



United States
Department of
Agriculture

Forest
Service

July 2015



Amendment to the Aquatic Resources Report

Westside Fire Recovery Project

Happy Camp Oak Knoll and Salmon/Scott River Ranger Districts,
Klamath National Forest
Siskiyou County, California

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I. Summary of Modifications between Draft and Final EIS

Between the draft and final EIS, two additional alternatives are being analyzed (Modified Alternative 2 and Modified Alternative 3), as discussed in section II of this document. Additionally, ongoing unit layout and effects analyses have led to changes to units; some salvage units were re-shaped or dropped completely including any associated temporary road actions. These changes were integrated into all alternatives as appropriate. For Alternative 2, across the project area, about 1592 acres of salvage harvest was dropped and 533 acres of salvage was added; there were no changes to proposed fuels treatments or the extent of roadside hazard removal. Tables showing acreage changes by 7th field watershed, for each alternative, are available in the project record.

Between the draft and final EIS, changes were made to several project design features (PDFs); these changes reduce potential effects related to aquatic resources and habitat. The updated PDFs are as follows (new text shown in *italics*): Watershed-4 (related to equipment in RR), Watershed-12 (related to hazard tree removal), and a Wildlife PDF that has been added to further restrict removal of live trees during roadside hazard operations. That new Wildlife PDF is: “*Trees without fire damage will not be felled unless they are an immediate hazard.*” Another PDF, Watershed-6, was updated to provide more information on geologic features in specific units. The three updated watershed PDFs are:

Updated Watershed-4

Tractors and mechanical harvesters will be excluded from all RR associated with stream channels, active landslides, inner gorges, and toe zones of dormant landslide deposits. *During roadside hazard tree removal actions within RR, ground based equipment will not leave the road.*

Updated Watershed-6

There will be no salvage logging on active landslides *or toe zones of dormant landslides except for units 5, 23, 32, 39, 55, 56, 57, 59, 64, 226, 268, 406, 520, 524, 525, and 530 which have been field reviewed by the Forest Geologist (see Geology amendment for details on criteria for exceptions).*

Updated Watershed-12

All hazard trees cut within 25 feet of a stream channel *or spring* will be left on site unless they continue to pose a threat to safety or accessibility (see Watershed-4 for equipment exclusion restrictions). *Along all stream channels (perennial and intermittent), all hazard trees 26 inches diameter at breast height (dbh) or greater that are within the first site tree distance (150-170 feet) of any stream channel will be left on site unless after felling, they continue to pose a threat to safety, infrastructure, forest road drainage system integrity or accessibility. Any hazard tree (equal or greater than 26 inches dbh) below a road that would contact a fish bearing stream channel if felled that direction will be retained on site.*

Updated Watershed-34

Draft water only at sites designated by the Forest Service. Decisions related to where water drafting occurs will be coordinated with a Forest Service fisheries biologist so that potential impacts to anadromous fish, and the thermal refugia they rely upon, are sufficiently minimized. *Sites that are not likely to have rearing Coho salmon present will be prioritized for use, such as mainstem sites on the Klamath, Scott, and Salmon rivers. Priority will also be given to sites that involve drafting relatively warmer waters in mainstem rivers; drafting from tributaries and*

colder water sources, especially in their lower reaches, will be avoided particularly during late summer and early fall (when fish survival is dependent upon thermal refugia). Water storage facilities such as foldable tanks are encouraged and will be assessed for sites with moderate flows that simultaneously support rearing SONCC coho salmon, and may be subject to high drafting use (e. g., Walker Creek). Project-related water drafting will be monitored, and shifted away from streams if their baseflows will no longer sustain drafting-related water withdrawal consistent with PDFs. The following creeks will be avoided, due to their small size, small summer base flows, and consistent presence of rearing SONCC Coho salmon - Tom Martin Cr, O'Neil Cr, Little Horse Cr, and China Cr.

The remaining text of this PDF describes NOAA and Forest Service drafting specifications, this information has not changed.

Updated Tables

Several tables from the Aquatic Species Resource Report are updated as described below.

Table 1 (of resource report (page 5)): Summary of special status aquatic species--Southern torrent salamander was added

		Endangered	Threatened	Forest Sensitive	MIS	Critical Habitat	Essential Fish Habitat
<i>Salmonids</i>							
Coho Salmon (Southern Oregon/Northern California Coasts)	<i>Oncorhynchus kisutch</i>		X			X	X
Chinook Salmon (Spring/Fall runs) (Upper Klamath-Trinity Rivers)	<i>Oncorhynchus tshawytscha</i>			X			X
Steelhead Trout (Klamath Mountains Province)	<i>Oncorhynchus mykiss</i>			X	X		
Rainbow Trout	<i>Oncorhynchus mykiss</i>				X		
<i>Lamprey</i>							
Pacific Lamprey	<i>Entosphenus tridentatus</i>			X			
Klamath River Lamprey	<i>Entosphenus similis</i>			X			
<i>Amphibians and Reptile</i>							
Foothill Yellow Legged Frog	<i>Rana boylei</i>			X			
Cascade Frog	<i>Rana cascadae</i>			X			
Western Pond Turtle	<i>Emys marmorata</i>			X	X		
Southern Torrent Salamander	<i>Rhyacotriton variegatus</i>			X			

Table 2 (of resource report (page 68)): Summary of findings for the action alternatives with regard to Threatened/Endangered species, Sensitive species, and Management Indicator Species--The determination for Coho salmon and remaining Sensitive species has been added and determination for Essential Fish Habitat has been updated

Species	Special Status	Alternative	Effects Determination
<i>Fish</i>			
Coho Salmon and designated Critical Habitat	Endangered Species Act Threatened	Alternative 4 Alternative 5 Modified Alternative 2 Modified Alternative 3	May affect, but is not likely to adversely affect
		Alternative 2 Alternative 3	May affect, and is likely to adversely affect
Upper Klamath-Trinity Rivers Chinook Salmon	FS Sensitive	All Action Alternatives	May affect individuals, but is not likely to lead to a trend towards listing
Klamath Mountains Province Steelhead Trout	FS Sensitive, MIS	All Action Alternatives	May affect individuals, but is not likely to lead to a trend towards listing
Rainbow Trout	MIS	All Action Alternatives	Determinations are not applicable to MIS, effects to habitat have been disclosed
Pacific Lamprey	FS Sensitive	All Action Alternatives	May affect individuals, but is not likely to lead to a trend towards listing
Klamath River Lamprey	FS Sensitive	All Action Alternatives	May affect individuals, but is not likely to lead to a trend towards listing
Foothill yellow legged frog, Cascade frog, Western pond turtle, southern torrent salamander	FS Sensitive	All Action Alternatives	May affect individuals, but is not likely to lead to a trend towards listing
<i>Other Habitat</i>			
Essential Fish Habitat (Coho/Chinook)	All Action Alternatives	All Action Alternatives	May adversely affect

Table 3 (Table 1 from the Management Indicator Report (page 18)): is updated to summarize habitat effects for all FEIS alternatives

River/Streams Species Association	Current Amount of Habitat (miles of stream)	Miles of Stream/River Affected by Each Alternative					
		Alternative 2	Alternative 3	Alternative 4	Alternative 5	Modified Alternative 2	Modified Alternative 3
Rainbow trout	338 miles	4.1	4.1	0.5	3.5	1.1	0.6
Steelhead	224 miles	3.1	3.1	0	2.5	0.6	0.6
Tailed frog	802 miles	10.5	10.5	0.5	3.7	2.4	1.5
Cascades frog	314 miles	7	7	0.5	5.1	1.3	1.0
American dipper	802 miles	10.5	10.5	0.5	3.7	2.4	1.5

River/Streams Species Association	Current Amount of Habitat (miles of stream)	Miles of Stream/River Affected by Each Alternative					
		Alternative 2	Alternative 3	Alternative 4	Alternative 5	Modified Alternative 2	Modified Alternative 3
Northern water shrew	802 miles	10.5	10.5	0.5	3.7	2.4	1.5
Long-tailed vole	802 miles	10.5	10.5	0.5	3.7	2.4	1.5
Miles of Stream/River Affected by Each Alternative (no effect to lake habitat)							
Marsh/Lake/Pond Species Association	Current Amount of Habitat (miles of stream and acres lake)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Modified Alternative 2	Modified Alternative 3
		Alternative 2	Alternative 3	Alternative 4	Alternative 5	Modified Alternative 2	Modified Alternative 3
Western pond turtle	802 miles and 362 acres	1.25	1.25	0	0.25	0.25	0

Methods

The methods used for this analysis are the same as for the DEIS and can be found in detail in the Aquatic Resources Report. As part of finalizing the Aquatic Conservation Strategy assessment, fisheries biologists completed additional analysis related to potential effects of hazard tree removal, by fire area; this information is integrated into the updated analysis provided below.

Since the DEIS, fisheries biologists continued field reviews of proposed activities within and near Riparian Reserves and completed several additional 5th and 7th field watershed checklists of baseline habitat conditions. Fifth field checklists that were updated and added to the Aquatic Resources Report and the biological assessment for Coho salmon include: Horse Creek-Klamath River, Seiad Creek-Klamath River, and Thompson Creek-Klamath River. Seventh field checklists that were added to the Aquatic Resources Report and biological assessment for Coho salmon include: Cliff Valley Creek, Rancheria Creek, and Upper Grider Creek. The updated checklists are attached to this amendment as updated Appendix D.

II. Environmental Consequences of Modified Alternatives

Modified Alternative 2

This is an analysis of the Modified Alternative 2 by fire-identified project areas (A, B, and C). This section adds to the analysis provided (prior to these modifications) in the DEIS Aquatic Resources Report.

Environmental Consequences

Modified Alternative 2 is subject to the same Watershed PDFs provided in Appendix B of the Aquatic Resources Report, along with updates of several PDFs as described above. These measures were developed by watershed specialists to minimize impacts to soils and aquatic resources and ensure compliance with the Forest Plan’s Aquatic Conservation Strategy. Relative to Alternative 2, Modified Alternative 2 has 620 acres of salvage removed. Site prep and plant,

and roadside hazard removal remain as proposed in Alternative 2; proposed fuels treatments remain as proposed in Alternative 2 and 80 acres of fuels treatment are added in Beaver Fire area. Temporary road and landing actions were modified based on where salvage units were dropped. Notably, Modified Alternative 2 drops all near stream temporary road actions in the Beaver Fire area and drops the proposed reopening of decommissioned 46N62 (Caroline Cr road) in the Happy Camp Fire area.

The assessment of indirect effects is organized by the following Project Elements:

- Salvage and Reforestation
- Fuels Reduction
- Hazard Tree Removal
- Temporary Roads, Landings, Stream Crossings and Water Drafting
- Legacy Sediment Site Treatments

Project Area A: Beaver Fire

Direct Effects and Indirect Effects

Direct Effects

Water drafting is the only action proposed within fish-bearing streams, and therefore the only action that has the potential for direct effects to aquatic resources. Between the DEIS and FEIS, a PDF (Watershed-34) was changed to achieve more protection for aquatic species utilizing thermal refugia habitat areas. PDF watershed-34 was refined during consultation with NMFS and the Karuk Tribe and specifies that certain areas (lower reaches of cold tributaries) across the project area and several specific creeks are to be avoided during late summer and fall water drafting. None of the specific creeks identified in the PDF occur in the Beaver Fire area; however, the increased protection of flows in lower reaches of cold tributaries reduces the chance that water drafting would have measurable negative impacts to fish that are relying upon thermal refugia. Due to implementation of this updated PDF, lower reaches of cold water tributaries to, and including, Beaver Creek would be avoided during water drafting. This modified PDF more fully minimizes effects to thermal refugia and helps avoid reductions of cold water inputs to the Klamath River. This is important to aquatic species, especially as extended drought conditions persist. Therefore, potential direct effects in the Beaver Fire area are similar but slightly less than effects described in the DEIS Aquatic Resources Report.

Modified Alternative 2 does not include any near stream temporary road actions or legacy sediment site treatments; there would be no potential effects of these actions in Beaver Fire.

Indirect Effects

Salvage Harvest and Reforestation: Modified Alternative 2 removes approximately 300 acres of salvage harvest from the Beaver Fire area relative to Alternative 2. Thus, Modified Alternative 2 reduces salvage acreage and associated effects relative to Alternative 2 (reduces net acres of salvage from 490 acres under Alternative 2 to 190 acres). Modified Alternative 2 does not change the acres of site preparation in the Beaver Fire area relative to Alternative 2; the effects of reforestation described in the Aquatic Resources Report for Alternative 2 are the same as for Modified Alternative 2. The reduced acreage of salvage treatments proposed under Modified Alternative 2 further reduces the discountable effects on sediment, water quality and riparian

function described in the Aquatic Resources Report for Alternative 2. Minor effects to aquatic species and discountable effects to habitat indicators are expected due to implementation of minimization measures (PDFs) and the small acreage treated in the Beaver Fire area. Similar to Alternative 2, but to a lesser degree, the effects of Modified Alternative 2 would add to the elevated sediment conditions that exist in Doggett and Kohl creeks. These watersheds were heavily disturbed by 2014 fires and subsequent timber harvest on private lands. The influence of this project on aquatic habitat in these creeks is minor because of the dispersed and limited extent of ground disturbance proposed; and in the long term beneficial because of the proposed re-planting.

Like Alternative 2, Modified Alternative 2 does not include Riparian Reserve hand treatments within Beaver Fire area units. The potential benefits of this treatment to overall watershed condition, as described for Modified Alternative 3, is foregone for the Beaver Fire area with this alternative.

In summary, the effects of Modified Alternative 2 on habitat indicators and aquatic species would be reduced from those described for Alternative 2 in the DEIS Aquatic Resources Report due to less acreage proposed for treatment: effects on habitat indicators would be discountable and effects on aquatic species would be minor. Reforestation actions are designed to increase the likelihood and speed by which burned areas are reforested which is considered a long term positive effect to aquatic resources.

Fuels Reduction: Modified Alternative 2 adds approximately 80 acres of fuels treatments within the Beaver Fire area relative to Alternative 2. The potential effects of Modified Alternative 2 on aquatic resources are very similar to effects of Alternative 2 (described in the DEIS Aquatic Resources Report). The discountable impacts of fuels reduction on sediment, water quality and riparian function described in the DEIS Aquatic Resources Report for Alternative 2 would be slightly increased due to the addition of 80 acres of treatment in the Beaver Creek watershed, some of which overlaps Riparian Reserves. The CWE analysis and site reviews indicate that effects would be short term and discountable under Modified Alternative 2. Minor effects on aquatic species and discountable effects on habitat indicators are expected under Modified Alternative 2 due to implementation of minimization measures (PDFs), the small amount of acreage treated, and the low level of ground disturbance involved with fuels treatments. Long-term benefits from fuels reduction associated with future fire behavior are expected.

Hazard Tree Removal: The amount of acreage treated in the Beaver Fire area would not change under Modified Alternative 2 relative to Alternative 2. Table 4 displays miles of stream within watersheds of the Beaver Fire that are within 200 feet of proposed hazard tree removal roads. About 12 miles, less than 2% of the total stream mileage in the Beaver Fire area, may be affected by these actions.

Table 3: Miles of stream that may be affected by hazard tree removal in Beaver Fire, Modified Alternative 2

5 th field watershed	Miles of perennial stream within 200 feet from roadside hazard tree removal roads	Miles of intermittent stream within 200 feet from roadside hazard tree removal roads	Total stream miles in watershed -intermittent and perennial Percentage of streams miles potentially affected by Project roadside hazard tree removal
Humbug Creek-Klamath River	0	1	245 0.4%
Beaver Creek	3	4	277 2.5%
Horse Creek-Klamath River	1	3	322 1.2%
TOTAL	4	8	844 1.4%

The potential effects of roadside hazard tree removal on aquatic resources includes localized loss of shade, ground disturbance associated with felling trees and yarding up to roads, and localized loss of woody debris. Equipment restrictions that prohibit ground based equipment from leaving roads when implementing roadside hazard tree removal within RR minimizes near stream ground disturbance.

Project design features ensure retention of large wood within near stream areas. The PDF watershed-12 was changed between the DEIS and FEIS to further increase retention of large wood near streams; Watershed-12 now ensures retention of all hazard trees equal to or greater than 26 inches DBH that are within one site tree distance from all stream channels, including perennial non-fish bearing and intermittent channels. Retention of large wood near streams is expanded under Watershed-12 to areas above fish bearing reaches; retention of all large wood in these near stream areas maximizes protection of this habitat component that is important for aquatic habitat formation and function and for providing for terrestrial wildlife connectivity. This modified PDF also increases the probability that future debris flows will deliver intact large woody debris downstream to fish-bearing reaches, wherever future debris flows may occur. Modified Alternative 2 is the same as Alternative 2 (described in the DEIS Aquatic Resources Report) within the Beaver Fire area with respect to the potential for indirect effects to aquatic resources from hazard tree treatments. Effects of hazard tree removal along roads on habitat indicators would be discountable and effects on aquatic species would be minor.

Roads, Landings, Stream Crossings and Water Drafting: As shown in Table 5, Modified Alternative 2 drops 1.7 miles of temporary road construction and three landings in the Beaver Fire area relative to Alternative 2. Most of the temporary road actions were dropped as a result of dropping units due to short term wildlife habitat connectivity concerns. The temporary road actions that were dropped included existing sediment sources on old road beds that would be addressed after use of road beds in Alternative 2 (temporary roads 8, 39, and 40). As described in the DEIS for Alternative 2, there would have been short term negative effects to aquatic resources in Doggett Creek and a face drainage to Beaver Creek from use of these temporary roads, but long term benefits to water quality through addressing sediment sources on these road beds. Modified Alternative 2 drops these temporary road actions and therefore would result in less short term

negative effects related to roads and sediment production, however, the opportunity to reduce sedimentation from these old road beds long-term would be foregone. Effects from Modified Alternative 2 from temporary road construction would be discountable to habitat indicators and minor to aquatic species.

Modified Alternative 2 would remove 3 landings from use in the Beaver Fire area; as with all the alternatives, there are no new landings in Riparian Reserve proposed in Beaver Fire area. The effects described for landings in the DEIS Aquatic Resources Report would be reduced with Modified Alternative 2. The CWE modelling indicates that landings proposed under Alternative 2 would not add incremental increases to disturbance at the 5th-field watershed scale, and only a slight incremental increase in some watersheds at the 7th-field scale. Modified Alternative 2 further reduces the effects of landings that were described for Alternative 2 in the DEIS Aquatic Resources Report. Due to PDFs that would be implemented to minimize site scale effects, and due to reduced acreage of landings in the Beaver Fire area, effects of landings on habitat indicators would be reduced but similar to those described in the DEIS. Modified Alternative 2 is similar to Alternative 2 (described in the DEIS Aquatic Resources Report) within the Beaver Fire area with respect to the potential for indirect effects to aquatic resources from landings. Effects to habitat indicators would be discountable and effects to aquatic species would be minor.

Modified Alternative 2 includes water drafting (locations are shown on maps in Appendix A of the Aquatic Resources Report), which can result in indirect effects through short term and localized increases in turbidity when substrates are disturbed as the water hose is set into and pulled from the water. Watershed PDFs (34 and 35) will be implemented to minimize effects of water drafting on sediment and aquatic species. The effects of water drafting under Modified Alternative 2 are the same as Alternative 2, which are described in the DEIS Aquatic Resources Report. Existing water drafting sites will be used to avoid new streamside disturbance associated with construction of drafting sites. Turbidity that may result during water hose sets and removals will be localized, limited to pre-designated sites. A measurable increase in turbidity is not expected beyond the immediate drafting area. This conclusion is based on field observations that indicate turbidity is quickly diluted to background water clarity conditions. Modified Alternative 2 is the same as Alternative 2 (described in the DEIS Aquatic Resources Report) within the Beaver Fire area with respect to the potential for indirect effects to aquatic resources from water drafting. Effects to habitat indicators would be discountable and effects to aquatic species would be minor.

Table 4: Comparison of temporary road actions between Alternative 2 and Modified Alternative 2 for the Beaver Fire area

Road Type	Alt. 2 Miles	Modified Alt. 2 Miles
Re-open, Decommissioned Road	0	0
Temporary Road on Existing Roadbed	2.8	1.1
Total Miles	2.8	1.1

Legacy Sediment Site Treatments: Legacy sediment site treatments and associated effects will not occur in the Beaver Fire area.

Cumulative Effects

Appendix C of the EIS contains a list of the current and future foreseeable actions considered for cumulative effects analysis within the Beaver Fire area. These activities were accounted for in the project CWE analysis and interpretation. The Forest uses standardized CWE models (Equivalent Routed Area, Universal Soil Loss Equation, Mass Wasting) to assess effects of past, present, and reasonably foreseeable activities. In addition to other current actions, models were updated to incorporate effects of the 2014 fires and road improvements identified in BAER assessments. The modelling provides the fundamental assessment of post-fire existing conditions, as well as an initial assessment of the project *No Action* alternative. Subsequently, effects of project *action alternatives* were modeled based on proposed actions. These model results reflect that there will be minimal cumulative impact from adding the effects of Modified Alternative 2 to the past, present and reasonably foreseeable future actions. For Modified Alternative 2 the site level analysis found that no short term negative effects to aquatic habitat would occur due temporary road actions. Ongoing and future actions in the Beaver Fire area are expected including private timber harvest (green and salvage timber harvest plans) but project effects would be so minor as not to add to these impacts in any meaningful way; and would allow for active reforestation on some public land in this landscape that is managed mostly as private industrial timberland.

Project Area B: Happy Camp Fire

Direct Effects and Indirect Effects

Direct Effects

Water drafting and stream crossing work associated with temporary road actions and legacy sediment site treatments are the only actions proposed within streams, and therefore the actions with potential for directly affecting aquatic resources. All temporary road stream crossings would occur above fish habitat (most are on seasonal streams), and potential effects to downstream fish habitat are discussed as indirect effects below. Modified Alternative 2 is materially the same as Alternative 2 (described in the Aquatic Resources Report) with respect to the potential for direct effects to aquatic resources because this alternative also includes water drafting and stream crossing work associated with temporary road actions and legacy sediment site treatments.

As described above, Watershed-34 was modified between the DEIS and FEIS to achieve more protection for aquatic species utilizing thermal refugia areas. PDF watershed-34 was refined during consultation with NMFS and Karuk Tribe and specifies that certain areas (lower reaches of cold tributaries) across the project area and several specific creeks are to be avoided during late summer and fall water drafting. Aquatic species within the Happy Camp Fire area, including Coho salmon, will be provided increased protection from water drafting, particularly within the following creeks: Tom Martin Cr, O'Neil Cr, Little Horse Cr, and China Cr. These increased protection measures further reduce the chance that water drafting would have measurable negative impacts to fish that are utilizing thermal refugia. This modified PDF helps to avoid reducing cold water inputs to the Klamath River, which is critical to aquatic species as extended drought conditions persist.

Modified Alternative 2 does not change the scope or location of legacy sediment site treatments in the Elk Creek watershed and the effects described for Alternative 2 in the DEIS Aquatic Resources Report are the same for Modified Alternative 2.

Indirect Effects

Salvage Harvest and Reforestation: Modified Alternative 2 removes about 300 net acres of salvage in the Happy Camp Complex relative to Alternative 2. The discountable effects of salvage and reforestation on sediment, water quality and riparian function described in the DEIS Aquatic Resources Report for Alternative 2 would be reduced under Modified Alternative 2 due to the reduction in acres treated. Minor effects to aquatic species and discountable effects to habitat indicators are expected due to exclusion of stream course Riparian Reserves and inner gorges and implementation of minimization measures (PDFs). While many of the watersheds were heavily disturbed by 2014 fires, the CWE analysis and site reviews indicate that the effects of proposed salvage on habitat indicators would be discountable and effects to aquatic species would be minor.

Modified Alternative 2 includes the same amount of site-preparation, planting, and release relative to Alternative 2. Like Alternative 2, Modified Alternative 2 includes hand treatments in some Riparian Reserves within Happy Camp and Whites Fire areas; in Modified Alternative 2 these treatments are proposed within Riparian Reserves within salvage or site prep and plant units, and only where they occur on the upper 1/3 of slopes. Table 6 displays where these treatments are proposed in Modified Alternative 2 by 7th field watershed.

Table 5: Modified Alternative 2 proposed hand treatments in Riparian Reserve, in the Happy Camp fire area

7th field watershed	Acres proposed for hand treatments within Riparian Reserve
Caroline Creek-Klamath River	4
China Creek	7
Cliff Valley Creek	5
Cougar Creek-Elk Creek	4
Deep Creek-Scott River	2
Doolittle Creek	1
Fryingpan Creek-Klamath River	1
Lower East Fork Elk Creek	2
Lower Grider Creek	36
McCarthy Creek-Scott River	20
Middle Creek	17
North Fork Kelsey Creek	1
O'Neil Creek	2
Rancheria Creek	3
Robinson Gulch-North Fork Salmon River (Whites Fire)	1
South Fork Kelsey Creek	2
Schutts Gulch-Klamath River	8
Tom Martin Creek-Klamath River	5

7 th field watershed	Acres proposed for hand treatments within Riparian Reserve
Tompkins Creek	11
Upper East Fork Elk Creek	1
Upper Elk Creek	4
Upper Grider Creek	1
Walker Creek	12
TOTAL	151

As described for Alternative 2, the short term effects of these actions relate to ground disturbance in Riparian Reserves caused by hand work and burning; these actions cause localized and temporary disturbance to vegetation and soils and are not likely to have negative effects to aquatic habitat. With Modified Alternative 2 these actions are confined to Riparian Reserves within upper 1/3 of slopes. Based on field reviews, Riparian Reserves in lower slope positions could also benefit from this treatment as described for Modified Alternative 3. Also, as described for Alternative 4, the feasibility of implementing these actions within Riparian Reserve of salvage harvest units is questionable due to the likelihood of substantial overhead hazards and economic and efficiency considerations. Short term effects of these actions to aquatic habitat indicators would be discountable and effects to aquatic species would be minor; long term benefits to watershed condition indicators are likely for drainages where these treatments occur. The long term benefits are more likely as the amount of this treatment across the post fire landscape increases, therefore Alternative 2, Alternative 4, and Modified Alternative 3 all of which have more acreage of this treatment proposed, would be more beneficial to watershed condition including fire resiliency.

Fuels Reduction: Modified Alternative 2 includes the same amount of fuels reduction actions relative to Alternative 2. The discountable effects of fuels treatments on sediment, water quality and riparian function described in the DEIS Aquatic Resources Report for Alternative 2 would be the same for Modified Alternative 2. Minor effects to aquatic species and discountable effects to habitat indicators are expected due to implementation of minimization measures (PDFs), and the low level of ground disturbance involved in fuels treatments. Long-term benefits from fuels reduction associated with future fire behavior are expected.

Hazard Tree Removal: The amount of acreage treated in the Happy Camp Fire would not change under Modified Alternative 2 relative to Alternative 2. Table 7 displays stream miles within Happy Camp Fire watersheds that are within 200 feet of proposed hazard tree treatments on roads. About 46 miles, or less than 4% of the total stream miles within the Happy Camp Fire area may be affected by hazard tree treatments.

Table 6: Miles of stream that may be affected by roadside hazard tree removal in Happy Camp Fire, Modified Alternative 2

5 th field watershed	Miles of perennial stream within 200 feet from roadside hazard tree removal roads	Miles of intermittent stream within 200 feet from roadside hazard tree removal roads	Total stream miles in watershed -intermittent and perennial Percentage of streams miles potentially affected by Project roadside hazard tree removal

5 th field watershed	Miles of perennial stream within 200 feet from roadside hazard tree removal roads	Miles of intermittent stream within 200 feet from roadside hazard tree removal roads	Total stream miles in watershed -intermittent and perennial Percentage of streams miles potentially affected by Project roadside hazard tree removal
Seiad Creek-Klamath River	8	0	205 3.9%
Lower Scott River	6	8	476 2.9%
Thompson Creek-Klamath River	3	5	297 2.7%
Elk Creek	7	9	300 5.3%
TOTAL	24	22	1277 3.6%

Potential effects of roadside hazard tree removal on aquatic resources includes localized loss of shade, ground disturbance associated with felling trees and yarding up to roads, and localized loss of large wood. Equipment restrictions that prohibit ground based equipment from leaving roads when implementing roadside hazard tree removal within RR minimizes near stream ground disturbance.

Project design features ensure retention of large wood within near stream areas. PDF Watershed-12 was changed between the DEIS and FEIS to further increase retention of large wood near streams: Watershed-12 ensures retention of all hazard trees equal to or greater than 26 inches DBH that are within one site tree distance from all stream channels, including perennial non-fish bearing and intermittent channels. Retention of large wood near streams is expanded under Watershed-12 to areas above fish bearing reaches, maximizing protection of this habitat component that is important for aquatic habitat formation and function and for providing for terrestrial wildlife connectivity. This modified PDF also increases the probability that future debris flows, wherever they occur, will deliver intact large woody debris downstream to fish-bearing reaches. Modified Alternative 2 is the same as Alternative 2 (described in the DEIS Aquatic Resources Report) within the Happy Camp Complex area with respect to the potential for indirect effects to aquatic resources from hazard tree treatments. Effects of hazard tree removal along roads on habitat indicators would be discountable and effects on aquatic species would be minor.

Roads, Landings, Stream Crossings and Water Drafting: As shown in Table 7 , Modified Alternative 2 drops approximately 0.2 mile of new temporary road construction and drops about 5 miles of reopening of decommissioned roads in the Happy Camp Fire. Temporary road actions dropped include mostly short ridge-top segments; however, reopening the Caroline Creek road (46N62) is also dropped from Modified Alternative 2. The Caroline Creek road is a mid-slope decommissioned road that is associated with several stream crossings and active landslide features (longest road feature displayed in Figure 1).

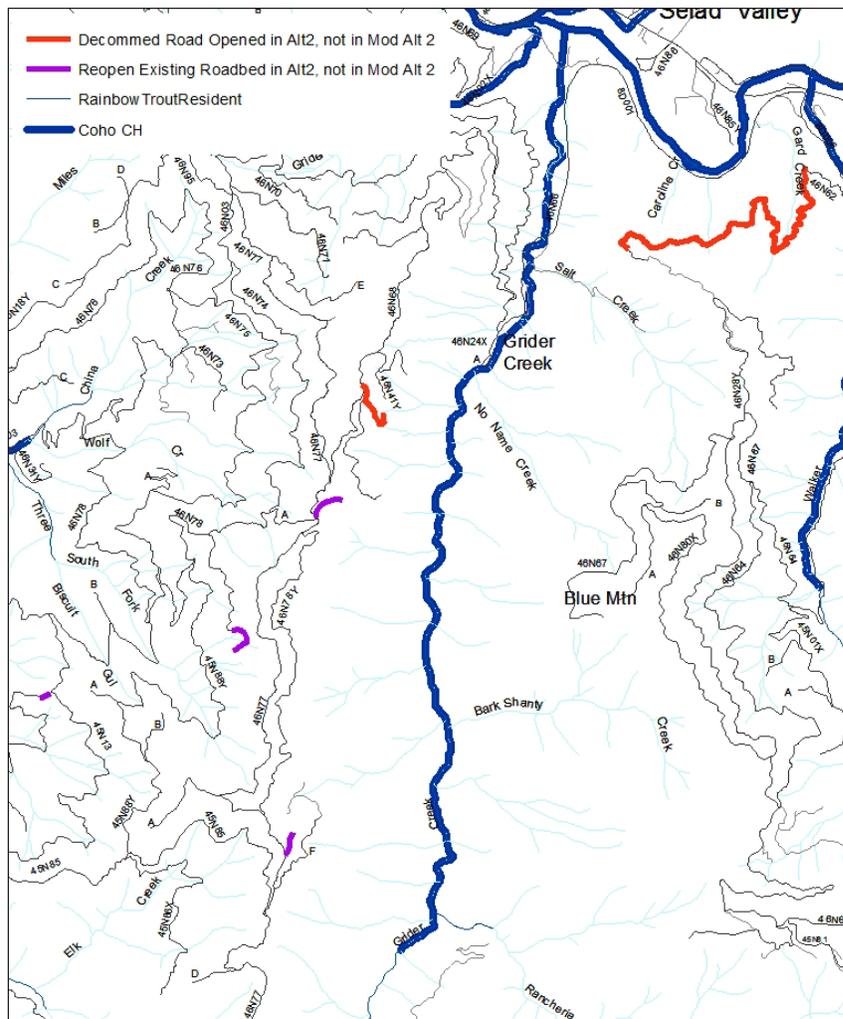


Figure 1: Comparison of temporary road actions, in Alternative 2 and Modified Alternative 2, in the Grider Creek area of Happy Camp Fire

The effects of temporary road and stream crossings under Alternative 2, with the exception of the road 46N62, were determined to be discountable and minor because none of the temporary road stream crossings were proposed within fish-bearing habitat, watershed PDFs would be implemented to minimize impacts at the site scale, and because any temporary crossing structures would be pulled and the roads would be hydrologically restored before winter rains. However, with respect to the proposed reopening/use/re-decommissioning of 46N62, the scale and intensity of potential effects to aquatic species for Alternative 2 was described in the DEIS as moderate with negative site level effects expected at several stream crossings and potential effects to an active landslide. Under Modified Alternative 2 these moderate and negative impacts, that may adversely affect aquatic resources including Coho salmon, are avoided. Proposed salvage in this area would be accomplished by helicopter logging systems under Modified Alternative 2. Because of the deletion of road 46N62, and reduction in mileage of temporary road actions, Modified Alternative 2 would have fewer impacts upon aquatic

resources than Alternative 2. Effects would be discountable to habitat indicators and minor to aquatic species.

Table 7: Comparison of temporary road actions between Alternative 2 and Modified Alternative 2 for the Happy Camp Fire

Road Type	Alternative 2 miles	Modified Alternative 2 miles
Re-open Decommissioned Road	9.0	5.6
Temporary Road on Existing Roadbed	5.8	5.5
New Temporary Road	3.5	3.3
Total Miles	18.3	14.4

Modified Alternative 2 drops approximately 14 landings from the Happy Camp Fire Area, however, the 5 new landings in Riparian Reserves proposed under Alternative 2 remain proposed under Modified Alternative 2. Modified Alternative 2 further reduces the effects of landings that were described for Alternative 2 in the DEIS Aquatic Resources Report because of the 14 landings dropped. Due to PDFs that will be implemented to minimize site scale effects, and due to the reduced acreage of landings and soil disturbance in the Happy Camp Complex, effects of landings on habitat indicators would be discountable and effects on aquatic species would be minor.

Water drafting (locations are shown on maps in Appendix A of the Aquatic Resources Report) can result in indirect effects through short term and localized increases in turbidity when substrates are disturbed as the water hose is set into and pulled from the water. Watershed PDFs (34 and 35) will be implemented to minimize effects of water drafting on sediment and aquatic species. The indirect effects of water drafting under Modified Alternative 2 are the same as Alternative 2, which are described in the Aquatic Resources Report. Existing water drafting sites will be used to avoid new streamside disturbance associated with construction of drafting sites. Turbidity may result during water hose sets and removals; however, this effect would be localized, and limited to pre-designated sites. A measurable increase in turbidity is not expected beyond the immediate drafting area. This conclusion is based on field observations that indicate turbidity is quickly diluted to background water clarity conditions. Thus, water drafting would result in discountable effects to habitat indicators and minor effects to aquatic species.

Legacy Sediment Site Treatments: Elk Creek watershed legacy sediment site treatment, and potential effects, are described in the Aquatic Resources Report and are the same across all action alternatives including Modified Alternative 2.

Cumulative Effects

Appendix C of the EIS contains a list of the current and future foreseeable actions considered for cumulative effects analysis within the Happy Camp Complex. These activities were accounted for in the project CWE analysis and interpretation. The Forest uses standardized CWE models (Equivalent Roaded Area, Universal Soil Loss Equation, Mass Wasting) to assess effects of past, present, and reasonably foreseeable future activities. In addition to other current actions, models were updated to incorporate effects of the 2014 fires and road improvements identified in BAER assessments. The modelling provides the fundamental assessment of post-fire existing conditions, as well as an initial assessment of the project *No Action* alternative. Subsequently,

effects of project *action alternatives* were modeled based on proposed actions. These model results reflect that there will be minimal cumulative impact from adding the effects of Modified Alternative 2 to the past, present and reasonably foreseeable future actions. The site level analysis found that short term negative effects to aquatic habitat may occur in several stream reaches due to project temporary road actions; for Modified Alternative 2 stream reaches affected include an unnamed tributary to Grider Cr (46N41YA), Cliff Valley Cr (46N77), and China Cr (46N78). Stream reaches affected are ½ mile or more upstream of the range of resident fish in these creeks. Due to proper implementation of PDFs and BMPs, these sediment-related effects to habitat are expected to be localized and short term; overall effects would be discountable and would not be additive to effects of other actions nor appreciably reduce the current quality of fish habitat in tributaries within the Happy Camp Fire Area (see list of drainages given in the Aquatic Resources Report).

Project Area C: Whites Fire

Direct Effects and Indirect Effects

Direct Effects

Water drafting is the only action proposed within fish-bearing streams, and therefore the only action with potential for direct effects to aquatic resources. Legacy sediment site treatments will not occur in the Whites Fire area. Between the DEIS and FEIS, a PDF was changed to achieve more protection for aquatic species in thermal refugia areas. The PDF watershed-34 was refined during consultation with NMFS and Karuk Tribe and specifies that certain areas (lower reaches of cold tributaries) across the project area and several specific creeks are to be avoided during late summer and fall water drafting. None of the specific creeks identified in the PDF occur in the Whites Fire area; however the increased protection measures still reduce the chance that water drafting would have meaningful negative impacts to fish that are relying upon thermal refugia because lower reaches of cold water tributaries to North Fork Salmon River would be avoided. Making every attempt to avoid reducing cold water inputs to the Salmon River may be critical to aquatic species as extended drought conditions persist.

Indirect Effects

Salvage Harvest and Reforestation: Modified Alternative 2 proposes a net reduction of 20 acres of salvage harvest acres in the Whites Fire area. Therefore, the discountable effects of salvage and reforestation on sediment, water quality and riparian function as described in the Aquatic Resources Report for Alternative 2 would be reduced under Modified Alternative 2. Minor effects to aquatic species and discountable effects to habitat indicators are expected due to implementation of minimization measures (PDFs) and the reduction in acres treated.

Modified Alternative 2 includes the same amount of site-preparation, planting, and release relative to Alternative 2. Like Alternative 2, Modified Alternative 2 includes hand treatments in some Riparian Reserves within Happy Camp and Whites Fire areas. As shown in Table 6, these treatments are proposed on only one acre in Modified Alternative 2 (Near the top of Applesauce Gulch in Robinson Gulch 7th field watershed). As described above for the Happy Camp Fire area, and for the other alternatives where this treatment is proposed, these actions are likely to have no short term negative effects to aquatic habitat and long term benefits to watershed

condition. For Modified Alternative 2 these potential beneficial effects are foregone as the one acre of treatment would be inconsequential.

These actions are designed to increase the likelihood and speed by which burned areas are reforested which is considered a positive effect to aquatic resources. Potential effects of Modified Alternative 2 are the same as those described for Alternative 2 in the Aquatic Resources Report. Effects to habitat indicators would be discountable and effects to aquatic species would be minor.

Fuels Reduction: Modified Alternative 2 includes the same fuels reduction treatments as Alternative 2. Minor effects to aquatic species and discountable effects to habitat indicators are expected due to implementation of minimization measures (PDFs) and the low level of ground disturbance involved in fuels treatments. A more detailed discussion of the effects of fuels treatment on aquatic resources is given in the Aquatic Resources Report under Alternative 2. Long-term benefits to fuels reduction and future fire behavior are expected.

Hazard Tree Removal: The amount of acreage treated in the Whites Fire would not change under Modified Alternative 2 relative to Alternative 2. Table 8 displays miles of stream within the Whites Fire that are near (within 175 feet of) proposed hazard tree removal. About 19 miles, or close to 3% of total, streams in the Whites Fire (and in NF Salmon River 5th field watershed) may be affected by these actions.

Table 8: Miles of stream that may be affected by hazard tree removal in Whites Fire, Modified Alternative 2

5 th field watershed	Miles of perennial stream within 200 feet from roadside hazard tree removal roads	Miles of intermittent stream within 200 feet from roadside hazard tree removal roads	Total stream miles in watershed -intermittent and perennial Percentage of streams miles potentially affected by Project roadside hazard tree removal
North Fork Salmon River	13	6	654 2.9%

Potential effects of roadside hazard tree removal on aquatic resources includes localized loss of shade, ground disturbance associated with felling trees and yarding up to roads, and localized loss of woody debris. Equipment restrictions that prohibit ground based equipment from leaving roads when implementing roadside hazard tree removal within RR minimizes near stream ground disturbance.

Project design features ensure retention of large wood within near stream areas. The PDF watershed-12 was changed between the draft and final EIS to ensure retention of all hazard trees equal to or greater than 26 inches DBH that are within one site tree distance from all stream channels, including perennial non-fish bearing and intermittent channels. Retention of large wood near streams is expanded under Watershed-12 to areas above fish bearing reaches, maximizing protection of this habitat component that is important for aquatic habitat formation and function and for providing for terrestrial wildlife connectivity. Modification of this PDF also increases the probability that future debris flows, wherever they occur, will deliver intact large woody debris downstream to fish-bearing reaches. Overall the effects of hazard tree removal along roads on habitat indicators would be discountable and effects on aquatic species would be minor.

Roads, Landings, Stream Crossings and Water Drafting: As shown in Table 10, temporary road actions in the Whites Fire are the same as proposed in Alternative 2. There are no near stream temporary road actions in the Whites Fire in any alternative. Effects on habitat indicators would be as described in the DEIS Aquatic Resources Report for Alternative 2; effects to habitat indicators would be discountable and effects to aquatic species would be minor.

Four landings would be dropped under Modified Alternative 2 in the Whites Fire area, and the one new landing initially proposed in Riparian Reserve (L072) is relocated to outside of the Riparian Reserve. The CWE modelling indicates that landings and roads proposed under Alternative 2 will not add incremental increases to disturbance at the 5th field watershed scale, and only a slight incremental increase in some watersheds at the 7th field scale. Modified Alternative 2 further reduces the effects of landings that were described for Alternative 2 in the Aquatic Resources Report. Due to PDFs that will be implemented to minimize site scale effects, and due to reduced acreage of landings in the Whites Fire area, effects of landings on habitat indicators would be discountable and effects on aquatic species would be minor.

Table 9: Comparison of temporary road actions between Alternative 2 and Modified Alternative 2 for the Whites Fire

Road Type	Alternative 2 miles	Modified Alternative 2 miles
Re-open Decommissioned Road	0	0
Temporary Road on Existing Roadbed	0.7	0.7
New Temporary Road	0.1	0.1
Total Miles	0.8	0.8

Modified Alternative 2 includes water drafting (locations are shown on maps in Appendix A of the Aquatic Resources Report), which can result in indirect effects through short term and localized increases in turbidity when substrates are disturbed as the water hose is set into and pulled from the water. Watershed PDFs (37 and 38) will be implemented to minimize effects of water drafting on sediment and aquatic species. The effects of water drafting under Modified Alternative 2 are the same as Alternative 2, which are described in the DEIS Aquatic Resources Report. Existing water drafting sites will be used to avoid new streamside disturbance associated with construction of drafting sites. Turbidity that may result during water hose sets and removals will be localized, limited to pre-designated sites. A measurable increase in turbidity is not expected beyond the immediate drafting area. This conclusion is based on field observations that indicate turbidity is quickly diluted to background water clarity conditions. Modified Alternative 2 is the same as Alternative 2 (described in the DEIS Aquatic Resources Report) within the Whites Fire area with respect to the potential for indirect effects to aquatic resources from water drafting. Effects to habitat indicators would be discountable and effects to aquatic species would be minor.

Cumulative Effects

Appendix C of the EIS contains a list of the current and future foreseeable actions considered for cumulative effects analysis within the Whites Fire area. These activities were accounted for in the project CWE analysis and interpretation. The Forest uses standardized CWE models (Equivalent Roaded Area, Universal Soil Loss Equation, Mass Wasting) to assess effects of past, present, and reasonably foreseeable future activities. In addition to other current actions, models

were updated to incorporate effects of the 2014 fires and road improvements identified in BAER assessments. The modelling provides the fundamental assessment of post-fire existing conditions, as well as an initial assessment of the project *No Action* alternative. Subsequently, effects of project *action alternatives* were modeled based on proposed actions. These model results reflect that there will be minimal cumulative impact from adding the effects of Modified Alternative 2 to the past, present and reasonable foreseeable future actions. These effects to habitat are expected to be discountable and would not appreciably reduce the current quality of fish habitat in Whites Gulch or the Salmon River.

Compliance with Law, Policy and the Forest Plan

Refer to Aquatic Conservation Strategy analysis that was developed together in an interdisciplinary fashion with the project watershed specialists. The Forest Plan consistency checklist reflects how the project meets specific standards and guidelines from the Forest Plan. Interagency consultation under ESA section 7 is currently in progress with National Marine Fisheries Service, and will also include consultation under the Magnuson-Stevens Fishery Conservation and Management Act.

Modified Alternative 3

This is an analysis of the Modified Alternative 3 by fire-identified project areas (A, B, and C). This section adds to the analysis provided in the DEIS Aquatic Resources Report.

Environmental Consequences

Modified Alternative 3 is subject to the same Watershed PDFs provided in Appendix B of the Aquatic Resources Report, along with updates of several PDFs as described above. These measures were developed by watershed specialists to minimize impacts to soils and aquatic resources and ensure compliance with the Forest Plan's Aquatic Conservation Strategy. Relative to Alternative 2, Modified Alternative 3 has 870 acres of salvage removed. Relative to Alternative 2, Modified Alternative 3 has 730 acres of site prep and plant removed and 2,230 acres of fuels treatments added. Temporary road and landing actions were modified based on where salvage units were dropped; these changes are described below.

The assessment of indirect effects is organized by the following Project Elements:

- Salvage and Reforestation
- Fuels Reduction
- Hazard Tree Removal
- Temporary Roads, Landings, Stream Crossings and Water Drafting
- Legacy Sediment Site Treatments

Project Area A: Beaver Fire

Direct Effects and Indirect Effects

Direct Effects

Water drafting is the only action proposed within streams, and therefore the only action that has the potential for direct effects to aquatic resources. Special status aquatic species that may be affected by water drafting in the Beaver Fire area include: SONCC Coho salmon, Chinook

salmon, steelhead and resident rainbow trout, Pacific lamprey, Klamath River lamprey, Foothill yellow legged frog, and western pond turtle.

During water drafting, aquatic species present could experience direct effects associated with rapid changes or sustained reductions in flow, reduced dissolved oxygen, and/or increased water temperature. In order to reduce or eliminate these potential effects, the Forest Service follows Best Management Practice guidance described in Region 5 Forest Service Handbook 2509.22, Chapter 10-Water Quality Management Handbook (2011). Specifically Best Management Practice (BMP) 2.5 Water Source Development and Utilization provides direction specific to water drafting.

These BMP protection measures ensure that water drafting may only occur when bypass stream flows can be sustained of 1.5 cubic feet per second for fish bearing streams, or 10 gallons per minute for non-fish bearing streams; drafting rate is not to exceed 20% of surface flows in fish bearing streams and 50% of surface flows in non-fish bearing streams. When in Coho salmon Critical Habitat (CH), in addition Project water drafting will be implemented according to NOAA water drafting specifications (2001). These NOAA water drafting specifications require that pumping rates during drafting do not exceed 10% of the stream flow, and that drafting does not result in obvious draw-down of either upstream or downstream pools. Both BMPs and NOAA specifications require that water drafting operations use a fish screen appropriate to protect aquatic species present at the site; NOAA specifications require specific size of screen mesh (maximum 3/32 inch diameter for round or square openings).

Water drafting typically overlaps the Coho salmon lifecycle when young fish (0+ and 1+ years old) are utilizing summer rearing habitat, which is limiting in general in the mid Klamath River. Protection of cold water habitat is critical to promote the survival of juvenile Coho salmon in this area. The potential effects of water drafting were further minimized between DEIS and FEIS by updating PDF Watershed-34 with NOAA Fisheries and Karuk Tribe specifically to avoid potential impacts drafting could have on salmonids that are dependent upon thermal refugia areas in summer and early fall. This PDF specifies that certain areas (lower reaches of cold tributaries) across the project area and several specific creeks are to be avoided during summer and fall water drafting (generally June through September). None of the specific creeks identified in the PDF occur in the Beaver Fire area; however, the increased protection of flows in lower reaches of cold tributaries reduces the chance that water drafting would have measurable negative impacts to fish that are relying upon thermal refugia. Implementation of this PDF requires that lower reaches of cold water tributaries to, and including, Beaver Creek would be avoided during water drafting; water needed for dust abatement in this area will primarily come from the Klamath River at drafting site(s) outside of any cold-water tributary inputs. Watershed-34, updated between DEIS and FEIS, more fully minimizes effects to thermal refugia and helps avoid reductions of cold water inputs to the Klamath River. Protection of cold aquatic habitat is incredibly important to aquatic species in this area including SONCC Coho salmon, especially as extended drought conditions persist.

Relative to Pacific and Klamath River lamprey, Chinook salmon, and steelhead trout; because these species occur primarily within Coho salmon CH they will be protected from impacts of water drafting as described for Coho salmon. Especially for steelhead trout, the overlap in typical timing of water drafting operations and fish life cycle results in more potential exposure of

vulnerable life history forms (eggs and alevins which are still dependent upon gravel nests/redds) to water drafting impacts, especially when dust abatement is needed early during dry spring and early summer months. As described in PDF Watershed-35, minor instream modifications are only allowed outside of CH which is mostly equivalent to steelhead trout spawning distribution. This reduces the chance that water drafting operations would directly affect steelhead redds or young fish. Required screening in all fish bearing streams eliminates the chance of direct impacts to all fish species.

In many drainages, the distribution of resident rainbow trout and other aquatic species extend beyond/above Coho salmon CH. According to current water drafting site information, no water drafting sites are proposed in fish-bearing creeks with resident trout only in Beaver Fire area. However, if one was to be identified and designated for use by the Forest Service, BMPs described above would protect flows in these creeks by allowing drafting only up to 20% of surface flows and providing for at least 1.5 cubic feet per second bypass flows in the creek. Required screening in all fish bearing streams eliminates the chance of direct impacts to all fish species.

Foothill yellow legged frog and Western pond turtle, in the Beaver Fire area, are likely to occur along Beaver Creek and the Klamath River. Because these areas are also Coho salmon CH, there will be no modification of drafting sites that could impact these species. Screening requirements, and maintenance of surface flows as described above for fish species, will also protect foothill yellow legged frogs and Western pond turtles. It is possible that these species also occur in upper watershed areas in small spring ponds or wetlands. These water sources are subject to the same BMPs that protect flows and require screening (and require coordination with fish biologists on drafting locations); these areas often do not provide the conditions suitable to non-emergency water drafting per BMPs. Also, the timing of typical water drafting operations is when frogs and turtles are mobile and able to avoid areas of disturbance. If water drafting per BMPs occurs in upper watershed ponds or springs, there would be some impact to these species if they occur there. The impact would be a result of losing up to 50% of surface flow, or reducing flowing water to 10 gallons per minute. In this case, individuals may be temporarily harassed or displaced, however essential functions such as breeding, feeding, and sheltering would not be meaningfully affected.

Modified Alternative 3 does not include any temporary road actions, landings, or legacy sediment site treatments; there would be no potential effects of these actions in Beaver Fire area.

Indirect Effects

Salvage Harvest and Reforestation: Modified Alternative 3 removes all salvage harvest from the Beaver Fire area. Thus, Modified Alternative 3 will have no salvage harvest-related environmental effects (eliminates 490 acres of salvage proposed under Alternative 2). Modified Alternative 3 reduces site prep and planting in the Beaver Fire area by 120 acres relative to Alternative 2. Most of the reduced salvage and site prep and plant acreage in the Beaver Fire area is within Doggett Creek drainage so these actions would have less potential negative short term impacts to aquatic habitat in Doggett Creek, relative to Alternative 2. However, the beneficial long term effects of reforestation are foregone on these 610 acres that will not be included in

Modified Alternative 3. Site prep and planting still included (1,660 acres) with this alternative would cause a low level of short term ground disturbance and will likely speed the recovery of mature forests on treated areas.

Unlike the other alternatives, Modified Alternative 3 includes hand treatments in some Riparian Reserves within the Beaver Fire area. These activities are proposed in Riparian Reserves that are within site prep and plantation units, and burned at moderate to high severity. Proposed treatments include cutting dead brush and trees less than 10 inches in diameter by hand; equipment will not leave roads in Riparian Reserve. The material would be lop and scattered to achieve ground cover and may be burned if fuel loading exceeds 7 tons per acre. Table 11 and Figure 2 display where these treatments are proposed in Beaver Fire area for Modified Alternative 3 by 7th field watershed.

Table 10: Modified Alternative 3 proposed hand treatment in Riparian Reserves, Beaver Fire area

7th field watershed	Acres of hand treatments within Riparian Reserve
Buckhorn Creek	36
Buckhorn Gulch-Beaver Creek	94
Collins Creek - Klamath River	7
Doggett Creek	13
Dona Creek – Klamath River	11
Dutch Creek	12
Horse Creek	11
Kohl Creek	37
Quigleys Cove – Klamath River	31
TOTAL	252

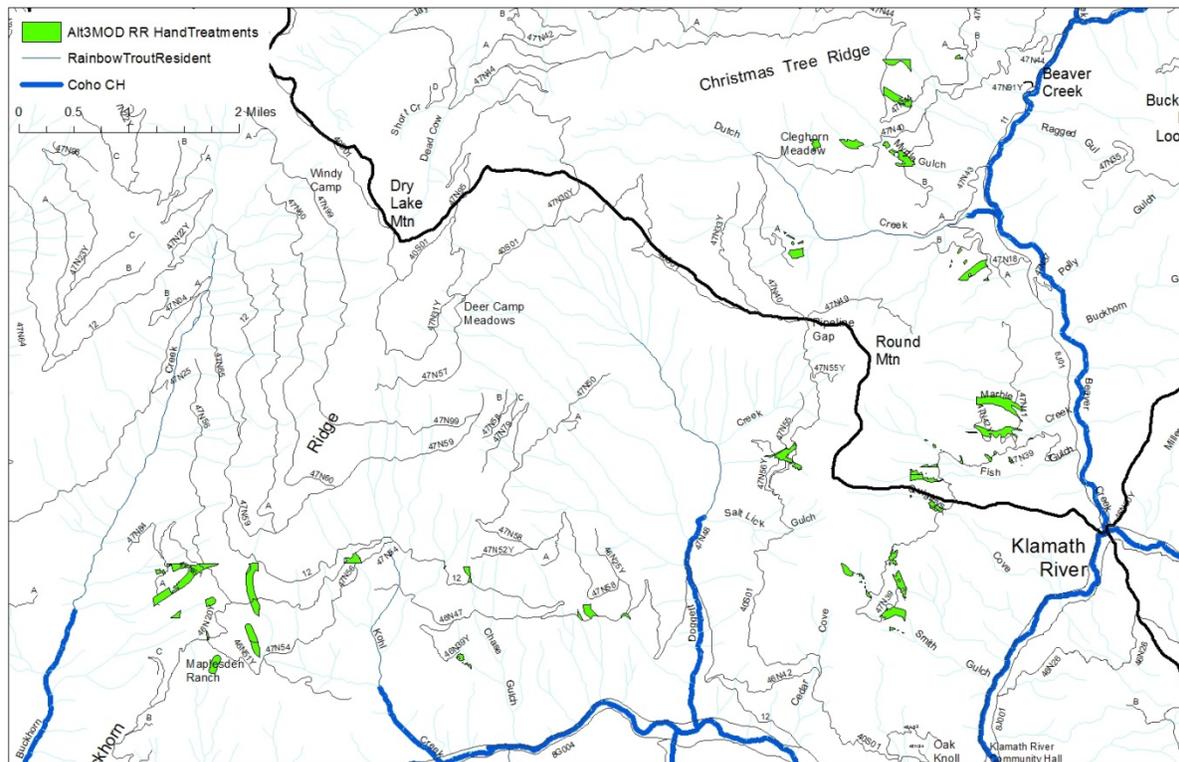


Figure 2: Riparian Reserve hand treatments proposed for Beaver Fire are, Modified Alternative 3

As described for the other fire areas where Riparian Reserve hand treatments are proposed, these actions are likely to have an overall benefit to watershed condition in the drainages where they occur. Particularly when more of these treatments occur within a given drainage, it increases the likelihood that these broader scale beneficial effects would occur. Between DEIS and FEIS, field review in the Beaver Fire area found that conditions in the Riparian Reserves would be improved by including hand treatments in heavily burned areas. As represented in Figure 3, these areas currently have very low soil cover and in many cases are far from seed-producing trees. Also, watershed specialists worked with Project implementers to ensure that the actions were feasible, and likely to occur, even though ground-based equipment would not be allowed within the Riparian Reserve.



Figure 3: Heavily burned riparian area that would receive hand treatment in Modified Alternative 3

Forests and soils within the Beaver Fire area were heavily impacted by 2014 fires, as well as ongoing and subsequent timber harvest on private lands which comprise a majority of the watershed. Because Federal lands comprise a minority of this landscape, and all salvage harvest in Beaver Fire has been dropped with this alternative, the influence of the Project on aquatic habitat and watershed condition on this landscape are minor. Overall, proposed hand treatments that may involve planting if necessary to restore conifers as a component of forests, will be beneficial to aquatic habitat and watershed condition including fire resiliency and the sustainability of forests overtime.

In summary, the effects of salvage and reforestation on aquatic habitat indicators would be neutral or discountable and effects on aquatic species would be neutral or minor. Reforestation actions are designed to increase the likelihood and speed by which burned areas are reforested which is considered a long term positive effect to aquatic resources.

Fuels Reduction: Modified Alternative 3 adds approximately 1,210 acres of fuels treatments within the Beaver Fire area relative to Alternative 2. The potential effects of Modified Alternative 3 on aquatic resources are very similar to effects of Alternative 2. The discountable impacts of fuels reduction on sediment, water quality and riparian function described for Alternative 2 would be slightly increased due to the addition of 1,210 acres of treatment in the Beaver Creek watershed, a small amount of this overlaps Riparian Reserves. The CWE analysis and site reviews indicate that effects to aquatic habitat would be either neutral or short term and discountable under Modified Alternative 3. Effects are minimal due to the relatively small amount of acreage treated, implementation of minimization measures (PDFs), and the low level of ground

disturbance involved with fuels treatments. Long-term benefits from fuels reduction associated with future fire behavior are expected.

Hazard Tree Removal: The amount of roadside hazard tree removal is reduced with Modified Alternative 3 to 48 miles, or 2,190 acres; relative to 170 miles, or 5,800 acres, with Alternative 2. Table 12 displays miles of stream within watersheds of the Beaver Fire that are within 200 feet of proposed hazard tree removal roads. About 9 miles, or just over 1% of the total stream mileage in the Beaver Fire area, may be affected by these actions.

Table 11: Miles of stream that may be affected by hazard tree removal in Beaver Fire, Modified Alternative 3

5th field watershed	Miles of perennial stream within 200 feet from roadside hazard tree removal roads	Miles of intermittent stream within 200 feet from roadside hazard tree removal roads	Total stream miles in watershed -intermittent and perennial Percentage of streams miles potentially affected by Project roadside hazard tree removal
Humbug Creek-Klamath River	0	0	245 0%
Beaver Creek	3	4	277 2.5%
Horse Creek-Klamath River	0	2	322 0.6%
TOTAL	3	6	844 1.1%

In the Beaver Fire area, roadside hazard tree removal is proposed in relatively close proximity to Coho salmon CH in mainstem reaches of Beaver Creek and the Klamath River. Fisheries biologists conducted field review of roadside hazard tree marking in these areas and confirmed that no hazard trees are marked in Riparian Reserve associated with Coho salmon CH. Roadside hazard tree removal would occur through Riparian Reserves associated with streams outside of CH in tributaries of Beaver, Doggett, and Kohl Creeks. Potential effects of roadside hazard tree removal on aquatic resources includes localized loss of shade, ground disturbance associated with felling trees and yarding up to roads, and localized loss of woody debris.

Equipment restrictions that prohibit ground based equipment from leaving roads when implementing roadside hazard tree removal within RR minimizes potential for any near stream ground disturbance. Project design features ensure retention of large wood within near stream areas. The PDF watershed-12 was changed between the DEIS and FEIS to further increase retention of large wood near streams; Watershed-12 now ensures retention of all hazard trees equal to or greater than 26 inches DBH that are within one site tree distance from all stream channels, including perennial non-fish bearing and intermittent channels. Retention of large wood near streams is expanded under Watershed-12 to areas above fish bearing reaches; retention of all large wood in these near stream areas maximizes protection of this habitat component that is important for aquatic habitat formation and function and for providing for terrestrial wildlife connectivity. This modified PDF also increases the probability that future debris flows will deliver intact large woody debris downstream to fish-bearing reaches, wherever future debris flows may occur. For these reasons, effects of roadside hazard tree removal on aquatic habitat indicators would be discountable and effects on aquatic species would be minor.

Roads, Landings, Stream Crossings and Water Drafting: As shown in Table 13, Modified Alternative 3 drops all temporary road and landing actions in the Beaver Fire area; there would be no effect of these actions on aquatic habitat or species. As described in the DEIS for Alternative 2, there would have been short term negative effects to aquatic resources in Doggett Creek and a face drainage to Beaver Creek from use of these temporary roads, but long term benefits to water quality through addressing sediment sources on these road beds. Because these road actions are dropped with Modified Alternative 3, there will be less short term negative effects related to roads and sediment production, however, the opportunity to reduce sedimentation from these old road beds long-term would be foregone.

Modified Alternative 3 includes water drafting which can result in indirect effects through short term and localized increases in turbidity when substrates are disturbed as the water hose is set into and pulled from the water. A measurable increase in turbidity is not expected beyond the immediate drafting area. This conclusion is based on field observations that indicate turbidity is quickly diluted to background water clarity conditions during typical water drafting operations. Additionally, exposed surfaces of water drafting sites and road approaches to drafting sites could erode and discharge sediment back into the waterway. Water trucks can leak oil, and sometimes fuel, onto drafting pads, becoming a source of petroleum product contamination to surface waters. For these reasons, Forest Service BMPs are designed to avoid or eliminate these potential impacts; it is the responsibility of Forest Service Representatives to monitor these activities regularly and ensure these BMPs are implemented appropriately. Fisheries biologists will also be monitoring water drafting activities, particularly during June through September as described in Fisheries Biological Assessment and associated Letter of Concurrence from NOAA Fisheries.

The effects of water drafting under Modified Alternative 3 would be less, relative to Alternative 2, because all salvage harvest has been dropped thus reducing the need for dust abatement related to log haul. Due to the protection measures described above, water drafting effects to aquatic habitat indicators would be discountable and effects to aquatic species would be minor.

Table 12: Comparison of temporary road actions between Alternative 2 and Modified Alternative 3 for the Beaver Fire area

Road Type	Alt. 2 Miles	Modified Alt. 3 Miles
Re-open, Decommissioned Road	0	0
Temporary Road on Existing Roadbed	2.8	0
Total Miles	2.8	0

Legacy Sediment Site Treatments: Legacy sediment site treatments and associated effects will not occur in the Beaver Fire area.

Cumulative Effects

Appendix C of the EIS contains a list of the current and future foreseeable actions considered for cumulative effects analysis within the Beaver Fire area. These activities were accounted for in the project CWE analysis and interpretation. The Forest uses standardized CWE models (Equivalent Roaded Area, Universal Soil Loss Equation, Mass Wasting) to assess effects of past, present, and reasonably foreseeable activities. In addition to other current actions, models were updated to incorporate effects of the 2014 fires and road improvements identified in BAER

assessments. The modelling provides the fundamental assessment of post-fire existing conditions, as well as an initial assessment of the project *No Action* alternative. Subsequently, effects of project action alternatives were modeled based on proposed actions. These model results reflect that there will be minimal cumulative impact from adding the effects of Modified Alternative 3 to the past, present and reasonably foreseeable future actions. For Modified Alternative 3 the site level analysis found that no negative effects to aquatic habitat are likely to occur as a result of the project. Ongoing and future actions in the Beaver Fire area are expected including private timber harvest (green and salvage timber harvest plans) but project effects would be so minor as not to add to these impacts in any negative way; and would allow for active reforestation on some public land in this landscape that is managed mostly as private industrial timberland.

Project Area B: Happy Camp Fire

Direct Effects and Indirect Effects

Direct Effects

Water drafting and stream crossing work associated with temporary road actions and legacy site treatments are the only actions proposed within streams, and therefore the actions with the potential for directly affecting aquatic resources. Special status aquatic species that may be affected by these actions in the Happy Camp Fire area include: SONCC Coho salmon, Chinook salmon, steelhead and resident rainbow trout, Pacific lamprey, Klamath River lamprey, Foothill yellow legged frog, western pond turtle, Cascade frog, and southern torrent salamander.

Water Drafting

During water drafting, aquatic species present could experience direct effects associated with rapid changes or sustained reductions in flow, reduced dissolved oxygen, and/or increased water temperature. In order to reduce or eliminate these potential effects, the Forest Service follows Best Management Practice guidance described in Region 5 Forest Service Handbook 2509.22, Chapter 10-Water Quality Management Handbook (2011). Specifically Best Management Practice (BMP) 2.5 Water Source Development and Utilization provides direction specific to water drafting.

These BMP protection measures ensure that water drafting may only occur when bypass stream flows can be sustained of 1.5 cubic feet per second for fish bearing streams, or 10 gallons per minute for non-fish bearing streams; drafting rate is not to exceed 20% of surface flows in fish bearing streams and 50% of surface flows in non-fish bearing streams. When in Coho salmon Critical Habitat (CH), in addition Project water drafting will be implemented according to NOAA water drafting specifications (2001). These NOAA water drafting specifications require that pumping rates during drafting do not exceed 10% of the stream flow, and that drafting does not result in obvious draw-down of either upstream or downstream pools. Both BMPs and NOAA specifications require that water drafting operations use a fish screen appropriate to protect aquatic species present at the site; NOAA specifications require specific size of screen mesh (maximum 3/32 inch diameter for round or square openings).

Water drafting typically overlaps the Coho salmon lifecycle when young fish (0+ and 1+ years old) are utilizing summer rearing habitat, which is limiting in general in the mid Klamath River.

Protection of cold water habitat is critical to promote the survival of juvenile Coho salmon in this area. The potential effects of water drafting were further minimized between DEIS and FEIS by updating PDF Watershed-34 with NOAA Fisheries and Karuk Tribe specifically to avoid potential impacts drafting could have on salmonids that are dependent upon thermal refugia areas in summer and early fall. This PDF specifies that certain areas (lower reaches of cold tributaries) across the project area and several specific creeks in the Happy Camp Fire area that have low base flows and are known to regularly support Coho salmon rearing are to be avoided during summer and fall water drafting (generally June through September). Creeks that will be avoided include Tom Martin Cr, O'Neil Cr, (Little) Horse Cr, and China Cr; aquatic species and habitat in these creeks would not be affected by Project water drafting. The increased protection of salmonid rearing habitat in these creeks, as well as flows in lower reaches of all cold tributaries reduces the chance that water drafting would have measurable negative impacts to fish that are relying upon thermal refugia. Implementation of this PDF requires that lower reaches of cold water tributaries to Scott and Klamath Rivers would be avoided during water drafting; water needed for dust abatement in this area will primarily come from the mainstem Scott or Klamath River at drafting site(s) outside of any cold-water tributary inputs. Watershed-34, updated between DEIS and FEIS, more fully minimizes effects to thermal refugia and helps avoid reductions of cold water inputs to the Scott and Klamath River. Protection of cold aquatic habitat is incredibly important to aquatic species in this area including SONCC Coho salmon, especially as extended drought conditions persist.

Relative to Pacific and Klamath River lamprey, Chinook salmon, and steelhead trout; because these species occur primarily within Coho salmon CH they will be protected from impacts of water drafting as described for Coho salmon. Especially for steelhead trout, the overlap in typical timing of water drafting operations and fish life cycle results in more potential exposure of vulnerable life history forms (eggs and alevins which are still dependent upon gravel nests/redds) to water drafting impacts, especially when dust abatement is needed early during dry spring and early summer months. As described in PDF Watershed-35, minor instream modifications are only allowed outside of CH which is mostly equivalent to steelhead trout spawning distribution. This reduces the chance that water drafting operations would directly affect steelhead redds or young fish. Required screening in all fish bearing streams eliminates the chance of direct impacts to all fish species.

In many drainages, the distribution of resident rainbow trout and other aquatic species extend beyond/above Coho salmon CH. Especially during the current extended drought, in late summer and fall, project area streams above mainstem rivers and several tributaries (Tompkins, Grider, and Elk Creeks), are likely to be dry or have flows too low to allow for drafting in accordance with BMPs described above. Project water drafting will most likely be occurring at mainstem rivers (Scott and Klamath River). However, if drafting sites above CH in the mainstem rivers and tributaries are identified and designated for use by the Forest Service, BMPs allow for drafting only up to 20% of surface flows and providing for at least 1.5 cubic feet per second bypass flows in fish bearing creeks. Required screening in all fish bearing streams eliminates the chance of direct impacts to all fish species. These protection measures are likely to ensure that Project water drafting will not negatively affect the distribution or viability of trout populations in the project area.

Foothill yellow legged frog and Western pond turtle, in the Happy Camp Fire area, are likely to occur along Scott and Klamath Rivers and potentially Tompkins, Grider, Walker, and Elk Creeks. Because these areas are also Coho salmon CH, there will be no modification of drafting sites that could impact these species. Screening requirements, and maintenance of surface flows as described above for fish species, will also protect other aquatic species that may be present. It is possible that these species also occur in upper watershed areas in small spring ponds or wetlands. However, these areas often do not provide the conditions suitable to non-emergency water drafting per BMPs, and use of them are subject to the same BMPs that protect flows and require screening (and require coordination with fish biologists on drafting locations). Also, the timing of typical water drafting operations is when frogs and turtles are mobile and able to avoid areas of disturbance. If water drafting per BMPs occurs in upper watershed ponds or springs, there would be some impact to these species if they occur there. The impact would be a result of losing up to 50% of surface flow, or reducing flowing water to 10 gallons per minute. In this case, individuals may be temporarily harassed or displaced, however the ability to carry out essential functions such as breeding, feeding, and sheltering would not be meaningfully affected.

Special status aquatic species that are less likely to occur where water drafting occurs, and are therefore less likely to be affected include Cascade frog and southern torrent salamander. Cascade frogs are likely to occur in the project area within lakes and streams above 2500 feet in elevation. Much of the suitable habitat for this species occurs in Wilderness lakes, where they are known to occur (i.e. Turk Lake and Bear Lake). As described above, Project water drafting will most likely be occurring in mainstem rivers and tributaries including: Klamath River, Scott River, Tompkins Cr, Grider Cr, and Elk Cr. With the exception of Tompkins Cr, water drafting sites on these streams are below 2500 feet and thus water drafting at most sites would not affect Cascade frogs. Because upper watershed spring ponds or wetlands, where Cascade frogs may occur, do not often provide the flows necessary for non-emergency water drafting per BMPs, it is not likely that this species would be exposed to the impacts of Project water drafting. If water drafting does occur in these upper watershed areas, it is subject to the same BMPs that protect flows and require screening (and require coordination with fish biologists on drafting locations). Southern torrent salamanders are typically found in relatively undisturbed stream environments nearer to the coast than the project area, however this species may occur only in the western-most parts of the project area in Elk Creek watershed. While it is possible that this species may occur where water drafting occurs in Elk Creek watershed, it is not likely because water drafting sites are typically along roads in stream reaches that are regularly disturbed by human activities and are not well-shaded. Therefore water drafting is not likely to occur within suitable habitat for southern torrent salamanders. If water drafting per BMPs occurs in upper watershed ponds or springs, there would be potential impacts to Cascade frogs and southern torrent salamanders that may occur there. The impact would be a result of disturbance and loss of up to 50% of surface flow, potentially reducing flowing water to 10 gallons per minute. In this case, individuals may be temporarily harassed or displaced, however the ability to carry out essential functions such as breeding, feeding, and sheltering would not be meaningfully affected.

Stream Crossing Work

For the Happy Camp Fire, Modified Alternative 3 includes several near stream temporary road actions and legacy sediment site treatments (culvert upgrades) that involve work within stream channels and therefore may directly affect aquatic species if they are present. Potential short and long term effects to aquatic habitat from these actions are discussed below as indirect effects.

Table 14 displays near stream temporary road actions. Only the site on road 46N41YA may involve work within an active stream channel, and therefore may directly affect aquatic species if present.

Table 13: Modified Alternative 3 near stream temporary road actions

Receiving Stream Name	Road Type	Confirmed Stream Type Crossing	Comments
Grider Creek	Decomm. Road 46N41YA	2 perennial	One crossing is legacy site; the Project will reduce sediment in the long term by properly hydrologically stabilizing this crossing.
Cliff Valley Creek	Decomm. Road 46N77	1 Intermittent	Stable, moderate risk
China Creek	Decomm. Road 46N78	1 Intermittent	Stable, low risk
Kuntz Creek	Existing and New Temporary Road	No crossing involved in road (except crossing of private diversion ditch)	Road has drainage problems; use of road is low risk; the Project will reduce sediment long term

There are two perennial stream crossings associated with use of previously decommissioned road 46N41YA; the stream involved is a non-fish-bearing perennial face drainage to Grider Creek. The first crossing, shown in Figure 4, is a legacy site that if used for the Project would be properly hydrologically stabilized to current specifications. Currently, the stream uphill of this crossing drains into several ponds then flows under the road where there does not appear to be any culvert or other crossing structure.



Figure 4: Upper perennial stream crossing on 46N41YA

The second crossing, shown in Figure 5, was properly hydrologically stabilized when this road was decommissioned approximately 10 years ago. The Project would reopen and use this road to

facilitate skyline salvage harvest in unit 62-2, and then restore this crossing back to its current condition.



Figure 5: Lower perennial stream crossing on 46N41YA

The upper crossing can most likely be utilized without disturbance to aquatic habitat, however hydrologically stabilizing this legacy site crossing post-Project would result in some temporary disruption of the aquatic environment. At the lower crossing, a temporary structure (culvert or pipe) would most likely be used to facilitate use of the road; per BMPs and PDFs (Watershed-20), the crossing structure would be removed and the site hydrologically stabilized prior to wet weather. Forest Service BMPs, particularly BMP 2.8 which applies specifically to road stream crossings, will be integrated into the design and erosion control plan for stream crossing work. Stream crossing work will be conducted, to the extent possible, during the least critical period for aquatic resources when streams are dry or at base flow conditions and aquatic species are mobile (PDF Watershed-18). If surface flow is present, short sections of stream would be de-watered to allow for in channel work and any turbid water would be captured and retained so that only clean flows are returned to the live stream.

The only special status aquatic species that may be present at this site, and therefore may be directly affected by stream crossing work on temporary roads, is Cascade frog. Timing of the instream work will most likely be late summer or fall, and not during early spring when Cascade frog breeding occurs. During opening and use of the road, aquatic organism passage will be reduced at the lower crossing where a culvert or other temporary structure will be placed. Because BMPs will be implemented, use of the road is not likely to disrupt or affect aquatic habitat or species. Post-project when the crossings are stabilized there would be some in channel work at both upper and lower crossings; BMPs would be implemented to minimize potential effects. If present at this site, Cascade frogs may be affected by these stream crossing actions. Most likely any individuals present would be temporarily harassed or displaced, however the ability to carry out essential functions such as breeding, feeding, and sheltering would not be

meaningfully affected. Long term benefits associated with fixing the legacy site at the upper crossing are discussed below under indirect effects.

Legacy Site Work

Like the other alternatives, Modified Alternative 3 includes legacy site work in the Elk Creek watershed. In channel actions would be involved during culvert upgrades at 48 sites, including three culvert upgrades to open bottom arch structures (see project maps for locations). Most culvert upgrade locations are well above the distribution of Coho salmon CH and Chinook salmon; however six culvert upgrade sites are near CH (within 300 feet) on tributaries of Elk Creek and East Fork Creek. Special status aquatic species that may be present at these sites and therefore potentially directly affected include: rainbow trout, Pacific and Klamath River lamprey, foothill yellow legged frog, western pond turtle, Cascade frog, and southern torrent salamander.

Timing of the instream work will be targeted for late summer or fall when most of the sites will be dry; relevant PDFs (Watershed-17 through 21) and BMPs will be integrated into design and erosion control plans to minimize effects to aquatic resources. If surface flows are present, the work area would be dewatered to allow for in channel work and any turbid water would be captured and retained so that only clean flows are returned to live streams. In channel work will be coordinated with Forest Service fisheries biologists so that, if dewatering is necessary, any aquatic species present can be herded downstream and away from the site. Potential direct effects to aquatic species present include temporary harassment and displacement during the in channel work period (late summer or fall). Due to the timing of activities and implementation of PDFs, these temporary negative effects to individuals are not likely to have meaningful direct impacts on reproduction or distribution of aquatic species.

Indirect Effects

Salvage Harvest and Reforestation. Modified Alternative 3 removes about 510 net acres of salvage in the Happy Camp Complex relative to Alternative 2. The discountable effects of salvage and reforestation on sediment, water quality and riparian function described for Alternative 2 would be reduced under Modified Alternative 3 due to the reduction in acres treated. Minor effects to aquatic species and discountable effects to habitat indicators are expected due to exclusion of stream course Riparian Reserves and inner gorges and implementation of minimization measures (PDFs). While many of the watersheds were heavily disturbed by 2014 fires, the CWE analysis and site reviews indicate that the effects of proposed salvage on habitat indicators would be discountable and effects to aquatic species would be minor.

Modified Alternative 3 removes about 520 net acres of site-preparation, planting, and release relative to Alternative 2. Like Alternative 2, Modified Alternative 3 includes hand treatments in some Riparian Reserves; in Modified Alternative 3 these treatments are proposed within Riparian Reserves within site prep and plant units in all fire areas. These treatments within Riparian Reserve would occur only where 2014 wildfires burned at moderate to high severity. Dead trees up to 10 inches DBH and brush would be cut and scattered to achieve ground cover. If fuels loading would exceed seven tons per acre, pile burning or underburning would occur to maintain/restore desired fuel loading. Live vegetation, including hardwoods, would not be cut.

Table 15 displays where these treatments are proposed in Modified Alternative 3 by 7th field watershed; these areas include Riparian Reserves that overlap site prep and plant units with lower burn severity areas removed.

Table 14: Modified Alternative 3 proposed hand treatments in Riparian Reserve, Happy Camp fire area

7th field watershed	Acres of hand treatments within Riparian Reserve
China Creek	13
Cliff Valley Creek	13
Cougar Creek-Elk Creek	22
Deep Creek-Scott River	9
Doolittle Creek	18
Fryingpan Creek-Klamath River	19
Hoop & Devil-Elk Creek	8
Lower East Fork Elk Creek	30
Lower Grider Creek	42
McCarthy Creek-Scott River	15
Middle Creek	31
North Fork Kelsey Creek	1
O'Neil Creek	5
Rancheria Creek	19
South Fork Kelsey Creek	2
Schutts Gulch-Klamath River	2
Tom Martin Creek-Klamath River	4
Tompkins Creek	33
Upper East Fork Elk Creek	68
Upper Elk Creek	3
Upper Grider Creek	10
Walker Creek	17
TOTAL	384

These actions are designed to increase the likelihood and speed by which burned areas are reforested which is considered a positive effect to aquatic resources. Potential effects of Modified Alternative 3 are the same as those described for Alternative 2 in the Aquatic Resources Report. Effects to habitat indicators would be discountable and effects to aquatic species would be minor. Long term beneficial effects are likely as these actions will reduce fuels and use fire to maintain and restore ecosystem function in Riparian Reserves.

Fuels Reduction: Modified Alternative 3 includes approximately 950 additional acres of fuels reduction actions in the Happy Camp Fire area relative to Alternative 2. Most of the additional acres are part of strategic ridge top fuel breaks, although some acreage is within Riparian Reserve. The discountable effects of fuels treatments on sediment, water quality and riparian function described for Alternative 2 would be the same for Modified Alternative 3. Minor effects to aquatic species and discountable effects to habitat indicators are expected due to implementation of minimization measures (PDFs), and the low level of ground disturbance

involved in fuels treatments. Long-term benefits from fuels reduction associated with future fire behavior are expected.

Hazard Tree Removal: The amount of roadside hazard tree removal is reduced with Modified Alternative 3 to 215 miles, or maximum of 9,730 acres within Happy Camp Fire area; relative to 400 miles, or maximum of 14,000 acres, with Alternative 2. Table 16 displays miles of stream within watersheds of the Happy Camp Fire that are within 200 feet of proposed hazard tree removal roads. About 30 miles, or just over 2% of the total stream mileage in the Happy Camp Fire area, may be affected by these actions.

Table 15: Miles of stream that may be affected by roadside hazard tree removal in Happy Camp Fire, Modified Alternative 3

5 th field watershed	Miles of perennial stream within 200 feet from roadside hazard tree removal roads	Miles of intermittent stream within 200 feet from roadside hazard tree removal roads	Total stream miles in watershed -intermittent and perennial Percentage of streams miles potentially affected by Project roadside hazard tree removal
Seiad Creek-Klamath River	6	0	205 2.9%
Lower Scott River	4	5	476 1.9%
Thompson Creek-Klamath River	2	4	297 2.0%
Elk Creek	5	4	300 3.0%
TOTAL	17	13	1277 2.3%

In the Happy Camp Fire area, roadside hazard removal is proposed in relatively close proximity to Coho salmon CH in Tompkins Creek, Walker Creek, Grider Creek, (Little) Horse Creek, Elk Creek, East Fork Elk Creek, and Cougar Creek. Fisheries biologists conducted field reviews of roadside hazard tree marking in these areas and confirmed that hazard trees are marked according to description in this EIS including PDFs. Potential effects of roadside hazard tree removal on aquatic resources includes localized loss of shade, ground disturbance associated with felling trees and yarding up to roads, and localized loss of large wood. Equipment restrictions that prohibit ground based equipment from leaving roads when implementing roadside hazard tree removal within RR minimizes near stream ground disturbance.

Project design features ensure retention of large wood within near stream areas. PDF Watershed-12 was changed between the DEIS and FEIS to further increase retention of large wood near streams: Watershed-12 ensures retention of all hazard trees equal to or greater than 26 inches DBH that are within one site tree distance from all stream channels, including perennial non-fish bearing and intermittent channels. Retention of large wood near streams is expanded under Watershed-12 to areas above fish bearing reaches, maximizing protection of this habitat component that is important for aquatic habitat formation and function and for providing for terrestrial wildlife connectivity. This modified PDF also increases the probability that future debris flows, wherever they occur, will deliver intact large woody debris downstream to fish-bearing reaches. Due to the reduced extent of proposed roadside hazard tree removal, Modified Alternative 3 would have less effect on aquatic resources than Alternative 2. Areas dropped for

roadside hazard removal with Modified Alternative 3 include a few reaches in close proximity to Coho salmon CH. These include reaches of the Scott River and Klamath River as well as Kelsey, China, Elk, and Doolittle Creeks. Effects of hazard tree removal along roads on habitat indicators would be discountable and effects on aquatic species would be minor; with Modified Alternative 3 these effects would not occur along roads in close proximity to the Klamath or Scott Rivers, as well as sections of China, Elk, and Doolittle Creeks.

Roads, Landings, Stream Crossings and Water Drafting: As displayed in Table 17 below, Modified Alternative 3 drops approximately 0.2 mile of new temporary road construction as well as drops about 4.2 miles of reopening of decommissioned roads and 1.9 miles of temporary road on existing road bed in the Happy Camp Fire area. Temporary road actions dropped include mostly short ridge-top segments; however, reopening the Caroline Creek road (46N62) is also dropped from Modified Alternative 3 thereby avoiding the potential adverse effects to aquatic habitat that were associated with Alternative 2. Other temporary road actions that were dropped for Modified Alternative 3 that are relevant to the analysis of effects to aquatic resources include the distal portion of proposed reopening of decommissioned road 46N78, and proposed temporary road on existing roadbed in O’Neil Cr drainage both near the bottom of the drainage (temp roads 02, 03, and 12) and top of the drainage (temp road 06).

For proposed reopening of 46N78, Modified Alternative 3 includes reopening only the first 0.55 miles of this roadbed which includes only one ephemeral or intermittent stream crossing. Alternative 2 proposed to reopen the entire 1.1 miles of this roadbed which included 5 intermittent stream crossings. Use of this decommissioned road constitutes a setback in the recovery of hillslope processes that has been occurring since the road was decommissioned about 15 years ago. However, due to the distance of this road to aquatic habitat as well as the generally stable geology of the China Cr drainage, these actions pose only a low risk of negatively affecting aquatic habitat for special status species. Post Project hydrologic stabilization actions will return the roadbed to its decommissioned state. Because near stream temporary road actions in the O’Neil Cr drainage have been dropped, temporary road actions are not likely to have any effect to aquatic habitat in O’Neil Cr. Because temp roadbeds 02, 03, and 12 in O’Neil Cr drainage have existing erosion related problems that would be addressed as part of this Project, potential long term benefits to water quality from improving conditions on this roadbed are foregone with Modified Alternative 3.

Table 16: Comparison of temporary road actions between Alternative 2 and Modified Alternative 3 for the Happy Camp Fire area

Road Type	Alt. 2 Miles	Modified Alt. 3 Miles
New Temporary Road	3.5	3.3
Re-open, Decommissioned Road	9.0	4.8
Temporary Road on Existing Roadbed	5.8	3.9
Total Miles	18.3	12

Landing actions have been reduced for Modified Alternative 3, however the six new landings approved for use within Riparian Reserves remain in this alternative therefore potential effects

from new landings in Riparian Reserve are the same as discussed for Alternative 2. In total, Modified Alternative 3 involves use of 40 existing landings (Alternative 2 uses 75 existing landings), and Modified Alternative 3 involves 69 new landings outside of Riparian Reserve (Alternative 2 has 129 new landings outside Riparian Reserves). As described for Alternative 2, potential effects of landing actions on aquatic habitat are minimized by implementation of PDF Watershed-23 and are expected to have only insignificant effects to aquatic habitat indicators.

Modified Alternative 3 includes water drafting which can result in indirect effects through short term and localized increases in turbidity when substrates are disturbed as the water hose is set into and pulled from the water. A measurable increase in turbidity is not expected beyond the immediate drafting area. This conclusion is based on field observations that indicate turbidity is quickly diluted to background water clarity conditions during typical water drafting operations. Additionally, exposed surfaces of water drafting sites and road approaches to drafting sites could erode and discharge sediment back into the waterway. Water trucks can leak oil, and sometimes fuel, onto drafting pads, becoming a source of petroleum product contamination to surface waters. For these reasons, Forest Service BMPs are designed to avoid or eliminate these potential impacts; it is the responsibility of Forest Service Representatives to monitor these activities regularly and ensure these BMPs are implemented appropriately. Fisheries biologists will also be monitoring water drafting activities, particularly during June through September as described in Fisheries Biological Assessment and associated Letter of Concurrence from NOAA Fisheries.

Legacy Sediment Site Treatments: Like the other alternatives, Modified Alternative 3 includes legacy sediment site treatments in the Elk Creek watershed. Potential short term negative effects, and long term beneficial effects of erosion reduction and improved passage for aquatic organisms, are as described for Alternative 2.

Cumulative Effects

Appendix C of the EIS contains a list of the current and future foreseeable actions considered for cumulative effects analysis within the Happy Camp Complex. These activities were accounted for in the project CWE analysis and interpretation. The Forest uses standardized CWE models (Equivalent Roaded Area, Universal Soil Loss Equation, Mass Wasting) to assess effects of past, present, and reasonably foreseeable future activities. In addition to other current actions, models were updated to incorporate effects of the 2014 fires and road improvements identified in BAER assessments. The modelling provides the fundamental assessment of post-fire existing conditions, as well as an initial assessment of the project *No Action* alternative. Subsequently, effects of project *action alternatives* were modeled based on proposed actions. These model results reflect that there will be minimal cumulative impact from adding the effects of Modified Alternative 2 to the past, present and reasonably foreseeable future actions.

The site level analysis found that short term negative effects to aquatic habitat may occur in several stream reaches due to project temporary road actions; for Modified Alternative 3 stream reaches affected include an unnamed tributary to Grider Cr (46N41YA), Cliff Valley Cr (46N77), and China Cr (46N78). Stream reaches affected are ½ mile or more upstream of the range of resident fish in these creeks. Due to proper implementation of PDFs and BMPs, these sediment-related effects to habitat are expected to be localized and short term; overall effects would be discountable and would not be additive to effects of other actions nor appreciably

reduce the current quality of fish habitat in tributaries within the Happy Camp Fire Area (see list of drainages given in the Aquatic Resources Report).

Project Area C: Whites Fire

Direct Effects and Indirect Effects

Direct Effects

Water drafting is the only action proposed within streams of the Whites Fire area, and therefore the only action that has the potential for direct effects to aquatic resources. Special status aquatic species that may be affected by water drafting in the Whites Fire area include: SONCC Coho salmon, Chinook salmon, steelhead and resident rainbow trout, Pacific lamprey, Klamath River lamprey, western pond turtle, and Cascade frog.

During water drafting, aquatic species present could experience direct effects associated with rapid changes or sustained reductions in flow, reduced dissolved oxygen, and/or increased water temperature. In order to reduce or eliminate these potential effects, the Forest Service follows Best Management Practice guidance described in Region 5 Forest Service Handbook 2509.22, Chapter 10-Water Quality Management Handbook (2011). Specifically Best Management Practice (BMP) 2.5 Water Source Development and Utilization provides direction specific to water drafting.

These BMP protection measures ensure that water drafting may only occur when bypass stream flows can be sustained of 1.5 cubic feet per second for fish bearing streams, or 10 gallons per minute for non-fish bearing streams; drafting rate is not to exceed 20% of surface flows in fish bearing streams and 50% of surface flows in non-fish bearing streams. When in Coho salmon Critical Habitat (CH), in addition Project water drafting will be implemented according to NOAA water drafting specifications (2001). These NOAA water drafting specifications require that pumping rates during drafting do not exceed 10% of the stream flow, and that drafting does not result in obvious draw-down of either upstream or downstream pools. Both BMPs and NOAA specifications require that water drafting operations use a fish screen appropriate to protect aquatic species present at the site; NOAA specifications require specific size of screen mesh (maximum 3/32 inch diameter for round or square openings).

Water drafting typically overlaps the Coho salmon lifecycle when young fish (0+ and 1+ years old) are utilizing summer rearing habitat, which is limiting in general in the mid Klamath River. Protection of cold water habitat is critical to promote the survival of juvenile Coho salmon in this area. The potential effects of water drafting were further minimized between DEIS and FEIS by updating PDF Watershed-34 with NOAA Fisheries and Karuk Tribe specifically to avoid potential impacts drafting could have on salmonids that are dependent upon thermal refugia areas in summer and early fall. This PDF specifies that certain areas (lower reaches of cold tributaries) across the project area and several specific creeks are to be avoided during summer and fall water drafting (generally June through September). None of the specific creeks identified in the PDF occur in the Whites Fire area; however, the increased protection of flows in lower reaches of cold tributaries reduces the chance that water drafting would have measurable negative impacts to fish that are relying upon thermal refugia. Implementation of this PDF requires that lower reaches of cold water tributaries to the Salmon River would be avoided during water

drafting; water needed for dust abatement in this area will primarily come from the North Fork Salmon River at drafting site(s) outside of any cold-water tributary inputs. Watershed-34, updated between DEIS and FEIS, more fully minimizes effects to thermal refugia and helps avoid reductions of cold water inputs to the Klamath and Salmon River. Protection of cold aquatic habitat is incredibly important to aquatic species in this area including SONCC Coho salmon, especially as extended drought conditions persist.

Relative to Pacific and Klamath River lamprey, Chinook salmon, and steelhead trout; because these species occur primarily within Coho salmon CH they will be protected from impacts of water drafting as described for Coho salmon. Especially for steelhead trout, the overlap in typical timing of water drafting operations and fish life cycle results in more potential exposure of vulnerable life history forms (eggs and alevins which are still dependent upon gravel nests/redds) to water drafting impacts, especially when dust abatement is needed early during dry spring and early summer months. As described in PDF Watershed-35, minor instream modifications are only allowed outside of CH which is mostly equivalent to steelhead trout spawning distribution. This reduces the chance that water drafting operations would directly affect steelhead redds or young fish. Required screening in all fish bearing streams eliminates the chance of direct impacts to all fish species.

In many drainages, the distribution of resident rainbow trout and other aquatic species extend beyond/above Coho salmon CH. If drafting sites above CH are identified and designated for use by the Forest Service, BMPs described above would protect flows in these creeks by allowing drafting only up to 20% of surface flows and providing for at least 1.5 cubic feet per second bypass flows in the creek. Required screening in all fish bearing streams eliminates the chance of direct impacts to all fish species.

Western pond turtle, in the Whites Fire area, are likely to occur only on the North Fork Salmon River. Because this river is also Coho salmon CH, there will be no modification of drafting sites that could impact this species. Screening requirements, and maintenance of surface flows as described above for fish species, will also protect Western pond turtles. Cascade frogs are likely to occur in the project area within lakes and streams above 2500 feet in elevation (all of the Whites Fire area is above 2500 feet in elevation). Although they may occur within streams, much of the suitable habitat for Cascade frogs occurs in Wilderness lakes, where they are known to occur (i.e. Lower Russian Lake and Golden Russian Lake). As described above, Project water drafting will most likely be occurring in mainstem rivers such as the North Fork Salmon River where NOAA drafting specifications will be implemented and provide the highest level of protection for aquatic species. Because upper watershed spring ponds or wetlands, where Cascade frogs are most likely to occur, do not often provide the flows necessary for non-emergency water drafting per BMPs, it is less likely that individuals in these areas would be exposed to the impacts of Project water drafting. If water drafting does occur in these upper watershed areas, it is subject to the same BMPs that protect flows and require screening (and require coordination with fish biologists on drafting locations); potential impacts to Cascade frogs would be a result of disturbance and loss of up to 50% of surface flow, potentially reducing flowing water to 10 gallons per minute. In this case, individuals may be temporarily harassed or displaced, however the ability to carry out essential functions such as breeding, feeding, and sheltering would not be meaningfully affected.

Modified Alternative 3 does not include any near stream temporary road actions or legacy sediment site treatments; there would be no potential effects of these actions in Whites Fire area.

Indirect Effects

Salvage Harvest and Reforestation: Modified Alternative 3 adds about 120 net acres of salvage in the Whites Fire area relative to Alternative 2. The discountable effects of salvage and reforestation on sediment, water quality and riparian function would be as described for Alternative 2. Minor effects to aquatic species and discountable effects to habitat indicators are expected due to exclusion of stream course Riparian Reserves and inner gorges and implementation of minimization measures (PDFs). While many of the watersheds were heavily disturbed by 2014 fires, the CWE analysis and site reviews indicate that the effects of proposed salvage on habitat indicators would be discountable and effects to aquatic species would be minor.

Modified Alternative 3 adds about 40 net acres of site-preparation, planting, and release relative to Alternative 2. Like Alternative 2, Modified Alternative 3 includes hand treatments in Riparian Reserves within site prep and plant units of the Whites Fire area. These treatments within Riparian Reserve would occur only where 2014 wildfires burned at moderate to high severity. Dead trees up to 10 inches DBH and brush would be cut and scattered to achieve ground cover. If fuels loading would exceed seven tons per acre, pile burning or underburning would occur to maintain/restore desired fuel loading. Live vegetation, including hardwoods, would not be cut. Table 18 displays where these treatments are proposed in Modified Alternative 3 by 7th field watershed; these areas include Riparian Reserves that overlap site prep and plant units with lower burn severity areas removed.

Table 17: Modified Alternative 3 proposed hand treatment in Riparian Reserves, Whites Fire area

7th field watershed	Acres of hand treatments within Riparian Reserve
Music Creek	7
Robinson Gulch – North Fork Salmon River	3
Upper South Russian Creek	1
Whites Gulch	15
TOTAL	26

As described for Alternative 2, Riparian Reserve hand treatments are not likely to cause any negative effects to aquatic habitat and overall are likely to improve Riparian Reserve and watershed condition. These actions are designed to increase the likelihood and speed by which burned areas are reforested which is considered a positive effect to aquatic resources. Potential effects of Modified Alternative 3 are the same as those described for Alternative 2 but less acres would benefit from the treatment where site prep and plant units are dropped. Effects to habitat indicators would be discountable and effects to aquatic species would be minor. Long term beneficial effects are likely as these actions will reduce fuels and use fire to maintain and restore ecosystem function in Riparian Reserves.

In summary, the effects of salvage and reforestation on aquatic habitat indicators would be neutral or discountable and effects on aquatic species would be neutral or minor. Reforestation

actions are designed to increase the likelihood and speed by which burned areas are reforested which is considered a long term positive effect to aquatic resources.

Fuels Reduction: Modified Alternative 3 adds approximately 50 acres of fuels treatments within the Whites Fire area relative to Alternative 2. The potential effects of Modified Alternative 3 on aquatic resources are very similar to effects of Alternative 2. The discountable impacts of fuels reduction on sediment, water quality and riparian function described for Alternative 2 would be slightly increased due to the addition of 50 acres of treatment in the North Fork Salmon River watershed, a small amount of this overlaps Riparian Reserves. The CWE analysis and site reviews indicate that effects to aquatic habitat would be either neutral or short term and discountable under Modified Alternative 3. Effects are minimal due to implementation of minimization measures (PDFs), and the low level of ground disturbance involved with fuels treatments. Long-term benefits from fuels reduction associated with future fire behavior are expected.

Hazard Tree Removal: The amount of roadside hazard tree removal is reduced with Modified Alternative 3 to 55 miles, or maximum of 2,400 acres; relative to 80 miles, or 2,700 acres, with Alternative 2. Table 19 displays miles of stream within the Whites Fire that are within 200 feet of proposed hazard tree removal roads. About 16 miles, or 2.4% of the total stream mileage in the North Fork Salmon River watershed, may be affected by these actions.

Table 18: Miles of stream that may be affected by hazard tree removal in Beaver Fire, Modified Alternative 3

5 th field watershed	Miles of perennial stream within 200 feet from roadside hazard tree removal roads	Miles of intermittent stream within 200 feet from roadside hazard tree removal roads	Total stream miles in watershed -intermittent and perennial Percentage of streams miles potentially affected by Project roadside hazard tree removal
North Fork Salmon River	11	5	654 2.4%

In the Whites Fire area, roadside hazard tree removal is proposed in relatively close proximity to Coho salmon CH in mainstem reaches of North Fork Salmon River, North Russian and South Russian Creeks, and Whites Gulch. Fisheries biologists conducted field review of roadside hazard tree marking in these areas and confirmed that hazard trees along roads in close proximity to Coho salmon CH are marked according to the description in this EIS including PDFs. Potential effects of roadside hazard tree removal on aquatic resources includes localized loss of shade, ground disturbance associated with felling trees and yarding up to roads, and localized loss of woody debris.

Equipment restrictions that prohibit ground based equipment from leaving roads when implementing roadside hazard tree removal within RR minimizes potential for any near stream ground disturbance. Project design features ensure retention of large wood within near stream areas. The PDF watershed-12 was changed between the DEIS and FEIS to further increase retention of large wood near streams; Watershed-12 now ensures retention of all hazard trees equal to or greater than 26 inches DBH that are within one site tree distance from all stream channels, including perennial non-fish bearing and intermittent channels. Retention of large wood near streams is expanded under Watershed-12 to areas above fish bearing reaches;

retention of all large wood in these near stream areas maximizes protection of this habitat component that is important for aquatic habitat formation and function and for providing for terrestrial wildlife connectivity. This modified PDF also increases the probability that future debris flows will deliver intact large woody debris downstream to fish-bearing reaches, wherever future debris flows may occur. For these reasons, effects of roadside hazard tree removal on aquatic habitat indicators would be discountable and effects on aquatic species would be minor.

Roads, Landings, Stream Crossings and Water Drafting: As shown in Table 20, Modified Alternative 3 involves only several temporary road actions on existing roadbed, there is no new temporary road construction or reopening of decommissioned roads in the Whites Fire area. Proposed temporary roads on existing roadbed are mostly ridgetop features well outside of Riparian Reserves. One segment, temporary road 44, traverses the hillslope just above Riparian Reserve in skyline unit 417. Adherence to PDFs (Watershed-2, 5, and 22) and appropriate hydrologic stabilization of this road segment will ensure potential impacts to aquatic resources are avoided.

There are no new landings in Riparian Reserve in the Whites Fire. Effects from use of existing landings, and new landings outside of Riparian Reserve, are the same as described for Alternative 2.

Table 19: Comparison of temporary road actions between Alternative 2 and Modified Alternative 3 for the Whites Fire area

Road Type	Alt. 2 Miles	Modified Alt. 3 Miles
New Temporary Road	0.1	0
Re-open, Decommissioned Road	0	0
Temporary Road on Existing Roadbed	0.7	0.7
Total Miles	0.8	0.7

Modified Alternative 3 includes water drafting which can result in indirect effects through short term and localized increases in turbidity when substrates are disturbed as the water hose is set into and pulled from the water. A measurable increase in turbidity is not expected beyond the immediate drafting area. This conclusion is based on field observations that indicate turbidity is quickly diluted to background water clarity conditions during typical water drafting operations. Additionally, exposed surfaces of water drafting sites and road approaches to drafting sites could erode and discharge sediment back into the waterway. Water trucks can leak oil, and sometimes fuel, onto drafting pads, becoming a source of petroleum product contamination to surface waters. For these reasons, Forest Service BMPs are designed to avoid or eliminate these potential impacts; it is the responsibility of Forest Service Representatives to monitor these activities regularly and ensure these BMPs are implemented appropriately. Fisheries biologists will also be monitoring water drafting activities, particularly during June through September as described in Fisheries Biological Assessment and associated Letter of Concurrence from NOAA Fisheries.

Legacy Sediment Site Treatments: Legacy sediment site treatments and associated effects will not occur in the Whites Fire area.

Cumulative Effects

Appendix C of the EIS contains a list of the current and future foreseeable actions considered for cumulative effects analysis within the Whites Fire area. These activities were accounted for in

the project CWE analysis and interpretation. The Forest uses standardized CWE models (Equivalent Routed Area, Universal Soil Loss Equation, Mass Wasting) to assess effects of past, present, and reasonably foreseeable future activities. In addition to other current actions, models were updated to incorporate effects of the 2014 fires and road improvements identified in BAER assessments. The modelling provides the fundamental assessment of post-fire existing conditions, as well as the effects of the action alternatives. These model results reflect that there will be minimal cumulative impact from adding the effects of Modified Alternative 3 to the past, present and reasonable foreseeable future actions.

Site level analysis of the project found that there would not be any negative site level effects to aquatic habitat because there are no new landings in Riparian Reserve and no near stream temporary road actions. As described above, aquatic resources may be exposed to disturbance-related effects due to water drafting and other minor effects due to roadside hazard tree removal. These effects are likely to be minor and discountable and, when added to the effects of past/present/future actions, would not appreciably reduce the current quality of fish habitat or distribution of aquatic species in Whites Gulch or the Salmon River.

III. Modification of Environmental Consequences by Fire Area since the Draft EIS

Affected Environment

The DEIS Aquatics Resources Report described the affected environment by fire area. There is no additional information or changes to add.

Environmental Consequences

Refer to the DEIS Aquatics Resources Report and EIS Chapter 3 for the analysis of potential effects of salvage harvest and reforestation; the analysis concluded that these actions would have only discountable or negligible impacts to aquatic resources due to the exclusion of Riparian Reserves and inner gorge areas and implementation of PDFs that sufficiently minimize disturbance outside of Riparian Reserves. Also refer to the DEIS Aquatics Resources Report and DEIS Chapter 3 for the analysis of potential effects of fuels treatments which are proposed in Riparian Reserves; the analysis concluded that these actions would have only negligible short term impacts and long term benefits associated with restoring this fire-dependent ecosystem. The following analysis focuses on project elements that may result in more than negligible impacts to aquatic resources: water drafting and instream work associated with legacy site treatments (direct effects); and roadside hazard tree removal, temporary road actions, and landings in Riparian Reserves (indirect effects). The indicators used to evaluate indirect effects remain the same as for the DEIS: stream temperature, sediment, and large wood.

Alternative 2

Project Area A: Beaver Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator Species

Direct Effects

Water drafting is the only action proposed within fish-bearing streams, and therefore the only action that has the potential for direct effects to aquatic resources. Between the DEIS and FEIS, a PDF (Watershed-34) was changed to achieve more protection for aquatic species utilizing thermal refugia habitat areas. PDF watershed-34 was refined during consultation with NMFS and the Karuk Tribe and specifies that certain areas (lower reaches of cold tributaries) across the project area and several specific creeks are to be avoided during late summer and fall water drafting. None of the specific creeks identified in the PDF occur in the Beaver Fire area; however, the increased protection of flows in lower reaches of cold tributaries reduces the chance that water drafting would have measurable negative impacts to fish that are relying upon thermal refugia. Due to implementation of this updated PDF, lower reaches of cold water tributaries to, and including, Beaver Creek would be avoided during water drafting. This modified PDF more fully minimizes effects to thermal refugia and helps avoid reductions of cold water inputs to the Klamath River. This is important to aquatic species, especially as extended drought conditions persist. Therefore, potential direct effects in the Beaver Fire area are similar but slightly less than effects described in the DEIS Aquatic Resources Report.

Indirect Effects

Alternative 2 includes temporary road actions in Doggett Creek (temporary road 8) and Beaver Creek (temporary roads 39 and 40), drainages that would experience temporary short term impacts from roads and sediment production and long term benefits from fixing sediment sources on these old road beds. These potential impacts are described in detail in DEIS Aquatics Resource Report and remain the same. No new landings in Riparian Reserves are proposed in the Beaver Fire area.

With respect to temporary roads, only minor changes to project design occurred between the DEIS and FEIS. There was realignment of 0.21 miles of temporary road on existing road bed, which remains outside of Riparian Reserves (temp road 045 in Dutch Cr drainage); and several landings were dropped and added. PDF watershed-12 was changed between the DEIS and FEIS to ensure retention of all hazard trees equal to or greater than 26 inches DBH that are within one site tree distance from all stream channels, including perennial non-fish bearing and intermittent channels. Although above fish bearing reaches, retention of all large wood in these near stream areas maximizes retention of down large wood. This habitat component is important for aquatic habitat formation and function as well as providing for terrestrial wildlife connectivity. Retaining larger felled hazard trees also increases the probability that future debris flows, wherever they occur, will deliver intact large woody debris downstream to fish-bearing reaches. Overall the effects of hazard tree removal along roads on habitat indicators would be discountable and effects on aquatic species would be minor. Potential indirect effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Cumulative Effects

Potential cumulative effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Project Area B: Happy Camp Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator Species

Direct Effects

The proposed actions that may have direct effects on aquatic species in the Happy Camp Fire Area include water drafting and legacy sediment site repair where it would occur in streams. As described above, Watershed-34 was modified between the DEIS and FEIS to achieve more protection for aquatic species utilizing thermal refugia areas. PDF watershed-34 was refined during consultation with NMFS and Karuk Tribe and specifies that certain areas (lower reaches of cold tributaries) across the project area and several specific creeks are to be avoided during late summer and fall water drafting. Therefore aquatic species within the Happy Camp Complex, including Coho salmon, will be provided increased protection from water drafting relative to the DEIS within the following creeks: Tom Martin, O'Neil, Little Horse, and China creeks. These increased protection measures further reduce the chance that water drafting would have measurable negative impacts to fish that are utilizing thermal refugia. This modified PDF helps avoid reducing cold water inputs to the Klamath River, which is critical to aquatic species as extended drought conditions persist.

There is potential for direct effects to aquatic species as part of legacy sediment site repair in Elk Creek Watershed, where actions are proposed in streams (culvert upgrades). This work will occur in a dry channel wherever possible; and BMPs and PDFs will be implemented to minimize the potential short term effects to aquatic species and habitat.

Indirect Effects

Within the Happy Camp Fire, there are several temporary road actions proposed within Riparian Reserves, and five new landings proposed in Riparian Reserves. As described in Chapter 3 of the DEIS, these actions are expected to result in short term site-scale negative effects associated with increased sediment production. Reopening nine miles of decommissioned road is proposed and, although these roads will be hydrologically stabilized after use, the opening and use of these road segments impedes the recovery of hill slope processes in these areas by at least a decade. Hillslopes and stream crossings negatively affected by reopening decommissioned roads include areas of Caroline Creek-Klamath River (46N62), Lower Grider Creek (46N41YA), Cliff Valley Creek (46N77), and China Creek (46N78) 7th field watersheds. As described in the DEIS Aquatics Resource Report and Chapter 3 of the DEIS, these actions would result in localized short term impacts to aquatic resources with the exception of 46N62 in Caroline Creek-Klamath River drainage where effects would be moderate and may extend beyond the localized site and short term timeframe and may adversely affect aquatic habitat.

Long term beneficial effects related to sediment reduction are expected due to legacy sediment site treatments within the Elk Creek watershed (and several sites in Lower Grider Creek, O'Neil

Creek, and Kuntz Creek drainages). See the project ACS analysis for more information regarding near stream temporary road actions.

With respect to road actions, only minor changes to project design occurred between the DEIS and FEIS (Figure 6). Several temporary road segments were dropped from the Happy Camp Complex; about a mile of temporary road construction was dropped. Most of these spurs were short ridge top features, only one entered Riparian Reserves in upper O'Neil Creek (this segment did not include a stream crossing). Other drainages where temporary road impacts would be slightly reduced from those analyzed in the DEIS are those within China Creek and Lower Grider Creek.

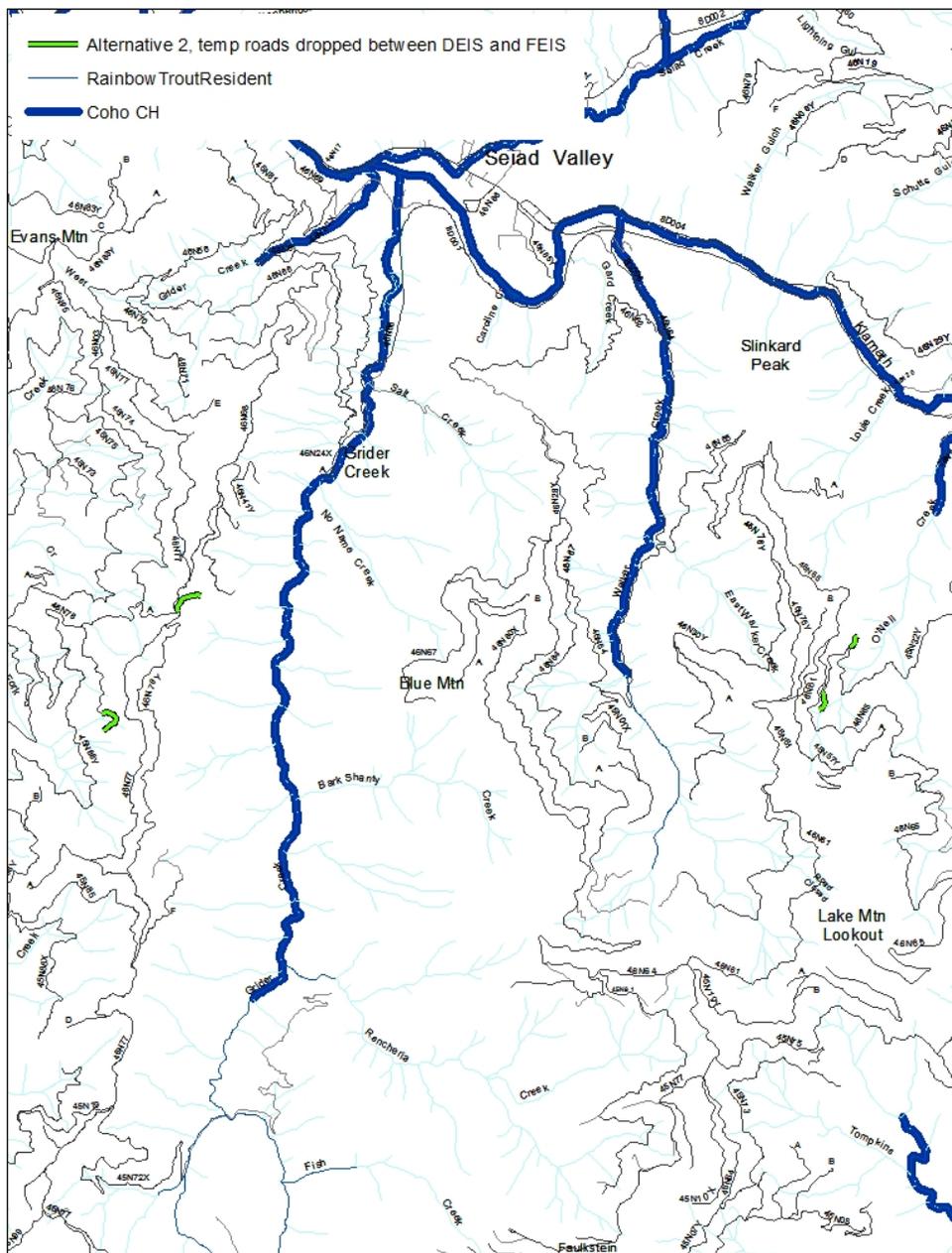


Figure 6: Alternative 2, temporary roads dropped between DEIS and FEIS as part of layout

Changes to landings between the DEIS and FEIS were minor and none of these changes would result in a measurable change to effects and therefore the analysis provided in the Chapter 3 of the DEIS still applies. Watershed-12 now ensures that all hazard trees equal to or greater than 26 inches DBH that are within one site tree distance from all stream channels will be retained on site even if they must be felled for safety, including perennial non-fish bearing and intermittent channels. Protection of large wood near streams is expanded under Watershed-12 to areas above fish bearing reaches, and thereby maximizes protection of this habitat component that is important for aquatic habitat formation and function and to provide for terrestrial wildlife

connectivity. This modified PDF also increases the probability that future debris flows, wherever they occur, will deliver intact large woody debris downstream to fish-bearing reaches. Overall the effects of hazard tree removal along roads on habitat indicators would be discountable and effects on aquatic species would be minor. Potential indirect effects to aquatic species remain as described in DEIS Chapter 3 and the DEIS Aquatics Resource Report.

Cumulative Effects

Potential cumulative effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Project Area C: Whites Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator Species

Direct Effects

Water drafting is the only action proposed within fish-bearing streams, and therefore the only action with potential for direct effects to aquatic resources. Legacy sediment site treatments will not occur in the Whites Fire area. Between the DEIS and FEIS, a PDF was changed to achieve more protection for aquatic species in thermal refugia areas. The PDF watershed-34 was refined during consultation with NMFS and Karuk Tribe and specifies that certain areas (lower reaches of cold tributaries) across the project area and several specific creeks are to be avoided during late summer and fall water drafting. None of the specific creeks identified in the PDF occur in the Whites Fire area; however the increased protection measures still reduce the chance that water drafting would have measurable negative impacts to fish that utilize thermal refugia because lower reaches of cold water tributaries to the North Fork Salmon River would be avoided. Minimizing impacts to thermal refugia is critical as extended drought conditions persist.

Indirect Effects

There are no near stream temporary road actions proposed in the Whites Fire Area. Only minor changes to project design occurred between the DEIS and FEIS. There was a new helicopter landing proposed within Riparian Reserves (L072) near Whites Gulch; this landing has been moved up the road to another location outside of Riparian Reserves. PDF watershed-12 was changed between the DEIS and FEIS to ensure retention of all hazard trees equal to or greater than 26 inches DBH that are within one site tree distance from all stream channels, including perennial non-fish bearing and intermittent channels. Although above fish bearing reaches, retention of all large wood in these near stream areas maximizes the persistence of this habitat component important for aquatic habitat formation and function as well as providing for terrestrial wildlife connectivity. It also increases the probability that future debris flows, wherever they occur, will deliver intact large woody debris downstream to fish-bearing reaches. Overall the effects of hazard tree removal along roads on habitat indicators would be discountable and effects on aquatic species would be minor. Potential indirect effects to aquatic species remain as described in the DEIS Chapter 3 and the DEIS Aquatics Resource Report.

Cumulative Effects

Potential cumulative effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Alternative 3

Project Area A: Beaver Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator Species

Direct Effects

Potential direct effects to aquatic species would be as described above for Alternative 2.

Indirect Effects

Near stream temporary road actions, and effects, would be the same as described for Alternative 2. Only minor changes to project design occurred between the DEIS and FEIS, these are described above for Alternative 2. Other than these minor changes, potential indirect effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Cumulative Effects

Potential cumulative effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Project Area B: Happy Camp Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator Species

Direct Effects

Potential direct effects to aquatic species would be as described above for Alternative 2.

Indirect Effects

Near stream temporary road actions, and effects, would be the same as described for Alternative 2. Only minor changes to project design occurred between the DEIS and FEIS, and these are described above for Alternative 2. Other than these minor changes, potential indirect effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Cumulative Effects

Potential cumulative effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resources Report.

Project Area C: Whites Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator

Species

Direct Effects

Potential direct effects to aquatic species would be as described above for Alternative 2.

Indirect Effects

There are no near stream temporary road actions in Whites Fire Area. Only minor changes to project design occurred between the DEIS and FEIS, and these are described above for Alternative 2. Other than these minor changes, potential indirect effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resources Report.

Cumulative Effects

Potential cumulative effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resources Report.

Alternative 4

Alternative 4 was designed to eliminate near stream temporary road actions, and crossings, and it reduces the extent of proposed roadside hazard tree removal by dropping Maintenance Level 1 roads that would not be used for the project. This change results in 917 acres of reduced hazard tree removal in Alternative 4 relative to Alternative 2.

Project Area A: Beaver Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator Species

Direct Effects

Potential direct effects to aquatic species would be as described above for Alternative 2.

Indirect Effects

Alternative 4, in the Beaver Fire area, proposes 274 less acres of road side hazard tree removal relative to Alternative 2 as shown in table 21 below. Potential effects of roadside hazard tree removal on aquatic resources includes localized short term loss of shade, ground disturbance associated with felling trees and yarding up to roads, and localized loss of woody debris; these effects would occur over less area with Alternative 4, as displayed in Figure 7 below.

Table 20: Reduced extent of proposed hazard tree removal in Alternative 4, relative to Alternative 2 in the Beaver Fire

5th field watershed	Acres of reduced hazard tree removal proposed in Alternative 4 (relative to Alternative 2)
Beaver Creek	180
Horse Creek-Klamath River	94
Total	274

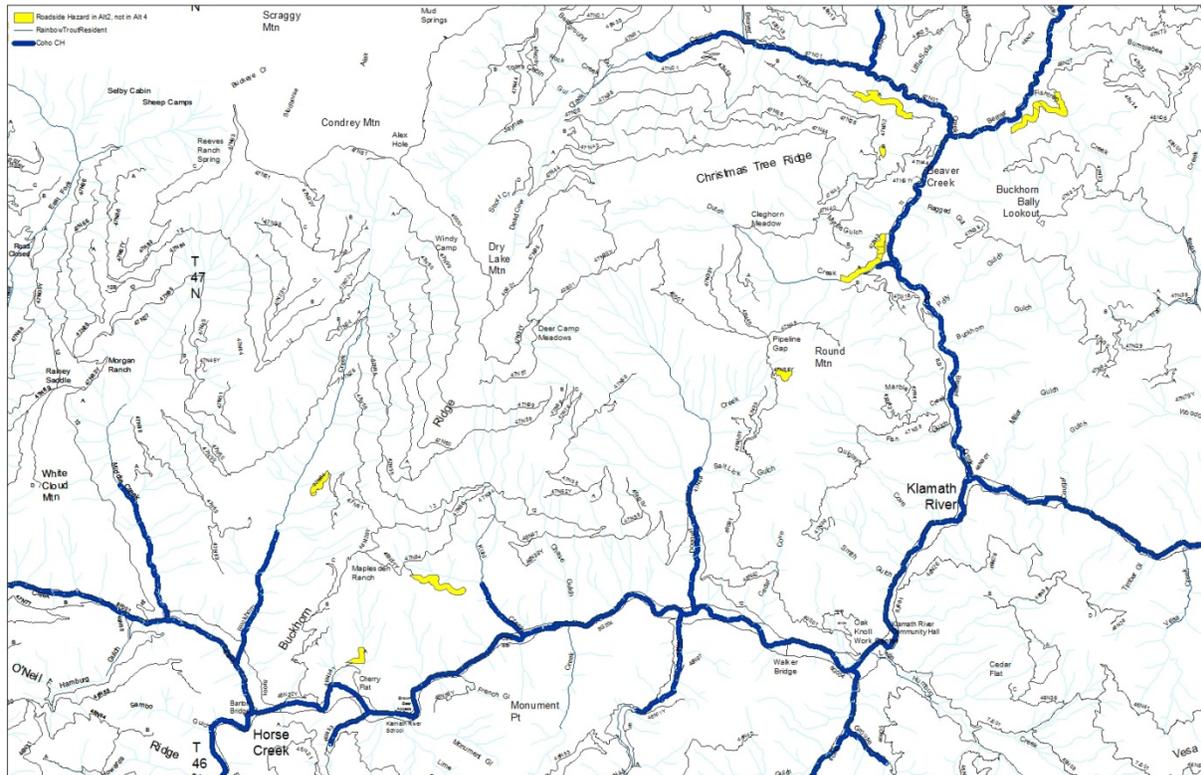


Figure 7: Roadside hazard removal proposed in Alternative 2, and not in Alternative 4, Beaver Fire

Changes to PDF watershed-12 are as described above for Alternative 2. Effects of hazard tree removal along roads on habitat indicators in the Beaver Fire area would be discountable and effects on aquatic species would be minor.

No near stream temporary road actions are proposed with Alternative 4, therefore (as with Modified Alternative 2) potential negative short term impacts (and long term benefits from addressing existing legacy sediment sites) in Doggett and Buckhorn-Beaver creeks discussed for Alternative 2 would not occur under Alternative 4. Only minor changes to project design occurred between the DEIS and FEIS, and these are described above for Alternative 2. Other than these minor changes, potential indirect effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Cumulative Effects

Potential cumulative effects to aquatic species remain the same as those described in the DEIS Chapter 3 and the DEIS Aquatics Resource Report.

Project Area B: Happy Camp Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator Species

Direct Effects

Potential direct effects to aquatic species would be the same as those described above for Alternative 2.

Indirect Effects

Alternative 4, in the Happy Camp Fire area, proposes 572 less acres of road side hazard tree removal relative to Alternative 2 as shown in Table 22 below. Potential effects of roadside hazard tree removal on aquatic resources includes localized loss of shade, ground disturbance associated with felling trees and yarding up to roads, and localized loss of woody debris; these effects would occur over less area with Alternative 4, as displayed in Figure 8 below.

Table 22: Reduced extent of proposed hazard tree removal in Alternative 4, relative to Alternative 2 in the Happy Camp Fire

5 th field watershed	Acres of reduced hazard tree removal proposed in Alternative 4 (relative to Alternative 2)
Elk Creek	1
Lower Scott River	433
Seiad Creek-Klamath River	51
Thompson Creek-Klamath River	87
Total	572

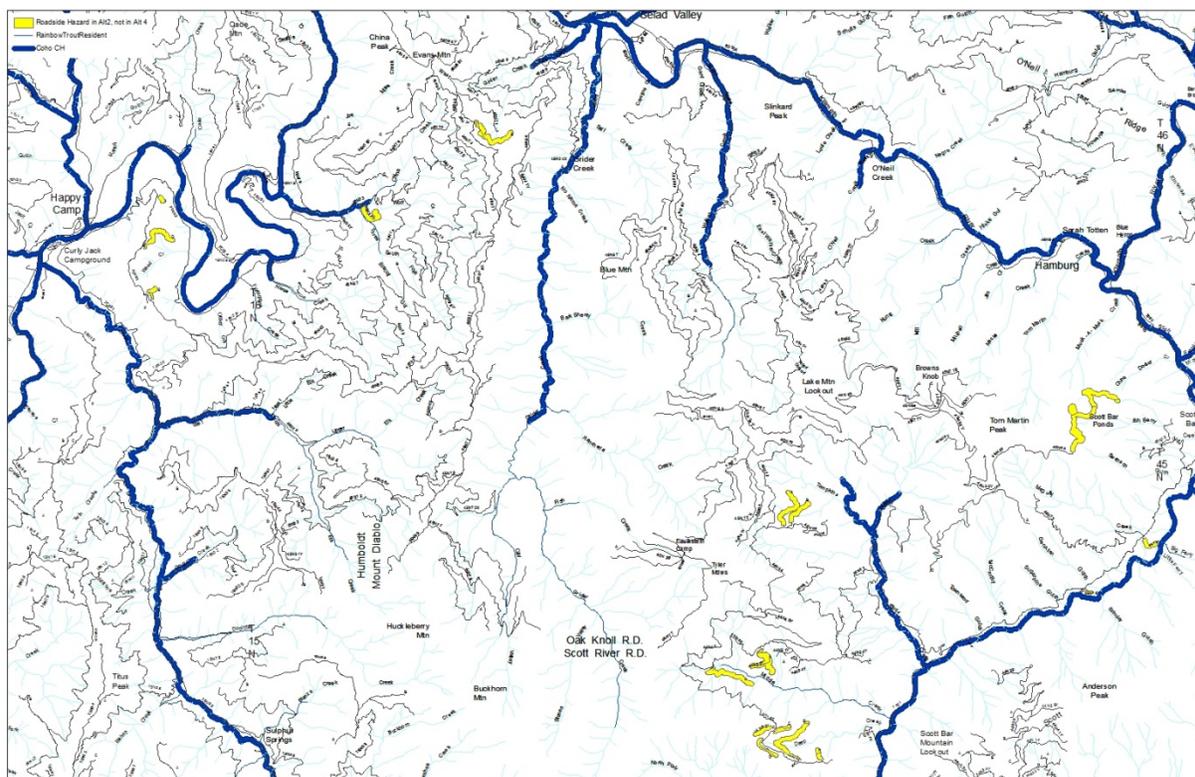


Figure 8: Roadside hazard removal proposed in Alternative 2, and not in Alternative 4, Happy Camp Fire

Changes to PDF watershed-12 are as described above for Alternative 2. Effects of hazard tree removal along roads on habitat indicators in the Happy Camp Fire area would be discountable and effects on aquatic species would be minor.

No near stream temporary road actions are proposed under Alternative 4, therefore all negative site-scale impacts to the sediment regime described for Alternative 2 are avoided. Only minor changes to project design occurred between the DEIS and FEIS, and these are described above for Alternative 2. Other than these minor changes, potential indirect effects to aquatic species remain the same as those described in the DEIS Chapter 3 and the DEIS Aquatics Resource Report.

Cumulative Effects

Potential cumulative effects to aquatic species are the same as those described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Project Area C: Whites Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator Species

Direct Effects

Potential direct effects to aquatic species would be the same as those described above for Alternative 2.

Indirect Effects

Alternative 4, in the Whites Fire area, proposes 71 less acres of road side hazard tree removal relative to Alternative 2 as shown in Table 23 below. Potential effects of roadside hazard tree removal on aquatic resources includes localized loss of shade, ground disturbance associated with felling trees and yarding up to roads, and localized loss of woody debris; these effects would occur over less area with Alternative 4, as displayed in Figure 9 below.

Table 23: Reduced extent of proposed hazard tree removal in Alternative 4, relative to Alternative 2 in the Whites Fire

5th field watershed	Acres of reduced hazard tree removal proposed in Alternative 4 (relative to Alternative 2)
North Fork Salmon River	71
Total	71

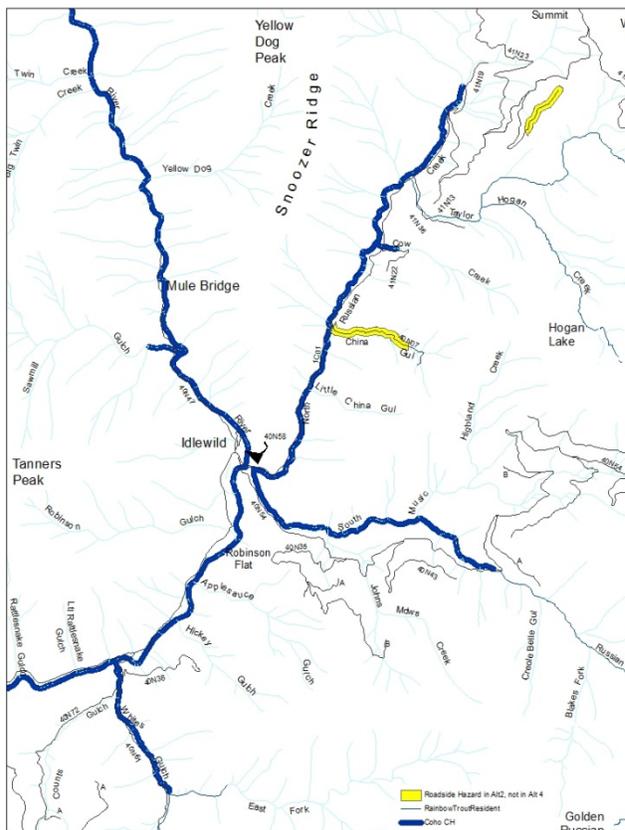


Figure 9: Roadside hazard removal proposed in Alternative 2, and not in Alternative 4, Whites Fire

There are no near stream temporary road actions in Whites Fire Area. Only minor changes to project design occurred between DEIS and FEIS, and these are described above for Alternative 2. Other than these minor changes, potential indirect effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Cumulative Effects

Potential cumulative effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Alternative 5

Project Area A: Beaver Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator Species

Direct Effects

Potential direct effects to aquatic species would be as described above for Alternative 2.

Indirect Effects

Near stream temporary road actions, and effects, would be the same as described for Alternative 2. Only minor changes to project design occurred between the DEIS and FEIS, and these are described above for Alternative 2. Other than these minor changes, potential indirect effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Cumulative Effects

Potential cumulative effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Project Area B: Happy Camp Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator Species

Direct Effects

Potential direct effects to aquatic species would be as described above for Alternative 2.

Indirect Effects

Near stream temporary road segments dropped under Alternative 5 include Road 46N41YA in the Lower Grider Creek drainage, Road 46N77 in the Cliff Valley Creek drainage, Road 46N78 in the China Creek drainage, and temporary road 2 located near the bottom of the O'Neil Creek drainage. Potential short term site-scale negative effects associated with these proposed road stream crossings, discussed in Chapter 3 of the DEIS would be avoided under this alternative. Also, the long term benefit to water quality from addressing existing legacy sediment sites in Lower Grider Creek drainage (46N41YA) and O'Neil Creek are avoided with this alternative.

Only minor changes to project design occurred between the DEIS and FEIS, and these are described above for Alternative 2. Other than these minor changes, potential indirect effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Cumulative Effects

Potential cumulative effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Project Area C: Whites Fire

Threatened/Endangered/Forest Service Sensitive Species/ Management Indicator Species

Direct Effects

Potential direct effects to aquatic species would be as described above for Alternative 2.

Indirect Effects

There are no near stream temporary road actions in the Whites Fire Area. Only minor changes to project design occurred between the DEIS and FEIS, and these are described above for Alternative 2. Other than these minor changes, potential indirect effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Cumulative Effects

Potential cumulative effects to aquatic species remain as described in Chapter 3 of the DEIS and the DEIS Aquatics Resource Report.

Summary of Effects

Effects of action alternatives on aquatic resource indicators are summarized in tables 24 through 26.

Summary of Effect Tables

Table 24: Summary of Effects by analysis indicator for the Beaver Fire Area

Indicator	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Mod Alt. 2	Mod Alt.3
<p>Indirect Effects: Sediment All ground disturbing actions have the potential to affect sediment production. As described in Aquatic Resources Report, salvage harvest, site prep and plant, and fuels treatments would have only minor and discountable effects to aquatic resources wherever they occur – due to project design.</p>	Includes temporary road actions in Doggett Creek and Beaver Creek resulting in temporary site-scale impacts and long term benefits from fixing sediment sources. Over-all, discountable negative effects (due to dispersed disturbance, replanting and PDFs).	Near stream temporary road actions, and effects would be the same as for Alternative 2. Discountable negative effects.	No near stream temporary road actions proposed. Negative short term impacts (and long term benefits from addressing existing legacy sediment sites) in Doggett and Buckhorn-Beaver creeks would not occur. Discountable negative effects reduced.	Near stream temporary road actions and effects would be the same as for Alt. 2. Discountable negative effects.	1.7 miles of temp road dropped (includes all near-stream temp roads and temp roads w/ crossings), 3 landings dropped. No benefits from addressing existing legacy sediment sites on temp roads. Discountable negative effects reduced.	All temp roads and landings dropped. RR hand treatments in site prep units added; these actions would have neutral short term effects and beneficial long term effects to watershed condition.
<p>Indirect Effects: Temperature Actions that could affect temperature include roadside hazard tree removal, fuels reduction, temp road crossings, landings in RR and increased sedimentation. Shade in RRs will not be affected by salvage since salvage excludes RR.</p>	Shade in RRs protected by PDFs which minimize effects of roadside hazard, temp road and landing, and fuels treatments resulting in discountable negative effects. Sedimentation can affect temps – see above for sediment impacts.	Same as Alternative 2	Slightly less potential effect of roadside hazard removal where it is reduced in extent.	Near stream temporary road actions and effects would be the same as for Alt. 2. Discountable negative effects.	Same as Alternative 2	Reduced effects from roadside hazard removal where it is reduced in extent. Also, effects are reduced because live hazard trees will not be felled.
<p>Indirect Effects: Large Wood Actions that could affect large wood are landings in RRs, near stream temp road actions, and hazard tree removal. No new landings in RR in Beaver Fire. Salvage harvest excludes stream course RR.</p>	Project design features ensure retention of large wood within near stream areas for hazard tree removal and temp road actions. Discountable negative effects.	Effects would be the same as Alt. 2.	Slightly less potential effect of roadside hazard removal where it is reduced in extent, and where temp road actions are dropped (Doggett Cr and face drain to Beaver Cr).	Effects would be the same as Alt. 2.	Effects would be the same as Alt. 2.	Less potential effect of hazard tree removal where it is reduced in extent.

Indicator	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Mod Alt. 2	Mod Alt.3
<p>Direct Effects: Salmon and Steelhead Water drafting is the only action that could directly affect fish</p>	Direct effects will be minimized through designation of acceptable sites (PDF watershed-34) and use of NMFS (2001) water drafting specifications. Direct effects would be discountable and minor to anadromous fish.	Effects would be the same as Alt. 2.	Effects would be the same as Alt. 2.	Discountable negative effects would be reduced due to substantially reduced ground disturbing actions and therefore need for water drafting.	Effects would be the same as Alt. 2.	Because all salvage, temporary roads and landings have been dropped there will be less need for water drafting therefore potential effects to aquatic resources are reduced.
<p>Direct Effects: Resident Trout - Actions that could directly affect resident trout include water drafting and legacy sediment site repair.</p>	Direct effects will be minimized through designation of acceptable sites and use of PDFs and BMPs for water drafting. Direct effects would be discountable and minor to trout.	Effects would be the same as Alt. 2.	Effects would be the same as Alt. 2.	Effects would be the same as Alt. 2.	Effects would be the same as Alt. 2.	Because all salvage, temporary roads and landings have been dropped there will be less need for water drafting therefore potential effects to aquatic resources are reduced.
<p>Direct Effects: Other Aquatic Species – Actions that could directly affect FS Sensitive aquatic species include water drafting, temporary road stream crossings and legacy sediment site repair.</p>	Direct effects will be minimized through designation of acceptable sites (PDF watershed-34) and implementation of BMPs for water drafting. Direct effects would be discountable and minor to aquatic species.	Effects would be the same as Alt. 2.	Discountable negative effects would be reduced where near stream temporary road and crossing work are dropped (Doggett Cr and face drain to Beaver Cr).	Effects would be the same as Alt. 2.	Effects would be the same as Alt. 4.	Because all salvage, temporary roads and landings have been dropped there will be less need for water drafting therefore potential effects to aquatic resources are reduced.
MIS River/Stream Habitat Affected	2.6 miles	2.6 miles	0 miles	2.6 miles	0 miles	0 miles
MIS Marsh/Lake/Pond Habitat Affected	0 miles	0 miles	0 miles	0 miles	0 miles	0 miles

Table 25: Summary of Effects by analysis indicator for the Happy Camp Fire

Indicator	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Mod Alt. 2	Mod Alt. 3
<p>Indirect Effects: Sediment All ground disturbing actions have the potential to affect sediment production. Salvage harvest, site prep and plant and fuels treatments would have only minor and discountable effects to aquatic resources wherever they occur-due to project design.</p>	<p>Several temporary road actions within RRs, six new landings in RR, reopen of 9 miles decommissioned roads resulting in short term negative effects that may be adverse. Areas of road impacts: Caroline Creek (46N62), Lower Grider Creek (46N41YA), Cliff Valley Creek (46N77), and China Creek (46N78). Existing sediment sites in Grider, Kuntz, and O'Neil drainages fixed.</p>	<p>Near stream temporary road actions, and effects would be the same as for Alternative 2. Potential adverse effects from reopening 46N62 remain.</p>	<p>Temp roads with crossings dropped: Grider, Gard, Caroline, Cliff Valley and China creeks. Negative short term impacts avoided. No long term benefits from addressing existing legacy sediment sites in O'Neill Creek. Potential adverse effects from reopening 46N62 avoided. Overall, discountable short term negative effects.</p>	<p>Temp road actions and effects are the same as Alt 4 except reopening 46N62 remains; therefore, potential adverse effects remain. No long term benefits from addressing existing legacy sediment sites in O'Neill Creek.</p>	<p>Reopening of 46N62 dropped; therefore, potential adverse effects are avoided. Overall, discountable negative short term effects.</p>	<p>Reopening of 46N62 dropped; therefore, potential adverse effects are avoided. Overall, discountable negative short term effects.</p>
<p>Indirect Effects: Temperature Actions that could affect temperature include roadside hazard tree removal, fuels reduction, temp road crossings and increased sedimentation.</p>	<p>Shade in RRs protected by avoiding salvage in RRs and PDFs minimize effects of roadside and fuels treatments resulting in discountable negative effects. Sedimentation can affect temps – see above for sediment impacts.</p>	<p>Same as Alternative 2.</p>	<p>Same as Alternative 2.</p>	<p>Same as Alternative 2.</p>	<p>Same as Alternative 2.</p>	<p>Same as Alternative 2.</p>
<p>Indirect Effects: Large Wood Actions that could affect large wood are landings in RRs, temp road crossings, and hazard tree removal</p>	<p>PDFs ensure retention of large wood near all stream channels. Discountable negative effects.</p>	<p>Same as Alternative 2.</p>	<p>Same as Alternative 2.</p>	<p>Same as Alternative 2.</p>	<p>Same as Alternative 2.</p>	<p>Less potential effect of hazard tree removal where it is reduced in extent.</p>

Indicator	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Mod Alt. 2	Mod Alt. 3
Direct Effects: Salmon and Steelhead Actions that could directly affect fish are water drafting and any stream crossing work	Direct effects will be minimized through designation of acceptable sites that avoid impacts to thermal refugia and compliance with PDFs including use of NMFS (2001) water drafting specifications in Coho CH. Direct effects would be due to disturbance and likely to be discountable and minor.	Same as Alternative 2.				
Direct Effects: Resident Trout	Direct effects will be minimized through designation of acceptable sites that avoid impacts to thermal refugia and compliance with FS BMPs. Direct effects would be due to disturbance and likely to be discountable and minor.	Same as Alternative 2.				
Direct Effects: Other Aquatic Species	Direct effects will be minimized through designation of acceptable sites that avoid impacts to thermal refugia and compliance with FS BMPs. Direct effects would be due to disturbance and likely to be discountable and minor.	Same as Alternative 2.				
MIS River/Stream Habitat Affected	6 miles	6 miles	0.5 miles	1.1 miles	2.35 miles	1.5 miles
MIS Marsh/Lake/Pond Habitat Affected	1.25 miles	1.25 miles	0 miles	0.25 miles	0.25 miles	0 miles

Table 26: Summary of Effects by analysis indicator for the Whites Fire Area

Indicator	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Mod Alt. 2	Mod Alt. 3
Indirect Effects: Sediment All ground disturbing actions have the potential to affect sediment production. Salvage harvest, site prep and plant and fuels treatments would have only minor and discountable effects to aquatic resources wherever they occur-due to project design.	There are no near stream temporary road actions in the Whites Fire area under any alternative. Discountable negative effects.	Same as Alternative 2.				
Indirect Effects: Temperature Actions that could affect temperature include roadside hazard tree removal, fuels reduction, temp road crossings and increased sedimentation.	Shade in RRs protected by avoiding salvage in RRs and PDFs minimize effects of roadside and fuels treatments resulting in discountable negative effects. Sedimentation can affect temps – see above for sediment impacts.	Same as Alternative 2.				
Indirect Effects: Large Wood Actions that could affect large wood are landings in RRs, temp road crossings, and hazard tree removal	Salvage excludes RRs. Project design features ensure retention of large wood within near stream areas for fuels, hazard tree removal and landings. Discountable negative effects.	Same as Alternative 2.	Less potential effect of hazard tree removal where it is reduced in extent.			
Direct Effects: Salmon and Steelhead Actions that could directly affect fish are water drafting and any stream crossing work	Direct effects will be minimized through designation of acceptable sites that avoid impacts to thermal refugia and compliance with PDFs including use of NMFS (2001) water drafting specifications in Coho CH. Direct effects would be due to disturbance and likely to be discountable and minor.	Same as Alternative 2.				
Direct Effects: Resident Trout	Direct effects will be minimized through designation of acceptable sites that avoid impacts to thermal refugia and compliance with FS BMPs. Direct effects would be due to disturbance and likely to be discountable and minor.	Same as Alternative 2.				
Direct Effects: Other Aquatic Species	Direct effects will be minimized through designation of acceptable sites that avoid impacts to thermal refugia and compliance with FS BMPs. Direct effects would be due to disturbance and likely to be discountable and minor.	Same as Alternative 2.				
MIS River/Stream Habitat Affected	2 miles	2 miles	0 miles	0 miles	0 miles	0 miles
MIS Marsh/Lake/Pond Habitat Affected	0 miles	0 miles	0 miles	0 miles	0 miles	0 miles