio for various channel types is based on delineative criteria of Rosgen (1994). Properly Functioning means that W/D ratio falls within expected channel type as determined by the other four delineative factors (entrenchment, sinuosity, slope, and substrate). Aggradation on alluvial flats causing braiding is well known phenomenon that often accompanies changes in W/D ratio as watershed condition deteriorates.

(7) Criteria changed from NMFS matrix.

Shasta-Trinity National Forest uses Equivalent Roaded Area/Threshold of Concern (ERA/TOC) Model (Haskins 1986) to determine the existing risk ratio as well as the effect risk ratio. Therefore, the ECA values are not used in Region 5 analysis; instead the ERA/TOC model is used. ERA/TOC provides a simplified accounting system for tracking disturbances that affect watershed processes, in particular, estimates in changes in peak runoff flows influenced by disturbance activities. This model is not intended to be a process-based sediment model, however it does provide an indicator of watershed conditions. This model compares the current level of disturbance within a given watershed (expressed as %ERA) with the theoretical maximum disturbance level acceptable (expressed as %TOC). ERA/TOC (or "risk ratio") estimates the level of hydrological disturbance or relative risk of increased peak flows and consequent potential for channel alteration and general adverse watershed impacts. TOC is calculated based on channel sensitivity, beneficial uses, soil erodibility, hydrologic response, and slope stability. The TOC does not represent the exact point at which cumulative watershed effects will occur. Rather, it serves as a "yellow flag" indicator of increasing susceptibility for significant adverse cumulative effects occurring within a watershed.

Susceptibility of CWE generally increases from low to high as the level of land disturbing activities increase towards or past the TOC (FS Handbook, 2509.22-23.63a).

CWE Analysis Threshold of Concern and Watershed Condition Class: The LRMP established TOC for 5th field watersheds and defines Watershed Condition Class (WCC) (USDA Forest Service, 1995b). The WCC are defined as follows:

- Watershed Condition Class I: ERA less than 40 percent TOC;
- Watershed Condition Class II: ERA between 40 and 80 percent TOC; and
- Watershed Condition Class III: ERA greater than 80 percent TOC.

The following summarizes the FSM 2521.1 - Watershed Condition Classes. The ERA evaluates watershed condition and assigns one of the following three classes:

1. **Class I Condition**. Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. The drainage network is generally stable. Physical, chemical, and biologic conditions suggest that soil, aquatic, and riparian systems are predominantly functional in terms of supporting beneficial uses.

2. **Class II Condition**. Watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Portions of the watershed may exhibit an unstable drainage network. Physical, chemical, and biologic conditions suggest that soil, aquatic, and riparian systems are at risk in being able to support beneficial uses.

3. **Class III Condition**. Watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. A majority of the drainage network may be unstable. Physical, chemical, and biologic conditions suggest that soil, riparian, and aquatic systems do not support beneficial uses.

(8) The components of the STNF CWE model (Haskins, 1986) are used to determine conditions and risk to this Indicator. The STNF CWE model components replace use of ECA that was originally identified in the Checklist. ECA is not used in Region 5.

References

Haskins, D.M. 1986. A Management Model for Evaluating Cumulative Watershed Effects; Proceedings from the California Watershed Management Conference, West Sacramento, CA, November 19-20, 1986, pp125-130.

National Marine Fisheries Service. 1996. Conference Opinion. Implementation of Land and Resource Management Plans 31p.

Rosgen, D.L. 1994.A Classification of Natural Rivers, Catena, vol 22:169-199 Eisevier Science, B.V. Amsterdam.

Strahler, A.N. 1957. Quantitative analysis of watershed geomorphology. American Geophysical Union Transactions. 38: 913-920.

USDA, Forest Service. 1995a. Klamath National Forest Land and Resource Management Plan Environmental Impact Statement. Klamath National Forest, Yreka CA.

USDA, Forest Service. 1995b. Shasta-Trinity National Forests Land and Resource Management Plan. Shasta-Trinity National Forests, Redding CA

Appendix B: Fisheries Biological Assessment

Coho Critical Habitat and Timber Sale Operations
Browns Timber Sale
Shasta Trinity National Forest
Weaverville Ranger District
Trinity River Management Unit
T 34 N R 9 W, M.D.M.
Sections 20-22, 27-29, 32-34

20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

N

0 1,000 2,000 4,000 6,000 Feet

Legend

- Private Lands
- Sale Area Boundary
- Forest Service System Roads
- Power/Telephone Line
- Specified Road New Construction
- Specified Road Reconstruction
- State Highways
- Trinity County Roads
- Coho Critical Habitat, Essential Fish Habitat

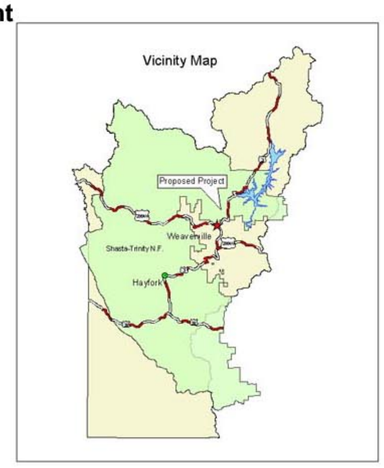
Timber Sale Units 2005

- Thinning, Tractor
- Thinning, Cable
- Regeneration, Tractor
- Regeneration, Cable
- Riparian Reserve, Tractor
- Riparian Reserve, Cable
- Designated Crossings
- Proposed Landings
- Proposed Temp Roads

Drawn By: LLL SFMU 03-31-2005

Appendix C: Fisheries Biological Assessment

Browns Proposed Road Management
National Forest: Shasta Trinity
Weaverville Ranger District
Trinity River Management Unit
T 34 N R 9 W, M.D.M.
Sections 16-18, 20-24, 27-29, 31-34



Legend

Owership
- National Forest Lands
- Private Lands
- Outside Forest Boundary
- Sale Area Boundary
- Timber Sale Units

Roads - Existing
- National Forest
- Trinity County
- State Highway

Browns Proposed Decommission Priority
- HIGH
- HIGH, Decom after use
- MED
- MED, Decom after use
- LOW
- Existing System Roads To Decommission

Proposed New Construction System Roads
- Decommission After Use
- Maintain After Use
- Road_Reconstruction
- Coho_Critical_Hahitat

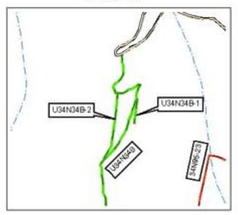
Culvert Management
- Decommission
- Replacement

N

0 1,000 2,000 4,000 6,000 Feet

Drawn By: LLL SFMU 04-05-2005

Detail A



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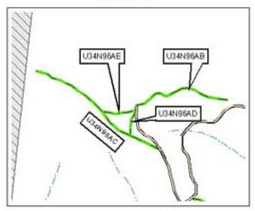
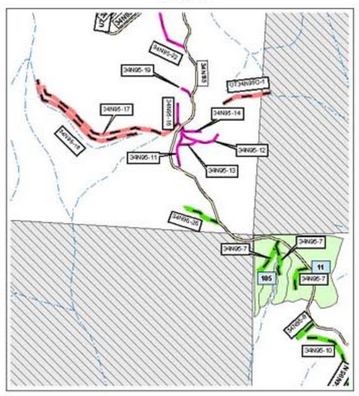


Detail E

Detail C



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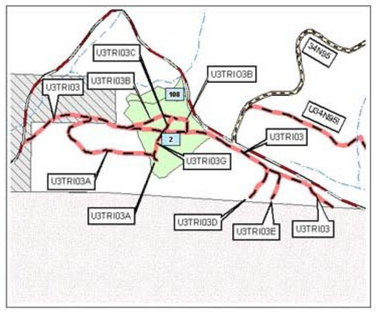

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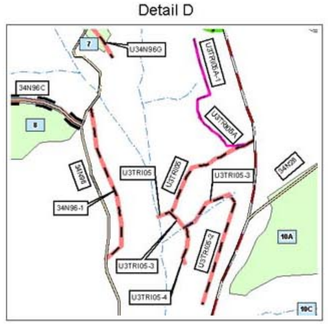

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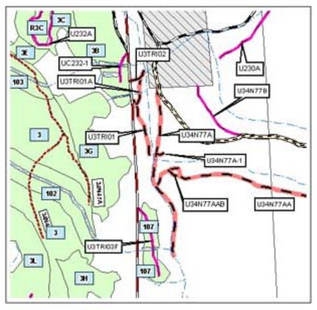
Detail G



Documentation of Expected Adverse Effects to Listed Fish Species and their Habitat

Name of action: Browns Project

Species of concern: SONCC coho salmon

HUCs in ESA action area: 1801021106

Critical habitat area of concern: Little Browns Creek

Element(s) of the action causing the expected adverse effects: Road Rehabilitation in the flood plain of Little Browns Creek.

1. **The proposed action may result in adverse effects through which of the following mechanisms (underline or circle and describe as appropriate)**.

   Harm: act that actually kills or injures fish (may include habitat modification that significantly impairs behavioral patterns such as breeding, spawning, rearing, migrating, feeding or sheltering).

   Harass: significantly disrupt normal behavior patterns such as breeding, feeding, or sheltering.

   Other forms of take: pursue, hunt, shoot, wound, trap, capture, kill, collect, or delayed mortality from stress or disease.

   Habitat: cause an adverse effect to occupied or accessible habitat of listed/proposed species; proposed/designated critical habitat. For anadromous fish, accessible habitat is considered to be occupied.

2. **Nature, magnitude and probability**

   Describe the nature, magnitude and probability of the effects of the action on a species or habitat. Quantify where possible. (Describe in BA outline)

   Nature: If spawning were to occur within the action area, increased fine sediment levels could cause a reduction in emergence of hatched coho salmon due to fine sediment infiltrating a redd. Increased fine sediment levels could cause a reduction in pool frequency and size (negative effect) that emerged coho salmon would use for rearing.

   Magnitude: The negative effects of road rehabilitation related turbidity, substrate, and its effect on pool frequency would be evident in Little Browns Creek for ¼ mile downstream of the Project area. An unknown amount of sediment will be moved into critical habitat.

   Probability: There is high probability that road rehabilitation will have (-) negative effect on turbidity, substrate, and pool frequency in critical habitat in the Little Browns Creek subwatershed.

3. **Which of the following life stages, forms and essential behaviors will be adversely affected (underline or circle and describe as appropriate)?**

   Life history forms

   Resident

   Fluvial

   Adfluvial

   Anadromous

Life stages and essential behaviors

Fertilization to emergence (incubation)Emergence to juvenile out-migration (freshwater rearing)

Juvenile out-migration and smoltification (including estuarine rearing)

Adult migration to spawning areas

Adult holding

Gamete survival and maturation

Spawning

4. **Temporal Scale (frequency and duration) (underline or circle and describe as appropriate).**
    1. **Frequency**: How often will the effect occur?
    2. **Duration**:
        a. **Short term or pulse effect**: subsides almost immediately.
        b. Long term or press effect: chronic.
        The effect will occur with each precipitation event for two to three years. The initial precipitation event would be the greatest impact with each succeeding event reducing in severity.
5. **Spatial scale**
    1. **Distribution**: Describe the geographic extent of the effect

    The impact is expected to occur in Little Browns Creek from the Hwy. 3 crossing down stream for about ¼ mile.
    2. Proximity
        a. Describe where the effect is in relation to the species and its habitat.
        b. Note relationship to occupied habitat, designated critical habitat, or essential fish habitat
        The effect will occur in a known spawning and rearing area. It is within designated critical habitat and essential fish habitat.
6. **Tracking Adverse Effects:**
Catalogue a unit number for this adverse effect and identify the specific location on the GIS water theme as a point, segment, or polygon datum (depending upon the nature of the effect).
7. **Include this form and map in the BA.**