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# Aquatic Conservation Strategy Objective Report

## Westside Fire Recovery project

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

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# Aquatic Conservation Strategy Objective Report

## Introduction

The Forest Plan contains the components, objectives and standards and guidelines for consistency of projects with the Aquatic Conservation Strategy (ACS). The Record of Decision for the Forest Plan (USFS, 1995c) is the guiding document for Forest projects; the Forest ROD incorporates the Aquatic Conservation Strategy standards and guidelines from the ROD for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (commonly known as the Northwest Forest Plan) (USDA Forest Service and USDI Bureau of Land Management 1994b).

This analysis will document the consistency of the project with the Aquatic Conservation Strategy Objectives at the site scale and the 5<sup>th</sup> field watershed scale. The consistency will be analyzed at the short-term (during implementation up to the first 1-2 years) and the long-term scales (any time after short-term). This report will provide a description of the existing watershed condition, including the important physical and biological components of the 5<sup>th</sup> field watershed, include discussion of the natural range of variability for potentially affected processes (i.e. temperature, sediment, flows – whatever may be affected by the project). Provide discussion of how the proposed action maintains the existing condition or moves it within the range of natural variability. It will also review the relevant recommendations of the watershed analyses. The assessment of effects at the watershed scale is specifically on the treatments proposes in alternative 2 since this has the highest impact of the alternatives. The acres of treatment in the 5<sup>th</sup> field watershed (Detailed descriptions of the actions proposed by alternative are in Chapter 2 of the DEIS. The near stream temporary roads and landings can be found in Table 11.

Table 7) and the Riparian Reserves (Table 8) are displayed for comparison between alternatives of the influence on the objectives. The Indian Creek 5<sup>th</sup> field only has 1.3 acres of roadside hazard tree removal, so there is no watershed scale effects or localized scale effects for any of the objectives and won't be analyzed further in this report.

The actions considered for influence to the objectives include salvage, roadside hazard, hazardous fuels treatments, site preparation, temporary road access and new landing construction. See the DEIS for full descriptions of these actions. There is also legacy sediment source mitigation in the Elk Creek watershed. Since this action only effects sediment regime is discussed only in the Objective 5. Any road related mitigations related to temporary road access are discussed under that section in the appropriate objective and watershed since they are effective at the site scale only. Water drafting may affect in-stream flows and will be discussed in Objective 6 only.

## Existing Condition

There are twelve 5<sup>th</sup> field watersheds that are at least partially contained in the project area (Table 1 and Table 2). Soil burn severity is used for this and other watershed resource reports because it best represents the watershed response to a wildfire. High soil burn severity areas have long-term soil damage and will be relatively slow to naturally recover. Tree canopy here is mostly consumed and absent, and effective soil cover is generally less than 20 percent, consisting of gravels and cobbles, some unburned down wood, and sparse needle cast. Moderate soil burn severity Tree canopy is mostly burned with “brown crowns” present and actively dropping enough needle cast to produce effective soil cover in many areas. Water repellency is fire-exacerbated but is patchy and discontinuous. Low soil burn severity has very little evidence of significant soil heating with essentially no changes in soil color, structure, organic matter or fine root combustion. Water repellency is hit-or-miss, from slight to severe, and is attributed as natural, not fire-exacerbated.

**Table 1: Soil burn severity for the 2014 wildfires by 5<sup>th</sup> field watershed.**

5th Field Code	5th Field Watershed	Acres with High Soil Burn Severity	Acres with Moderate Soil Burn Severity	Acres with Low Soil Burn Severity	Acres with Very Low Soil Burn Severity	Acres Outside of Fire Perimeter	Percent Watershed in Fire Perimeter
1801020608	Humbug Creek-Klamath River	1.7	269.9	2205.3	1,050.7	64,495.3	5.2%
1801020609	Beaver Creek	1,325.9	3,912.6	6,392.6	2,150.7	55,825.3	19.8%
1801020610	Horse Creek-Klamath River	661.6	5,027.0	7,539.9	1,929.7	83,452.9	15.4%
1801020611	Seiad Creek-Klamath River	689.6	14,155.4	28,942.7	4,249.2	33,669.5	62.3%
1801020802	French Creek-Scott River	0.1	72.0	260.3	115.4	114,770.0	0.4%
1801020806	Lower Scott River	234.0	6,498.0	21,166.4	2,631.0	67,070.8	35.1%
1801020901	Indian Creek	0.0	0.0	0.0	0.0	86,201.6	0.0%
1801020902	Thompson Creek-Klamath River	46.9	966.1	7,514.4	621.4	58,074.9	16.7%
1801020903	Elk Creek	289.7	4,183.9	20,816.7	3,409.1	32,129.8	56.9%
1801020906	Ukonom Creek-Klamath River	0.0	0.0	70.6	35.2	87,778.1	0.3%
1801021001	South Fork Salmon River	1.1	141.5	191.4	54.3	185,200.0	0.2%
1801021002	North Fork Salmon River	1,635.9	9,800.4	16,054.1	5,442.9	97,460.8	25.3%

**Table 2: Soil burn severity for the Riparian Reserves (RR) for the 2014 wildfires by 5<sup>th</sup> field.**

5th Field Code	5th Field Watershed	RR Acres in High Soil Burn Severity	RR Acres in Moderate Soil Burn Severity	RR Acres in Low Soil Burn Severity	RR Acres in Very Low Soil Burn Severity	RR Acres outside of fire Perimeter	% RR burned
1801020608	Humbug Creek-Klamath River	0.4	33.6	387.5	248.5	16,617.9	3.9%
1801020609	Beaver Creek	304.9	690.0	1448.0	535.6	12,647.7	19.1%
1801020610	Horse Creek-Klamath River	1,39.3	1,092.2	1,980.1	590.5	21,281.3	15.2%
1801020611	Seiad Creek-Klamath River	79.1	2,164.5	6,580.3	872.2	8,309.0	53.9%
1801020802	French Creek-Scott River	0.0	1.9	32.8	16.4	26,630.7	0.2%
1801020806	Lower Scott River	46.7	1,218.3	4,810.6	701.5	16,251.3	29.4%
1801020901	Indian Creek	0.0	0.0	0.0	0.0	20,069.3	0.0%
1801020902	Thompson Creek-Klamath River	5.1	117.3	1,692.0	112.7	12,894.8	13.0%
1801020903	Elk Creek	28.1	598.7	4,882.9	623.7	8,449.0	42.1%
1801020906	Ukonom Creek-Klamath River	0.0	0.0	5.0	3.4	22,284.7	0.0%
1801021001	South Fork Salmon River	0.2	24.8	41.1	14.7	42,819.8	0.2%
1801021002	North Fork Salmon River	327.7	1,662.8	4,011.2	1,614.5	23,022.6	24.9%

## Watershed Analysis Recommendations

This section of the ACS assessment documents review of relevant recommendations of watershed assessments applicable to the 2014 West Side Recovery Project.

## Thompson/Seiad/Grider Ecosystem Analysis

The Thompson/Seiad/Grider Ecosystem Analysis includes the Lower Grider Creek, West Grider/Bittenbender Creek, Caroline Creek, Walker Creek O'Neil/Schutts Creek, Panther/Williams Creek and China Creek sub watersheds. Extensive areas burned with moderate to high severity in the 2014 Happy Camp fire in this watershed. This area is generally south of the Klamath River, west of the Lower Scott River and east of Elk Creek.



**Figure 1: High intensity burn area in upper Walker Creek. Note the nearly complete consumption of ground fuels, duff and litter.**

## **Relevant Recommendations**

The Thompson/Seiad/Grider Ecosystem Analysis was prepared in 1999. The descriptions and recommendations in the assessment are based on watershed conditions at that time. Since the assessment was prepared, there have been minor disturbances from smaller fires and flood events. The most notable disturbance was a winter storm in 2005 that was a 10-20 year storm intensity event depending on location. Management activities including fuels reduction, road decommissioning, aquatic habitat improvements and vegetation management have been ongoing since the assessment was prepared. The 2014 Happy Camp fire was by far the largest watershed disturbance that has occurred since the assessment was written. Approximately 60-70% of the fire area was low to moderate intensity. Depending on the subwatershed, 30 – 40% burned with moderate to high intensity.

The Thompson/Seiad/Grider Ecosystem Analysis described a number of management opportunities that are relevant to the current situation.

**Table 3: Watershed Assessment recommendations for Thompson/Seiad/Grider Watersheds.**

Management Opportunity	Relevance to the 2014 Happy Camp Fire and the Westside Fire Recovery
<p>Page 6-3, Table 6-1, Hillslope Processes Existing Situation 1</p> <p>Caroline Creek, Walker Creek and West Grider /BittenBender are water quality impaired. High road densities have contributed to impaired conditions</p> <p>Decommission roads contributing to the impairment of subwatersheds following a site specific analysis.</p>	<p>All of these subwatersheds burned with extensive areas of moderate and high intensity fire. Conditions created by the fire are likely to impact water quality, notably sediment delivery. BAER actions were focused on reducing sediment-contributing impacts of the fire with an emphasis on roads. The Westside Fire Recovery will not increase road density. Any temporary roads used will be decommissioned after use.</p>
<p>Page 6-3, Table 6-2 Riparian Areas Existing Condition 4</p> <p>High amounts of instream fine sediments are reducing habitat quality. Most impacted streams are Walker, Grider, Thompson, Seiad</p> <p>Restore natural stream processes allowing streams to become resilient to disturbance.</p>	<p>Conditions created by the fire are likely to impact water quality, notably sediment delivery, far more than any of the action alternatives. BAER actions were focused on reducing sediment-contributing impacts of the fire with an emphasis on roads. No salvage harvest is proposed in Riparian Reserves in the Westside Fire Recovery in part to minimize potential sediment impacts. All temporary roads will be decommissioned after use.</p>
<p>Page 6-3, Table 6-2 Riparian Areas Existing Condition 6</p> <p>Low levels of instream large woody debris exist in Walker, Seiad and Thompson Creek.</p> <p>Improve site conditions to promote growth of large trees and increase large wood recruitment in capable Riparian Reserves. Discourage removal of large trees from Riparian Reserves.</p>	<p>Over time, there will likely be significant contributions of large wood and coarse gravel from landslides caused by the 2014 fire irrespective of the action alternatives. This has the potential to benefit aquatic conditions where large wood and coarse gravels are deficient. The Westside Fire Recovery does not propose to remove large woody debris from Riparian Reserves during salvage operations.</p>
<p>Page 6-4, Table 6-4 Fire Existing Condition 9</p> <p>Areas that burned with low and moderate intensity in the 1987 fires present an opportunity to apply underburning to establish conditions that existed with the influence of frequent fire disturbance.</p> <p>Treat or underburn areas that burned in fires of 1987 to restore conditions that were present prior to fire suppression activities.</p>	<p>About 60% of the Happy Camp Fire area burned with moderate or low fire intensity similar to the conditions that existed after the 1987 fires... These areas present an opportunity to reintroduce fire. The Westside Fire Recovery proposes extensive fuels treatments that include underburning for the purpose of restoring historic fuel conditions. .</p> <p>In areas of high severity fire where most of the trees were killed, salvage harvest can reduce the intensity of future fires by removing large fuels.</p>

<b>Management Opportunity</b>	<b>Relevance to the 2014 Happy Camp Fire and the Westside Fire Recovery</b>
<p>Page 6-4, Table 6-4 Fire Existing Condition 12</p> <p>Much of the area around residences is identified as having moderate to high fire behavior potential. Develop fire defensible spaces and fire safe conditions in and around residential areas.</p>	<p>A number of residences and small residential enclaves were evacuated, some multiple times, during the 2014 Happy Camp Fire. Approximately 1,200 acres of fuels reduction in the Wildland Urban Interface is proposed in the Happy Camp Fire area.</p>
<p>Page 6-4, Table 6-4 Fire Existing Condition 13, 14</p> <p>13: Species diversity is being lost with fire intolerant species (white fir) dominating much of the area.</p> <p>Establish a fire and fuels program that progresses toward a more frequent, low intensity fire regime.</p> <p>14: Change in stand structure has been most evident on south and west aspects and higher on slopes where historically stands are more open.</p> <p>Use prescribed fire to reduce fuels or use mechanical treatments prior to burning where fuel loadings are extreme.</p> <p>14 a. In late successional stands, reduce stand densities, ladder fuels and ground fuels where they contribute to the risk of large scale disturbance in reserves.</p> <p>14 b. Protect mid and early seral vegetation in LSRs from loss to large scale disturbance events. Use hand piling or mechanical treatment of fuels in areas that need pre-treatment.</p> <p>14 c. Promote the development of late successional habitat that is at a lower risk for large scale disturbance.</p>	<p>In many areas where low and moderate fire intensity occurred, the white fir understory was reduced. The Westside Fire Recovery proposes several thousand acres of underburning and other fuels treatments that will further reduce the dominance of white fir ladder fuels in the understory.</p> <p>Where high-severity fire occurred, most of the trees of all size classes were killed. In areas of high severity burns, approximately 5,400 acres of site preparation and planting of fire-adapted pines, Douglas fir and cedar is proposed to reestablish fire-resilient ecosystems. These acres are in addition to salvage areas where site preparation and planting will also occur.</p> <p>Where high severity fire occurred in standing timber, salvage is proposed to mechanically remove snags that would create future fuel loads as they break off and fall down. This provides a long-term reduction in heavy fuels (Peterson et al. 2014). Removing heavy fuels reduces future fire intensity in treated areas.</p>
<p>Page 6-6, Table 6-6 Terrestrial Wildlife Existing Condition 19</p> <p>Habitat for northern spotted owls has changed over time as a result of fire suppression. Lack of fire has resulted in the susceptibility of the area from catastrophic loss of habitat from wildfire.</p> <p>Implement Management Opportunities 14a, b, and c to protect and develop habitat for northern spotted owls within LSRs in the analysis area.</p>	<p>The Westside Fire Recover Project is consistent with Management Opportunities 14 a, b and c.</p> <p>In many areas where low and moderate fire intensity occurred, the white fir understory was reduced. The Westside Fire Recovery proposes several thousand acres of underburning and other fuels treatments that will further reduce the dominance of white fir ladder fuels in the understory.</p> <p>Where high-severity fire occurred, most of the trees of all size classes were killed. In areas of high severity</p>

Management Opportunity	Relevance to the 2014 Happy Camp Fire and the Westside Fire Recovery
	<p>burns, approximately 5,400 acres of site preparation and planting of fire-adapted pines, Douglas fir and cedar is proposed to reestablish fire-resilient ecosystems. These acres are in addition to salvage areas where site preparation and planting will also occur.</p> <p>Where high severity fire occurred in standing timber, salvage is proposed to mechanically remove snags that would create future fuel loads as they break off and fall down. This provides a long-term reduction in heavy fuels (Peterson et al. 2014). Removing heavy fuels reduces future fire intensity in treated areas.</p>



**Figure 2: A moderate to low intensity burn area in O’Neil Creek. This area provides important nesting and roosting habitat for the northern spotted owl.**

### **Elk Creek Ecosystem Analysis**

The Elk Creek Ecosystem Analysis covers the Elk Creek watershed which drains to the Klamath River west of Happy Camp. Elk Creek lies within the Happy Camp portion of the Westside Fire Recovery Project.

## **Relevant Recommendations**

The Elk Creek Ecosystem Analysis was prepared in 1994. The descriptions in the assessment are based on watershed conditions at that time. Since the assessment was prepared, there have been minor disturbances from smaller fires and flood events. The most notable disturbance was a winter storm in 2005 that was a 10 to 20 year storm intensity event. Management activities including fuels reduction, road decommissioning, aquatic habitat improvements and vegetation management have been ongoing since the assessment was prepared. The 2014 Happy Camp fire was by far the largest watershed disturbance that has occurred since the assessment was written. Approximately 60-70% of the fire area was low to moderate intensity. Depending on the subwatershed, 30 – 40% of the area burned with moderate to high intensity. Most of the fire activity associated with the Happy Camp Fire occurred in the headwaters of Cougar Creek and East Fork of Elk Creek.

The Elk Creek Ecosystem Assessment was one of the first watershed scale assessments done under the umbrella of the Northwest Forest Plan. As an early prototype of the watershed assessment process, the document does not make specific recommendations found in later iterations of other watershed assessments. The desired conditions described in the assessment are those found in the Klamath National Forest Land and Resource Management Plan (LRMP), as amended. The assessment notes the historic low to moderate intensity, frequent fire history of the watershed, and the trend toward larger, more intense fires at the landscape scale that are the result of fuel accumulation. The assessment notes the pattern of larger patch sizes on upper slopes. The 2014 burn patterns in the headwaters of Cougar Creek and the East Fork Elk Creek followed this pattern.

The primary action associated with the Westside Fire Recovery project in Elk Creek is site preparation and planting of appropriate fire-resilient species. Where high severity fire occurred in standing timber, salvage is proposed to mechanically remove snags that would create future fuel loads as they break off and fall down. This provides a long-term reduction in heavy fuels (Peterson et al. 2014). Removing heavy fuels reduces future fire intensity in treated areas. These actions are consistent with the objectives of the Klamath National Forest LRMP.

## **Lower Scott Ecosystem Analysis**

The Lower Scott River Ecosystem Analysis covers three major watersheds: Canyon Creek, Kelsey Creek and Mill Creek as well as several smaller face drainages that flow directly to the Scott River. Nearly all of the 2014 Happy Camp Fire occurred on the west side of the Scott River in the Middle Creek, Thompson Creek, McCarthy Creek and Swanson Gulch drainages.

## Relevant Recommendations

The Lower Scott Ecosystem Analysis was prepared in 2000. The descriptions and recommendations in the assessment are based on watershed conditions at that time. Since the assessment was prepared, there have been minor disturbances from smaller fires and flood events. The most notable disturbance was a winter storm in 2005 that was a 10 year storm intensity event. Management activities including fuels reduction, road decommissioning, aquatic habitat improvements and vegetation management have been ongoing since the assessment was prepared. The 2014 Happy Camp fire was by far the largest watershed disturbance that has occurred since the assessment was written. Approximately 60-70% of the fire area was low to moderate intensity. Depending on the subwatershed, 30 – 40% of the area burned with moderate to high intensity.

The Lower Scott Ecosystem Analysis described a number of management opportunities that are relevant to the current situation.

**Table 4: Watershed Assessment recommendations for Lower Scott Watershed.**

Management Opportunity	Relevance to the 2014 Happy Camp Fire and the Westside Fire Recovery
<p>Page 6-3, Table 6-1 Hillslope Processes Existing Condition 1</p> <p>Three subwatersheds have been identified as Impaired (Deep/Middle, Tompkins, &amp; Snow/Isinglass); high road density, fire, and timber harvest are the primary contributors</p> <p>Design and location of future management activities improve or maintain subwatershed conditions. Examples; avoid unstable lands, avoid constructing new roads, use prescribed fire and vegetation management to reduce fuel loadings. Manage planted stands in previously burned and harvested areas to maximize root strength and tree growth to promote hillslope stability.</p>	<p>The Westside Fire Recovery project includes fuel treatments intended to reduce the risk of catastrophic fire. Where high-severity fire occurred, most of the trees of all size classes were killed.</p> <p>In areas of high severity burns, approximately 5,400 acres of site preparation and planting of fire-adapted pines, Douglas fir and cedar is proposed to reestablish fire-resilient ecosystems. These acres are in addition to salvage areas where site preparation and planting will also occur.</p> <p>Where high severity fire occurred in standing timber, salvage is proposed to mechanically remove snags that would create future fuel loads as they break off and fall down. This provides a long-term reduction in heavy fuels (Peterson et al. 2014). Removing heavy fuels reduces future fire intensity in treated areas.</p>
<p>Page 6-3, Table 6-1 Hillslope Processes Existing Condition 4</p> <p>Catastrophic wildfire has the potential to cause watershed damage, increase erosion and negatively impact downstream resources.</p> <p>Identify and treat high fuel loading to reduce the risk of catastrophic fire.</p>	<p>No actions are anticipated on active landslides other than site stabilization that may have occurred during BAER work.</p>

<b>Management Opportunity</b>	<b>Relevance to the 2014 Happy Camp Fire and the Westside Fire Recovery</b>
<p>Page 6-3, Table 6-2 Riparian Areas Existing Condition 5</p> <p>High amounts of fine sediment are reducing habitat quality for aquatic species in the Scott River.</p> <p>5b: Promote and maintain vegetative growth, especially conifer on intensively burned land and on active landslides.</p>	
<p>Page 6-6, Table 6-4 Forest Health and Fire Existing Condition 18</p> <p>There are 5,900 acres of plantations in the analysis area. These investments in the forest's future are vulnerable to fire</p> <p>Thin plantations and remove fuels to develop condition that are resilient to fire.</p>	<p>The Westside Fire Recovery Project proposes to site prep and plant severely burned plantations, and areas that would naturally support conifers. A mix of fire-resistant pines, Douglas fir and incense cedar will be planted at appropriate spacing for the site conditions. Areas that are salvage harvested would also be site-prepped and planted. Site prep includes fuels reduction.</p>
<p>Page 6-6, Table 6-4 Forest Health and Fire Existing Condition 20</p> <p>Most of the residences within the analysis area are found in the lower elevations and usually in areas with naturally occurring flashy fuels.</p>	<p>Fuel breaks and fuel treatment zones are planned in key areas adjacent to communities at risk in the Lower Scott Watershed. Approximate 1,200 acres of fuels treatments in the Wildland Urban Interface are proposed.</p>
<p>Page 6-6, Table 6-4 Forest Health and Fire Existing Condition 22</p> <p>The analysis identified 50% of the analysis area as having moderate to high fire behavior potential. It is possible for large catastrophic fires to move from watershed to watershed.</p> <p>Utilize key ridges, existing firelines, and roads to develop a system of shaded fuel breaks that will be effective fuel breaks for underburn projects and/or wildfires.</p>	<p>Strategic fuel breaks are an integral part of the Westside Fire Recovery Project. An extensive network of shaded fuel breaks is proposed in the Lower Scott River assessment area.</p>
<p>Page 6-6, Table 6-4 Forest Health and Fire Existing Condition 24</p> <p>Effective fire suppression has changed the distribution and structure of late-successional forest. Lack of fire has resulted in increased stand densities, fuels buildup, development of ladder fuels, development of closed</p>	<p>A central objective of the Westside Fire Recovery Project is creation of sustainable, fire resilient ecosystems.</p> <p>The Westside Fire Recovery Project includes fuel treatments intended to reduce the risk of catastrophic fire.</p>

<b>Management Opportunity</b>	<b>Relevance to the 2014 Happy Camp Fire and the Westside Fire Recovery</b>
<p>canopies that can sustain crown fire, and an understory which has filled in with shade-tolerant conifer and hardwood reproduction. Change in stand structure has been most evident on south and west aspects and higher on slopes where historically stands were more open.</p> <p>24a- In late-successional forest stands reduce ground fuels and ladder fuels where they contribute to risk of large-scale disturbance events in reserves. Use prescribed fire to reduce fuels, use hand-piling or mechanical treatments prior to burning where fuel loadings are extreme.</p> <p>24b- Protect mid- and early seral vegetation in treatment of fuels in areas where prescribed fire is not recommended or in areas that need pre-treatment. Manage for more dense stands on N&amp;E aspects and in draws, manage for open grown stands on S&amp; W aspects and higher on slopes.</p>	<p>In areas of high severity burns, approximately 5,400 acres of site preparation and planting of fire-adapted pines, Douglas fir and cedar is proposed to reestablish fire-resilient ecosystems. These acres are in addition to salvage areas where site preparation and planting will also occur. Planting would reflect stand density objectives described in the assessment.</p> <p>Where high severity fire occurred in standing timber, salvage is proposed to mechanically remove snags that would create future fuel loads as they break off and fall down. This provides a long-term reduction in heavy fuels (Peterson et al. 2014). Removing heavy fuels reduces future fire intensity in treated areas.</p>
<p>Page 6-8, Table 6-5 Late Successional Habitat Existing Condition 25</p> <p>Forest management activities such as timber harvest, fire salvage and road building have reduced the amount of dense late successional forest in the assessment area</p> <p>25a Promote healthy, fast growing plantations that will develop into late successional forest within LSRs.</p>	
<p>Page 6-8, Table 6-6 Terrestrial Wildlife Existing Condition 28</p> <p>Habitat for spotted owls has changed over time as a result of fire suppression and management activities. The lack of fire has resulted in conditions which contribute to the susceptibility of the area to catastrophic loss from wildfire.</p> <p>28a Implement opportunities 24a, 24b, 25a, and 25b to develop suitable habitat for northern spotted owls within LSRs in the analysis area.</p>	

## North Fork Ecosystem Analysis

The North Fork Ecosystem Analysis covers the portions of the Westside Fire Recovery Project in the Whites Fire, which occurred in the North Fork of the Salmon River. Extensive areas burned

with moderate to high severity in the Whites Fire. This area is generally east of Sawyers Bar and West of the Russian Wilderness.

### Relevant Recommendations

The North Fork Ecosystem Analysis was prepared in 1995. The descriptions and recommendations in the assessment are based on watershed conditions at that time. Since the assessment was prepared, there have been minor disturbances from smaller fires and flood events. The most notable disturbance was a winter storm in 2005 that was a 10-20 year storm intensity event depending on location. Management activities including fuels reduction, road decommissioning, aquatic habitat improvements and vegetation management have been ongoing since the assessment was prepared. The 2014 Happy Camp fire was by far the largest watershed disturbance that has occurred since the assessment was written. Approximately 60-70% of the fire area was low to moderate intensity. Depending on the subwatershed, 30 – 40% burned with moderate to high intensity.

The North Fork Ecosystem Analysis described a number of management opportunities that are relevant to the current situation.

**Table 5: Watershed Assessment recommendations for North Fork Salmon River Watershed.**

<b>Management Opportunity</b>	<b>Relevance to the 2014 Whites Fire and the Westside Fire Recovery</b>
<p>Page 6-4, Table 6-3, Fire Management Opportunities Existing Condition 10, 12, 13, 15, 17</p> <p>Partial to complete stand replacement fires in mature stands of conifer and hardwoods can be expected from the current fire regime.</p> <p>Develop a fire regime of less severity and strategically locate treatments to protect high value resources areas from stand-replacing fires.</p> <p>12- Fire-adapted and shade intolerant species are not regenerating because of the increased shading and lack of fire to create openings.</p> <p>Using prescribed fire and other silvicultural treatments, develop stands that include fire-</p>	<p>A central objective of the Westside Fire Recovery Project is creation of sustainable, fire resilient ecosystems.</p> <p>The Westside Fire Recovery Project includes fuel treatments intended to reduce the risk of catastrophic fire. Approximately 9,800 acres of understory prescribed fire, 410 acres of Wildland Urban Interface fuels treatments and 920 acres of fuels management zones are proposed in the Whites Fire area.</p> <p>In areas of high severity burns, approximately 650 acres of site preparation and planting of fire-adapted pines, Douglas fir and cedar is proposed to reestablish fire-resilient ecosystems. These acres are in addition to salvage areas where site preparation and planting will also occur. Planting would</p>

<p>adapted, shade-Intolerant species.</p> <p>13- Early seral vegetation from past fire activity occurs in large homogeneous blocks and is very susceptible to rapidly spreading fire.</p> <p>Use prescribed fire and prescribed natural fire to develop a fire regime of less severity. Using prescribed fire and other silvicultural treatments, develop stands that Include fire adapted, shade intolerant species.</p> <p>15- There are 41,000 acres of fuel model 1 0 identified in this analysis.</p> <p>Develop a fire regime of less severity. Develop stands that include fire-adapted, shade-Intolerant species. Use vegetation management and timber harvest to make the watershed more resilient to catastrophic fire at an acceptable level and lessen excessive dead fuel component by controlling stocking levels in timbered stands.</p> <p>17- Fires starting on south aspects between 2,000-4,500 foot elevations have higher rates of spread and are more resistant to control than less exposed areas.</p> <p>Use prescribed fire and natural fire to develop a fire regime of less severity; consider mechanical means [of fuels reduction].</p>	<p>reflect stand density objectives described in the assessment.</p> <p>Where high severity fire occurred in standing timber, salvage is proposed to mechanically remove snags that would create future fuel loads as they break off and fall down. This provides a long-term reduction in heavy fuels (Peterson et al. 2014). Removing heavy fuels reduces future fire intensity in treated areas.</p>
<p>Page 6-6, Table 6-5, LSR Management Opportunities Existing Condition 20a</p> <p>20b The late-seral conifer disease and high intensity fires. Stands are now more susceptible to large-scale stand-replacing fires</p>	<p>The Westside Fire Recovery Project includes fuel treatments intended to reduce the risk of catastrophic fire. Approximately 9,800 acres of understory prescribed fire, 410 acres of Wildland Urban Interface fuels treatments and 920 acres of fuels management zones are proposed in the Whites Fire area.</p>

Use prescribed burning to reduce fuels buildup, construct fuel breaks where appropriate.	
<p>Page 6-6, Table 6-6, Areas with Watershed Concerns</p> <p>Existing Condition 27a</p> <p>27a Road erosion and instability problems are affecting Music Creek and South Russian Creek.</p> <p>Repair problem areas on the road system and close excess roads where appropriate.</p>	<p>The Westside Recovery Project proposes to use decommissioned roads and existing temporary roadbeds rather than construct new roads. Temporary roads will be decommissioned after use.</p>

## Beaver Creek Ecosystem Analysis

The North Fork Ecosystem Analysis covers the portions of the Westside Fire Recovery Project in the Beaver Fire, which occurred in the Beaver Creek Watershed on the north side of the Klamath River above Oak Knoll... Extensive areas burned with moderate to high severity in the Beaver Fire. .

### Relevant Recommendations

The Beaver Creek Ecosystem Analysis was prepared in 1996. The descriptions and recommendations in the assessment are based on watershed conditions at that time. Since the assessment was prepared, there have been minor disturbances from smaller fires and flood events. The most notable disturbance was a winter storm in 2005 that was a 10-20 year storm intensity event depending on location. Management activities including fuels reduction, road decommissioning, aquatic habitat improvements and vegetation management have been ongoing since the assessment was prepared. The 2014 Beaver Fire was by far the largest watershed disturbance that has occurred since the assessment was written. Much of the Beaver Fire was of relatively higher intensity than other parts of the Westside Fire Recovery Area because of the general south aspect of the watershed.

**Table 6: Watershed Assessment recommendations for Beaver Creek Watershed.**

<b>Management Opportunity</b>	<b>Relevance to the 2014 Beaver Fire and the Westside Fire Recovery</b>
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<p>Page 6-2, Table 6-1, Roads Existing Condition 4</p> <p>4. The existing road system provides good suppression access throughout the watershed.</p> <p>Roads are maintained in a condition adequate for fire suppression access. Roads scheduled for decommissioning are decommissioned after fuels treatment.</p>	<p>The Westside Fire Recovery Project would decommission temporary roads when on-the-ground treatments are completed.</p>
<p>Page 6-3, Table 6-2, Terrestrial Wildlife Habitat Existing Condition 7</p> <p>7- Beaver Creek is providing late-seral connectivity from the Oregon Cascades to the Klamath Mountains. Adequate connectivity, through checkerboard ownership, exists from the Mt. Ashland LSR to the west and southwest to adjoining watersheds.</p> <p>Manage public lands to maintain connectivity.</p>	<p>Connectivity of habitat was considered in the development of Alternatives in the Beaver Fire.</p>
<p>Page 6-4, Table 6-3, Fire Management Existing Condition 12</p> <p>12- Most of the watershed (53%) is identified through fuel modeling as having high fire behavior potential. Moderate fire behavior potential is identified in 39% of the watershed. These fire behavior predictions are attributed to high fuel loadings in the conifer communities and decadent conditions in the hardwood/shrub communities.</p> <p>Identify strategic areas to break up fuels continuity.</p>	<p>Strategic fuel breaks were considered in the Beaver fire in all of the Action Alternatives. Alternative 5 puts special emphasis on strategic fuel breaks adjacent to private lands.</p> <p>The Westside Fire Recovery Project includes fuel treatments intended to reduce the risk of catastrophic fire. Approximately 610 acres of Wildland Urban Interface fuels treatments and 870 acres of fuels management zones are proposed in the Beaver Fire area.</p>
<p>Page 6-8, Table 6-7, Riparian Reserves Existing Condition 31</p> <p>31- Riparian Reserves are serving as important travel corridors for a variety of terrestrial and aquatic species throughout the watershed.</p> <p>Utilize Riparian Reserves to provide connectivity as dispersal corridors between the Mt. Ashland LSR and neighboring LSRs.</p>	<p>No salvage harvest is proposed in any of the Action Alternatives in any of the Riparian Reserves in the Beaver Fire.</p>

## Proposed Treatments

Detailed descriptions of the actions proposed by alternative are in Chapter 2 of the DEIS. The near stream temporary roads and landings can be found in Table 11.

**Table 7: Proposed Activities by 5<sup>th</sup> field watershed for each alternative.**

5th Field Code	5th Field Watershed	Treatment	Acres of Treatment in Alt 2	Acres of Treatment in Alt 3	Acres of Treatment in Alt 4	Acres of Treatment in Alt 5
1801020608	Humbug Creek-Klamath River	Salvage*	0.0	0.0	0.0	0.0
		Roadside Hazard	410.0	410.0	410.0	410.0
		Hazardous Fuels	350.6	350.6	350.6	420.1
		Site Prep	0.0	0.0	0.0	0.0
		Temp Road Access (miles)	0.0	0.0	0.0	0.0
		Number of New Landings	0.0	0.0	0.0	0.0
1801020609	Beaver Creek	Salvage*	105.4	0.0	105.4	105.4
		Roadside Hazard	1,318.6	1,318.6	1,139.5	1,318.6
		Hazardous Fuels	724.8	724.8	724.8	1429.4
		Site Prep	689.6	689.6	689.6	689.6
		Temp Road Access (miles)	1.5	1.5	0.0	1.5
		Number of New Landings	6.0	6.0	4.0	1.0
1801020610	Horse Creek-Klamath River	Salvage*	575.0	0.0	494.6	559.6
		Roadside Hazard	1,387.8	1,387.8	1,293.9	1,387.8
		Hazardous Fuels	1,016.1	1,016.1	1,016.1	1,454.4
		Site Prep	1,092.6	1,092.6	1,092.6	1,081.7
		Temp Road Access (miles)	1.4	0.1	0.3	1.4
		Number of New Landings	15.0	15.0	14.0	6.0
1801020611	Seiad Creek-Klamath River	Salvage*	6,056.4	5,483.8	5,291.5	1,174.1
		Roadside Hazard	4,570.2	4,570.2	4,519.3	4,570.2
		Hazardous Fuels	2,532.5	2,532.5	2,532.5	2,532.5
		Site Prep	1,371.5	1,371.5	1,371.5	80.1

		Temp Road Access (miles)	13.0	13.0	2.1	2.1
		Number of New Landings	50.0	50.0	37.0	25.0
1801020806	Lower Scott River	Salvage*	1,361.6	1,263.9	1,360.3	572.5
		Roadside Hazard	3,810.5	3,810.5	3,378.5	3,810.5
		Hazardous Fuels	1,096.4	1,096.4	1,096.4	1,096.4
		Site Prep	1,293.4	1,293.4	1,293.4	362.8
		Temp Road Access (miles)	1.5	1.5	0.3	0.3
		Number of New Landings	23.0	23.0	16.0	9.0
1801020901	Indian Creek	Salvage*	0.0	0.0	0.0	0.0
		Roadside Hazard	1.3	1.3	1.3	1.3
		Hazardous Fuels	0.0	0.0	0.0	0.0
		Site Prep	0.0	0.0	0.0	0.0
		Temp Road Access (miles)	0.0	0.0	0.0	0.0
		Number of New Landings	0.0	0.0	0.0	0.0
1801020902	Thompson Creek-Klamath River	Salvage*	400.1	267.4	400.1	110.4
		Roadside Hazard	2,448.1	2,448.1	2,360.8	2,448.1
		Hazardous Fuels	1,667.3	1,667.3	1,667.3	1,667.3
		Site Prep	902.8	902.8	902.8	374.8
		Temp Road Access (miles)	1.6	1.6	0.7	0.4
		Number of New Landings	26.0	26.0	21.0	14.0
1801020903	Elk Creek	Salvage*	660.7	531.3	265.2	301.7
		Roadside Hazard	3,771.5	3,771.5	3,770.8	3,771.5
		Hazardous Fuels	3,336.2	3,336.2	3,336.2	3,336.2
		Site Prep	1,902.8	1,902.8	1,902.8	1,275.5
		Temp Road Access (miles)	2.7	2.1	0.3	0.6
		Number of New Landings	20.0	20.0	10.0	10.0
1801020906	Ukonom Creek-Klamath River	Salvage*	0.0	0.0	0.0	0.0
		Roadside Hazard	64.7	64.7	64.7	64.7

		Hazardous Fuels	155.6	155.6	155.6	155.6
		Site Prep	0.0	0.0	0.0	0.0
		Temp Road Access (miles)	0.0	0.0	0.0	0.0
		Number of New Landings	0.0	0.0	0.0	0.0
1801021001	South Fork Salmon River	Salvage*	0.1	0.1	0.1	0.0
		Roadside Hazard	232.3	232.3	232.3	232.3
		Hazardous Fuels	523.0	523.0	523.0	523.0
		Site Prep	0.2	0.2	0.2	0.0
		Temp Road Access (miles)	0.2	0.2	0.2	0.0
		Number of New Landings	1.0	1.0	1.0	0.0
1801021002	North Fork Salmon River	Salvage*	631.1	567.7	622.2	39.1
		Roadside Harvest	2,484.2	2,484.2	2,412.8	2,484.2
		Hazardous Fuels	10,823.6	10,823.6	10,823.6	10,823.6
		Site Prep	654.0	654.0	654.0	0.0
		Temp Road Access (miles)	1.0	1.0	0.6	0.0
		Number of New Landings	11.0	11.0	9.0	2.0

Salvage\* does not include hydrology RR acres because there is no salvage in RR's.

**Table 8: Proposed activities in Riparian Reserves (RR) by watershed for each alternative.**

5th Field Code	5th Field Watershed	Treatment	Acres of Treatment in RR in Alt 2	Acres of Treatment in RR in Alt 3	Acres of Treatment in RR in Alt 4	Acres of Treatment in RR in Alt 5
1801020608	Humbug Creek-Klamath River	Salvage	0.0	0.0	0.0	0.0
		Roadside Hazard	244.3	244.3	244.3	244.3
		Hazardous Fuels	90.2	90.2	90.2	90.2
		Site Prep	0.0	0.0	0.0 (0.0)	0.0
		Temp Road Access (miles)	0.0	0.0	0.0	0.0
		Number of New Landings	0.0	0.0	0.0	0.0
1801020609	Beaver Creek	Salvage	0.0	0.0	0.0	0.0

		Roadside Hazard	336.1	336.1	281.2	336.1
		Hazardous Fuels	198.2	198.2	198.2	300.8
		Site Prep	134.1	134.1	134.1 (23.3)	134.1
		Temp Road Access (miles)	0.2	0.2	0.0	0.2
		Number of New Landings	0.0	0.0	0.0	0.0
1801020610	Horse Creek-Klamath River	Salvage	0.0	0.0	0.0	0.0
		Roadside Hazard	361.4	361.4	335.9	361.4
		Hazardous Fuels	136.2	136.2	136.2	192.7
		Site Prep	224.2	224.2	224.2 (128.9)	219.4
		Temp Road Access (miles)	0.5	0.0	0.0	0.5
		Number of New Landings	0.0	0.0	0.0	0.0
1801020611	Seiad Creek-Klamath River	Salvage	0.0	0.0	0.0	0.0
		Roadside Hazard	905.7	905.7	902.8	905.7
		Hazardous Fuels	524.8	524.8	524.8	524.8
		Site Prep	125.0	125.0	125.0 (871.5)	3.8
		Temp Road Access (miles)	1.1	1.1	0.1	0.2
		Number of New Landings	5.0	5.0	1.0	5.0
1801020806	Lower Scott River	Salvage	0.0	0.0	0.0	0.0
		Roadside Hazard	926.9	926.9	854.4	926.9
		Hazardous Fuels	269.5	269.5	269.5	269.5
		Site Prep	180.5	180.5	180.5(302.5 )	64.5
		Temp Road Access (miles)	0.0	0.0	0.0	0.0
		Number of New Landings	1.0	1.0	1.0	1.0
1801020901	Indian Creek	Salvage	0.0	0.0	0.0	0.0
		Road	1.3	1.3	1.3	1.3
		Hazardous Fuels	0.0	0.0	0.0	0.0
		Site Prep	0.0	0.0	0.0(0.0)	0.0
		Temp Road Access (miles)	0.0	0.0	0.0	0.0
		Number of New Landings	0.0	0.0	0.0	0.0

1801020902	Thompson Creek-Klamath River	Salvage	0.0	0.0	0.0	0.0
		Roadside Hazard	472.8	472.8	450.7	472.8
		Hazardous Fuels	299.5	299.5	299.5	299.5
		Site Prep	109.6	109.6	109.6(29.5)	28.5
		Temp Road Access (miles)	0.1	0.1	0.0	0.0
		Number of New Landings	0.0	0.0	0.0	0.0
1801020903	Elk Creek	Salvage	0.0	0.0	0.0	0.0
		Roadside Hazard	949.6	949.6	949.6	949.6
		Hazardous Fuels	989.0	989.0	989.0	989.0
		Site Prep	280.5	280.5	280.5(24.7)	203.8
		Temp Road Access (miles)	0.0	0.0	0.0	0.0
		Number of New Landings	0.0	0.0	0.0	0.0
1801020906	Ukonom Creek-Klamath River	Salvage	0.0	0.0	0.0	0.0
		Roadside Hazard	46.5	46.5	46.5	46.5
		Hazardous Fuels	28.6	28.6	28.6	28.6
		Site Prep	0.0	0.0	0.0(0.0)	0.0
		Temp Road Access (miles)	0.0	0.0	0.0	0.0
		Number of New Landings	0.0	0.0	0.0	0.0
1801021001	South Fork Salmon River	Salvage	0.0	0.0	0.0	0.0
		Roadside Hazard	2.4	2.4	2.4	2.4
		Hazardous Fuels	2.0	2.0	2.0	2.0
		Site Prep	0.0	0.0	0.0(0.0)	0.0
		Temp Road Access (miles)	0.0	0.0	0.0	0.0
		Number of New Landings	0.0	0.0	0.0	0.0
1801021002	North Fork Salmon River	Salvage	0.0	0.0	0.0	0.0
		Roadside Hazard	906.9	906.9	884.7	906.9
		Hazardous Fuels	3,039.8	3,039.8	3,039.8	3,039.8
		Site Prep	58.5	58.5	58.5(165.8)	0.0
		Temp Road Access (miles)	0.0	0.0	0.0	0.0
		Number of New Landings	1.0	1.0	0.0	1.0

() = site prep in RR's of Salvage Units

## Aquatic Conservation Strategy Objectives

***Objective 1: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.***

Watershed complexity, for this analysis will consider effects to large wood recruitment to stream and coarse woody debris on the upland slopes.

Little quantitative data is available regarding the historic range of variability of large woody debris and coarse woody debris on the upland slopes. Assumptions can be made considering the history of disturbance. The sources of large woody (in channel wood) and coarse woody (upslope downed wood) debris have been reduced from historical conditions by commercial harvest, and ‘stream cleaning’ operations that occurred in 1960- early 1980s which removed large wood from many streams on the Forest with the intent of preventing damage to infrastructure. In the past frequent wildfires would have contributed to well distributed large woody and coarse woody debris by creating snags that eventually fall.

There are Forest Plan Standards and Guidelines that help illustrate the desired condition of large wood in the streams and coarse wood in the upslope. Standard and Guideline MA10-56 (pg. 4-112) outlines the large wood requirements for 3<sup>rd</sup> to 5<sup>th</sup> order streams. Standard and Guideline 6-16 outlines the upslope coarse wood requirements at the landscape scale (pg. 4-23:24).

### **Proposed Action Influence on Objective:**

- **Salvage.** Removing dead trees from the landscape (salvage harvest) is not proposed within stream course Riparian Reserves (RR), which is designated as one site tree height or greater from stream channels. While these actions will create short term ground disturbance outside of Riparian Reserve, they will also allow for quicker reforestation and restoration of soils and forests on the watershed scale. Snag and coarse woody debris retention standards are included in the project description and will ensure that these habitat elements persist on the watershed outside of Riparian Reserves. At the site level, salvage will not have any effect on large wood recruitment to streams or large trees in Riparian Reserve because it will not occur within one site tree height of streams and not within two site tree heights for fish-bearing streams(which are mainly the 3<sup>rd</sup> to 5<sup>th</sup> order streams). Snag retention will allow for long-term recruitment of coarse wood on the upslope and large wood in the Riparian Reserves. The project meets the Forest Plan Standards and Guidelines by retaining a portion of snags and coarse wood. So salvage harvest will maintain and restore the objective at the watershed and site scale for the long and short term.
- **Roadside Hazard.** The only project action that could have any effect the presence of large trees near streams and large wood recruitment is hazard tree removal. Considering that the

probability of wood entering an active stream channel from greater than one tree height is generally low (FEMAT, 1993)<sup>1</sup>. The project includes a project design features that requires all hazard trees 26 inches DBH and greater that are felled in Riparian Reserves associated with fish bearing streams are left on site. This protection measure is likely to ensure that roadside hazard tree removal would have only discountable effects to large wood recruitment. Because the project maintains large trees and snags in Riparian Reserves and it will meet Forest Plan Standards and Guidelines. The action will maintain and restore this important aquatic habitat element at the site scale and watershed scale at both short and long term time frames.

- **Hazard Fuels.** Project fuels treatments will occur within Riparian Reserve and include specific protection measures to ensure that these actions do not reduce the presence of large snags or downed wood. These treatments are designed to reduce fuels accumulations and small trees (less than 16 inches) to provide some protection for future watershed condition and function; especially if/when a fire occurs greater than 5 years in the future. Because no large trees will be removed coarse wood and snag Forest Plan Standards and Guidelines will be met on the short-term and the long-term. Also the treatment will reduce the risk of high severity fire in the project area on the long-term. This action will restore and maintain this objective at the watershed and site scales for the short and long term.
- **Site prep and plant.** This action is proposed mostly within young plantations that burned at moderate or high severity. Actions in Riparian Reserve include only hand treatment, where safe, designed to achieve near term ground cover and encourage natural regeneration of the site. These actions will not reduce large trees, snags, or downed wood in Riparian Reserve in the short term and are likely to speed the development of large trees in the long term. Because no large trees will be removed coarse wood and snag Forest Plan Standards and Guidelines will be met on the short-term and the long-term. Also the treatment will reduce the time it takes to recover the mature conifer forest in the project area on the long-term. This action will restore and maintain this objective at the watershed and site scales for the short and long term.
- **Temporary road actions.** These actions are proposed both outside of, and within, Riparian Reserve. Within Riparian Reserve, no new temporary roads will be built; use of existing roadbeds in Riparian Reserve would not require the removal of any large trees or snags. New Temporary road segments are primarily ridge top features to facilitate skyline logging systems. This action will meet the Forest Plan Standards and Guidelines for coarse wood

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<sup>1</sup> (FEMAT) Forest Ecosystem Management Assessment Team. 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. Portland (OR): US Department of Agriculture, Forest Service, US Department of Commerce, National Oceanic and Atmospheric Administration, US Department of the Interior, Bureau of Land Management, US Fish and Wildlife Service, National Park Service, Environmental Protection Agency.

and snag retention and will not prevent the attainment of the objective at the watershed or site scale or at the short or long-term.

- **New landings.** The project includes a project design features that precludes new landing construction in Riparian Reserve. However, several new landings in outer portions of Riparian Reserve were approved for use with alternative 2. These landings were approved for use by watershed specialists because field visits confirmed they were on stable landforms and slope positions, were in the outer zone of the Riparian Reserve, and/or were separated from streams by existing, stable road segments. Landings were not approved for use if they would require removal of mature vegetation or significant earthwork or fill. New landings outside of Riparian Reserve may require removal of large trees or snags in some cases. Snag and coarse woody debris retention standards are included in the project description and will ensure that these habitat elements persist on the landscape outside of Riparian Reserves. At the site scale, outside of Riparian Reserve, there would be a short term reduction in snags where new landings are constructed. This action will meet the Forest Plan Standards and Guidelines for coarse wood and snag retention and will not prevent the attainment of the objective at the watershed or site scale or at the short or long-term.

## **5<sup>th</sup> Field Watershed Analysis**

### *Humbug Creek-Klamath River*

There is roadside hazard tree removal (410 acres) this 5<sup>th</sup> field. Hazard tree removal will result in minor site level reduction of large trees or snags along roads, including where they are adjacent to or cross Riparian Reserves (about 245 acres). Because of the project design features including the retention of large trees/snags of any felled trees in the Riparian Reserves within one site distance of fish-bearing streams this action will not prevent the attainment of the objective. The proposed actions will not prevent the attainment of this objective.

### *Beaver Creek Watershed*

Hazard tree removal would result in a minor site level reduction of large trees or snags along roads, including in Riparian Reserve, over about 336 acres. Because project design features include retention of large trees/snags that are felled due to hazards, when they are within one site tree distance from fish-bearing streams, this action will not prevent the attainment of the objective. There are 6 new landings proposed with no new landings in Riparian Reserves. New landing construction, outside of Riparian Reserve, may also result in a minor site level reduction of large trees or snags. However, use of these landings facilitates quicker reforestation and recovery of forests over the long term and thus does not prevent the attainment of the objective.

### *Horse Creek-Klamath River*

Hazard tree removal would result in a minor site level reduction of large trees or snags along roads, including in Riparian Reserve, over about 1,390 acres. Because project design features include retention of large trees/snags that are felled due to hazards, when they are within one site tree distance from fish-bearing streams, this action will not prevent the attainment of the objective. There are 15 new landings proposed with no new landings in the Riparian Reserves. New landing construction, outside of Riparian Reserve, may also result in a minor site level reduction of large trees or snags. However, use of these landings facilitates quicker reforestation and recovery of forests over the long term and thus does not prevent the attainment of the objective.

#### *Seiad Creek-Klamath River*

Hazard tree removal would result in a minor site level reduction of large trees or snags along roads, including in Riparian Reserve, about 4,570 acres. Because project design features include retention of large trees/snags that are felled due to hazards, when they are within one site tree distance from fish-bearing streams, this action will not prevent the attainment of the objective. There are 50 new landings proposed in this 5<sup>th</sup> field watershed with 5 of these landings being in Riparian Reserves. New landing construction, outside of Riparian Reserve, may also result in a minor site level reduction of large trees or snags. New landings in Riparian Reserves may require the removal of large trees that provide shade to the stream and snags for safety reasons. This will limit the recruitment of large wood and coarse woody debris at the site scale, but not at the watershed scale. However, use of these landings facilitates quicker reforestation and recovery of forests over the long term and thus does not prevent the attainment of the objective.

#### *Lower Scott River*

Hazard tree removal would result in a minor site level reduction of large trees or snags along roads, including in Riparian Reserve, on about 3,810 acres. Because project design features include retention of large trees/snags that are felled due to hazards, when they are within one site tree distance from fish-bearing streams, this action will not prevent the attainment of the objective. There are 23 new landings proposed in the watershed with 1 of the landings in the Riparian Reserve. New landing construction, outside of Riparian Reserve, may also result in a minor site level reduction of large trees or snags. New landings in Riparian Reserves may require the removal of large trees that provide shade to the stream and snags for safety reasons. This will limit the recruitment of large wood and coarse woody debris at the site scale, but not at the watershed scale. However, use of these landings facilitates quicker reforestation and recovery of forests over the long term and thus does not prevent the attainment of the objective.

#### *Thompson Creek-Klamath River*

Hazard tree removal would result in a minor site level reduction of large trees or snags along roads, including in Riparian Reserve, over about 2,450 acres. Because project design features

include retention of large trees/snags that are felled due to hazards, when they are within one site tree distance from fish-bearing streams, this action will not prevent the attainment of the objective. There are 26 new landings proposed with no new landings proposed in the Riparian Reserves. New landing construction, outside of Riparian Reserve, may also result in a minor site level reduction of large trees or snags. However, use of these landings facilitates quicker reforestation and recovery of forests over the long term and thus does not prevent the attainment of the objective.

#### *Elk Creek Watershed*

Hazard tree removal would result in a minor site level reduction of large trees or snags along roads, including in Riparian Reserve, over about 3,770 acres. Because project design features include retention of large trees/snags that are felled due to hazards, when they are within one site tree distance from fish-bearing streams, this action will not prevent the attainment of the objective. There are 20 new landings proposed with no new landings in the Riparian Reserves. New landing construction, outside of Riparian Reserve, may also result in a minor site level reduction of large trees or snags. However, use of these landings facilitates quicker reforestation and recovery of forests over the long term and thus does not prevent the attainment of the objective.

#### *Ukonom Creek- Klamath River*

There is roadside hazard tree removal (about 64 acres) this 5<sup>th</sup> field. Hazard tree removal will result in minor site level reduction of large trees or snags along roads, including where they are adjacent to or cross Riparian Reserves (about 47 acres). Because of the project design features including the retention of large trees/snags of any felled trees in the Riparian Reserves within one site distance of fish-bearing streams this action will not prevent the attainment of the objective. The proposed actions will not prevent the attainment of this objective.

#### *South Fork Salmon River*

There is roadside hazard tree removal (230 acres) this 5<sup>th</sup> field. Hazard tree removal will result in minor site level reduction of large trees or snags along roads, including where they are adjacent to or cross Riparian Reserves (about 3 acres). Because of the project design features including the retention of large trees/snags of any felled trees in the Riparian Reserves within one site distance of fish-bearing streams this action will not prevent the attainment of the objective. The proposed actions will not prevent the attainment of this objective.

#### *North Fork Salmon River*

Hazard tree removal would result in a minor site level reduction of large trees or snags along roads, including in Riparian Reserve, over about 2485 acres. Because project design features

include retention of large trees/snags that are felled due to hazards, when they are within one site tree distance from fish-bearing streams, this action will not prevent the attainment of the objective. There are 11 new landings proposed with one being in the Riparian Reserve. New landing construction, outside of Riparian Reserve, may also result in a minor site level reduction of large trees or snags. New landings in Riparian Reserves may require the removal of large trees that provide shade to the stream and snags for safety reasons. This will limit the recruitment of large wood and coarse woody debris at the site scale, but not at the watershed scale. However, use of these landings facilitates quicker reforestation and recovery of forests over the long term and thus does not prevent the attainment of the objective.

***Objective 2: Maintain and restore spatial and temporal connectivity between watersheds.***

Watershed Connectivity, for this analysis, takes into consideration the effects to aquatic species, fish, and terrestrial species passage in the project area and connectivity with the larger 5<sup>th</sup> field watershed. The analysis focuses on physical blocking of the stream channel and snag retention. Water quality and sediment conditions are describe in subsequent objectives.

There are Forest Plan Standards and Guidelines that help illustrate the desired condition for snags on the landscape. Standard and Guideline 8-22 (pg. 4-30) outlines recommendations for snag retention for ecological purposes. These standards and guidelines will be met at the 7<sup>th</sup> field scale (see wildlife report and Forest Plan checklist).

So it can be assumed that even with the implementation of the project the desired conditions for large wood in the stream channels, coarse woody debris and snags will be met at the 5<sup>th</sup> field scale.

Watershed connectivity would have ranged from high to impaired on any given section of the Klamath, Scott, and North Fork Salmon rivers and their tributaries. Landslide producing storms occur about every 10 years in the Klamath Mountains so at any given time there would have been a percentage of stream channels recovering from debris flow and landslide impacts that would have scoured channels and stripped vegetation from the riparian zone. Small fires and blow-down would have left small openings in the canopy within Riparian Reserves as well. These impacts would have been smaller and more naturally distributed in the watershed than they are today. Past road construction and clear cutting have increased the likelihood and consequence of some landslides and debris flows in the watersheds. The 2014 wildfires were large and impacted entire 7<sup>th</sup> field watersheds and large portions of 5<sup>th</sup> fields (Table 1).

**Action Influence on Objective:**

- **Salvage.** Removing dead trees from the landscape (salvage harvest) is not proposed within stream course Riparian Reserves, which are designated as one site tree height or greater from stream channels; therefore these actions will not impact connectivity of aquatic or riparian habitat. The removal of fire injured or killed trees could impair terrestrial wildlife

connectivity by fragmenting the habitat. The amount of salvage relative to the fire affected area is small is won't affect connectivity at the 5<sup>th</sup> field watershed scale but may at the site scale. However, project design features that require snag retention in the salvage units will meet the standard and guidelines at the site scale. Therefore, it is assumed that the desired condition for connectivity for terrestrial wildlife is being met by the salvage harvest. This action will not prevent the attainment of the objective for aquatic or terrestrial resources at the site or watershed scale for the short or long-term.

- **Roadside Hazard.** This action will occur within Riparian Reserve but protection measures ensure that ground based equipment will stay farther than 50 feet from streams (and farther than 150 feet for fish-bearing streams). Also, all hazard trees 26 inches DBH and greater that are felled in Riparian Reserves associated with fish bearing streams will be left on site. These protection measures ensure that roadside hazard removal will not impact stream habitat and thus will have no impact on aquatic habitat connectivity at the watershed or site scale for the short or long term. The roadside hazard tree removal will be intermittent along the roadways and green tree 'bridges' will be left along the corridors which will serve to provide connectivity for terrestrial species. These effects would occur where habitat connectivity is already impacted by roadways and will have minimal effect to habitat connectivity at the watershed scale (see project wildlife resource report for further discussion). It will have minor, site level, impacts to terrestrial habitat where large trees or snags are felled, and in some cases removed. This action will not prevent the attainment of the objective for aquatic or terrestrial resources at the site or watershed scale for the short or long-term.
- **Hazard Fuels.** Project fuels treatments will occur within Riparian Reserve and include specific protection measures to ensure that these actions do not reduce overstory canopy or the presence of large snags or downed wood. Therefore there would be no effect to connectivity of aquatic or terrestrial habitat at the watershed or site scale. These treatments are designed to reduce fuels accumulations and small trees (less than 16 inches) to provide some protection for future watershed condition and function; especially if/when a fire occurs greater than 5 years in the future. Because no large trees will be removed coarse wood and snag Forest Plan Standards and Guidelines will be met on the short-term and the long-term which benefits terrestrial wildlife connectivity (see Wildlife report). Also the treatment will reduce the risk of high severity fire in the project area on the long-term. This action will restore and maintain this objective at the watershed and site scales for the short and long term.
- **Site prep and plant.** This action is proposed mostly within young plantations that burned at moderate or high severity. Actions in Riparian Reserve include only hand treatment, where safe, designed to achieve near term ground cover and encourage natural regeneration of the site. This action could have only beneficial effect to aquatic habitat, at the site and

watershed scales. Terrestrial habitat will not be affected in the short term, at the watershed or the site scale, because only small trees would be felled. Because no large trees will be removed coarse wood and snag Forest Plan Standards and Guidelines will be met on the short-term and the long-term. Also the treatment will reduce the time it takes to recover the mature conifer forest in the project area on the long-term. In the long term, terrestrial connectivity may be improved as planting is likely to result in larger trees faster than without planting. This action will restore and maintain this objective at the watershed and site scales for the short and long term.

- **Temporary road actions.** The footprint of temporary road crossings for this project compared to the watershed size is small. The 5<sup>th</sup> field watershed connectivity for aquatic resources would not be influence by this activity. Temporary road crossings in alternative 2 may have site level effects to aquatic habitat at several locations (discussed below under each watershed discussion). The project includes protection measures to reduce the likelihood of impacting live streams; most sites involve seasonal streams, the work is to be done at the driest part of the year and all temporary crossing structures are to be removed prior to the wet season. The potential temporary disruption to aquatic habitat connectivity at the site scale would be minor, and not meaningful at the watershed scale, because the crossings will be removed at project completion. The average road width for temporary road access is less than 20 feet. The opening the canopy from this action is not large enough to affect connectivity at the site or watershed scale for terrestrial wildlife. The activity does not prevent the attainment of the objective at the site or watershed scale for the short or long-term.
- **New landings.** The project includes a project design feature that precludes new landing construction in Riparian Reserve. However, several new landings in outer portions of Riparian Reserve were approved for use with alternative 2. These landings were approved for use by watershed specialists because field visits confirmed they were on stable landforms and slope positions, were in the outer zone of the Riparian Reserve, and/or were separated from streams by existing, stable road segments. Landings in Riparian Reserves were not approved for use if they would require removal of mature vegetation or significant earthwork or fill; therefore new landings are not expected to have any impact on aquatic habitat connectivity. New landings may have site level impacts to terrestrial habitat connectivity where large trees or snags are removed. The average size of the landings proposed is no larger than natural openings which will not prevent connectivity but they may increase the risk of predation for individuals until the canopy cover is recovered (greater than 10 years). The activity does not prevent the attainment of the objective at the site or watershed scale for the short or long-term.

## 5<sup>th</sup> Field Watershed Analysis

### *Humbug Creek-Klamath River*

Hazard tree removal will occur on about 410 acres which will have a site scale effect on terrestrial wildlife connectivity where there was high/moderate fire severity because there will be a high density of hazard trees in these areas. The roadside hazard tree removal will be intermittent along the roadways and green tree 'bridges' will be left along the corridors which will serve to provide connectivity for terrestrial species. These effects would occur where habitat connectivity is already impacted by roadways and will have minimal effect to habitat connectivity at the watershed scale (see project wildlife resource report for further discussion).

### *Beaver Creek Watershed*

Hazard tree removal will occur on about 1,320 acres which will have a site scale effect on terrestrial wildlife connectivity where there was high/moderate fire severity because there will be a high density of hazard trees in these areas.

Within this watershed there are two locations where temporary road actions involve stream crossings, and thus where site level short term effects are expected. The stream involved is a non-fish bearing intermittent face drainage to Beaver Cr which is crossed at two locations by temporary road on existing roadbed; the crossings are in relatively close proximity to each other in the upper part of the drainage (existing temp 39 and 40) and downstream the creek flows through private timber land that is currently being salvage logged. Short term sediment related impacts over about one mile of stream are expected during the time when the road is prepared for use, used, and then hydrologically stabilized. Effects may occur during storms throughout the first few years post-project as the road prism readjusts. Long term benefits to this drainage are expected because the condition of the road will be improved post project by outsloping and pulling fills at crossings and appropriately treating the current legacy sediment site.

There are 6 new landings proposed for this watershed. Landings may affect terrestrial wildlife connectivity at the site scale. However, the openings will not be larger than natural openings and won't prevent the movement of animals across the landscape. The project does not prevent the attainment of the objective.

### *Horse Creek-Klamath River*

Hazard tree removal will occur on about 1,390 acres which will have a site scale effect on terrestrial wildlife connectivity where there was high/moderate fire severity because there will be a high density of hazard trees in these areas.

Within this watershed there is one temporary road on existing roadbed (existing temp 9) that involves a perennial stream crossing. The stream involved is a non-fish bearing tributary to Doggett Creek that is also heavily affected by private timber harvest. Short term sediment related impacts along about 1.5 miles of stream are expected during the time with the road is prepared for use, used, then hydrologically stabilized. Effects may occur during storms throughout the first

few years post-project as the road prism readjusts. Long term benefits to this drainage are expected because the condition of the road will be improved post project by outsloping and pulling fills at crossings and appropriately treating the current legacy sediment site.

There are 15 new landings proposed for this watershed. Landings may affect terrestrial wildlife connectivity at the site scale. However, the openings will not be larger than natural openings and won't prevent the movement of animals across the landscape. The project does not prevent the attainment of the objective.

#### *Seiad Creek-Klamath River*

Hazard tree removal will occur on about 4,570 acres which will have a site scale effect on terrestrial wildlife connectivity where there was high/moderate fire severity because there will be a high density of hazard trees in these areas.

Within this watershed, there are several locations where temporary road actions are near streams (O'Neil and Kuntz creeks) or involve crossings (Gard Creek and Cliff Valley Creek). In O'Neil and Kuntz drainages, alternative 2 proposes to use existing road beds near the streams that currently have erosion related problems. Short term sediment related impacts along about half mile on both of these streams are possible during storms post project for several years as the road prisms readjust. Impacts of using these roads is of low risk to aquatic habitat because contemporary BMPs and project design features will be in place to ensure stream sedimentation does not occur. Because the project will address the erosion related problems on these segments of road, long term benefits and further protection of water quality is expected in O'Neil and Kuntz creeks. Alternative 2 proposes to temporarily re-open segments of decommissioned road in Gard and Cliff Valley creeks which involve several crossings in Gard Creek area and one intermittent stream crossing of Cliff Valley Creek. As these roads have been appropriately decommissioned and stabilized, there is no potential long term benefit involved in opening and using them for the project (no legacy sediment sites to address). Short term site level effects related to sediment delivery to streams as a result of disturbance, especially at crossings, would be expected during and post project during storms for several years. Reaches of Gard Creek, Caroline Creek, and the Klamath River would be subject to these impacts along a total of approximately 3.5 miles of stream habitat. Approximately 0.5 miles of Cliff Valley Creek would be affected.

There are 50 new landings proposed for this watershed. Landings may affect terrestrial wildlife connectivity at the site scale. However, the openings will not be larger than natural openings and won't prevent the movement of animals across the landscape. The project does not prevent the attainment of the objective.

#### *Lower Scott River*

Hazard tree removal will occur on about 3,810 acres which will have a site scale effect on terrestrial wildlife connectivity where there was high/moderate fire severity because there will be a high density of hazard trees in these areas.

There are no temporary road actions that involve stream crossings in this watershed. The project is not expected to impact connectivity of aquatic habitat in Lower Scott River, at watershed or site scale.

There are 23 new landings proposed for this watershed. Landings may affect terrestrial wildlife connectivity at the site scale. However, the openings will not be larger than natural openings and won't prevent the movement of animals across the landscape. The project does not prevent the attainment of the objective.

#### *Thompson Creek-Klamath River*

Hazard tree removal will occur on about 2,445 acres which will have a site scale effect on terrestrial wildlife connectivity where there was high/moderate fire severity because there will be a high density of hazard trees in these areas.

Within this watershed there is one location, in the upper China Creek drainage, where alternative 2 proposes to reopen a decommissioned road (46N78) involving several intermittent stream crossings. Short term sediment related impacts along about 0.5 miles of China Creek are expected during the time the road is re-opened for use, and decommissioned post project. These site level effects may occur during storms throughout the first few years post project as the road prism readjusts.

There are 26 new landings proposed for this watershed. Landings may affect terrestrial wildlife connectivity at the site scale. However, the openings will not be larger than natural openings and won't prevent the movement of animals across the landscape. The project does not prevent the attainment of the objective.

#### *Elk Creek Watershed*

Hazard tree removal will occur on about 3,335 acres which will have a site scale effect on terrestrial wildlife connectivity where there was high/moderate fire severity because there will be a high density of hazard trees in these areas.

The project includes treatment of legacy sediment sites, mostly associated with roads, in the Elk Creek Watershed. There will be meaningful beneficial effects to aquatic species, and the connectivity of aquatic habitat, at the 3 sites that will have crossings upgraded with bottomless arches. These sites are in the lowest reaches of Twin Creeks and Malone Creek, just upstream of their confluence with Elk Creek (just upstream of confluence of Elk and East Fork Elk Creeks); and in upper East Fork Elk Cr. These structures will allow for free movement of special status

fish and amphibian species under these road crossings, where passage has been blocked for many years during all or most flows. Resident trout, and other native species, are likely to have unimpeded access to a total of about 1 mile of additional habitat in Malone, Twin, and Upper Elk creeks post project. The culvert upgrades, to occur on 45 sites, will also have beneficial effects to the passage/connectivity of watershed products like coarse sediment and large wood, down through the Elk Creek watershed. All action alternatives also include stormproofing 33 miles of road, which will provide additional benefit to aquatic habitat in Doolittle, Cougar, East Fork Elk, and main stem Elk creeks by reducing diversion potential and chronic sediment inputs from roads.

There are 20 new landings proposed for this watershed. Landings may affect terrestrial wildlife connectivity at the site scale. However, the openings will not be larger than natural openings and won't prevent the movement of animals across the landscape. The project does not prevent the attainment of the objective.

#### *Ukonom Creek- Klamath River*

Hazard tree removal will occur on about 155 acres which will have a site scale effect on terrestrial wildlife connectivity where there was high/moderate fire severity because there will be a high density of hazard trees in these areas.

#### *South Fork Salmon River*

Hazard tree removal will occur on about 235 acres which will have a site scale effect on terrestrial wildlife connectivity where there was high/moderate fire severity because there will be a high density of hazard trees in these areas.

There is only one new landings proposed for this watershed. Landings may affect terrestrial wildlife connectivity at the site scale. However, the openings will not be larger than natural openings and won't prevent the movement of animals across the landscape. The project does not prevent the attainment of the objective.

#### *North Fork Salmon River*

Hazard tree removal will occur on about 2,485 acres which will have a site scale effect on terrestrial wildlife connectivity where there was high/moderate fire severity because there will be a high density of hazard trees in these areas.

There are no temporary road actions that involve stream crossings in this watershed. The project is not expected to impact connectivity of aquatic habitat in North Fork Salmon River, at watershed or site scale.

There are 11 new landings proposed for this watershed. Landings may affect terrestrial wildlife connectivity at the site scale. However, the openings will not be larger than natural openings and won't prevent the movement of animals across the landscape. The project does not prevent the attainment of the objective.

**Objective 3:** *Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.*

Aquatic Systems Integrity, in this analysis, will consider effects to the channel geomorphology and include evaluating direct effects to stream channels due to increased peak flows. Peak flows changes were estimated using the ERA model in the Hydrology Report. Site scale impacts are the direct impact to bank and stream bottom such as from stream crossings on temporary roads.

Under the historic range of variability the banks, shorelines and stream bottoms would have been varied and heterogeneous. At the site scale a downed tree or small landslide could have impacted banks, shores and bottom configurations and debris flows would have impacted these features along miles of stream channel at a time. However, there would have been a high percentage of streams with competent, overhanging banks, regularly inundated shorelines and stream bottoms with complex in-channel landforms and varied substrates.

#### **Action Influence on Objective:**

- **Salvage.** Potential effects to peak flow are only measurable at the watershed scale. Salvage harvest will remove only dead or dying trees which do not mediate peak flows in the watershed. The activities related to logging such as ground-based disturbance due to tractors and skyline yarding will add about 0.8 ERA/acre of treatment (from ERA model outputs – see Hydrology report). The Water Quality assessment (Hydrology report) used risk ratios of less than 1.0 to indicate a low risk to channel geomorphology, between 1.0 and 1.5 a moderate risk and greater than 1.5 to a high risk. The model outputs include all of the ground disturbing activities including road and landing construction and will be reported in the analysis cumulatively. Ground-based salvage units with Riparian Reserves may involve crossing dry intermittent stream channels which could have a site scale effect on banks and aquatic integrity. Best Management Practices and project design features require that the Forest Service approve these crossing locations and ensure they are restored with proper erosion control in place prior to the wet season.
- **Roadside Hazard.** The effects to peak flow, at the watershed scale, are accounted for with salvage harvest. Hazard trees may be felled in Riparian Reserves where they pose a threat to adjacent roadways. The direct effects to bank integrity will be minimal because project design features prohibit the removal of trees in near stream area (within 25 feet). The project design features require the use of directional felling and to avoid removing trees anchored in the banks of stream channels to minimize impacts to the aquatic integrity.

- **Hazard Fuels.** The effects to peak flow, at the watershed scale, are accounted for with salvage harvest. There will be fuels treatments in the Riparian Reserves. The treatments will implement measures (project design features) to minimize effects to the stream banks and channels from fuels treatments. There is not likely to be direct effects to stream channels from hazardous fuels treatments.
- **Site prep and plant.** The effects to peak flow, at the watershed scale, are accounted for with salvage harvest. There will be ground-based equipment and skyline yarding in some site preparation units. The direct effects to stream channels will be the same as for salvage logging.
- **Temporary road actions.** Each acre of temporary access will increase ERAs by 0.7 ERAs because they are hydrologically stabilized after use. There are temporary road crossings proposed which will directly affect the bank and channel integrity at the site scale. The banks will likely show effects of temporary crossings for the long-term. The use of the temporary road access will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective.
- **New landings.** Each acre of landings will increase the ERA by 0.12 ERAs. The main effect to channel integrity from landings will occur when the landings are constructed in the Riparian Reserve. There are 7 new landings in the Riparian Reserve for the entire project area. New landings in Riparian Reserves can have unstable fills which may have small landslides affecting the stream banks or the banks can be disturbed by heavy equipment while constructing the landings. In these cases, stream banks will likely experience long-term effects. However, use of these landings facilitates quicker reforestation and recovery of forests over the long term and thus does not prevent the attainment of the objective.

## 5<sup>th</sup> Field Watershed Analysis

### *Humbug Creek-Klamath River*

The ERA risk ratio for this watershed is 0.84 including the effects of alternative 2, which indicates a low risk to channel geomorphology at the watershed scale due to increase in peak flows. The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are no ground based salvage units or site preparation units with ground based treatments in this watershed. There are no temporary road stream crossings or new landings in the Riparian Reserve. The project will not prevent the attainment of this objective in this watershed.

### *Beaver Creek Watershed*

The ERA risk ratio for this watershed is 1.07 including the effects of alternative 2, which indicates a moderate risk to channel geomorphology. The increased risk is due to the fire effects and private land harvest activities. The alternative increases the risk ratio by 0.02.

There is one salvage unit and 32 site preparation units that contain Riparian Reserves and have ground based harvest proposed. Both the salvage and the site preparation are preparing the area for planting which will speed up recovery of the forest. This will, in turn, increase the stability of the stream banks and channels because living forests have a positive influence on stream integrity.

Within this watershed there are two locations where temporary road actions involve stream crossings, and thus where site level short term effects are expected. The stream involved is a non-fish bearing intermittent face drainage to Beaver Cr which is crossed at two locations by temporary road on existing roadbed; the crossings are in relatively close proximity to each other in the upper part of the drainage (existing temp 39 and 40) and downstream the creek flows through private timber land that is currently being salvage logged. Long term benefits to this drainage are expected because the condition of the road will be improved post project by outsliping and pulling fills at crossings and appropriately treating the current legacy sediment site. The banks will likely show effects of temporary crossings for the long-term. The use of the temporary road access will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective. There are no new landings proposed in Riparian Reserves for this watershed. The project does not prevent the attainment of the objective in this watershed.

#### *Horse Creek-Klamath River*

The ERA risk ratio for this watershed is 0.84 including the effects of alternative 2, which indicates a low risk to channel geomorphology at the watershed scale due to increase in peak flows. The ERA will be nearly recovered from the fire effects and the project effects in about 10 years.

There are 8 salvage units and 50 site preparation units that contain Riparian Reserves and have ground based harvest proposed. Both the salvage and the site preparation are preparing the area for planting which will speed up the recovery of the forest. This will, in turn, increase the stability of the stream banks and channels because living forests have a positive influence on stream integrity.

Within this watershed there is one temporary road on existing roadbed (existing temp 9) that involves a perennial stream crossing. The stream involved is a non-fish bearing tributary to Doggett Creek that is also heavily affected by private timber harvest. Long term benefits to this drainage are expected because the condition of the road will be improved post project by outsliping and pulling fills at crossings and appropriately treating the current legacy sediment

site. The use of the temporary road access will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective. There are no new landings proposed in Riparian Reserves for this watershed. The project does not prevent the attainment of the objective in this watershed.

#### *Seiad Creek-Klamath River*

The ERA risk ratio for this watershed is 0.82 including the effects of alternative 2, which indicates a low risk to channel geomorphology at the watershed scale due to increase in peak flows. The ERA will be nearly recovered from the fire effects and the project effects in about 10 years.

There are 8 salvage units and 2 site preparation units that contain Riparian Reserves and have ground based harvest proposed. Both the salvage and the site preparation are preparing the area for planting which will speed up the recovery of the forest. This will, in turn, increase the stability of the stream banks and channels because living forests have a positive influence on stream integrity.

Within this watershed, there are several locations where temporary road actions are near streams (O'Neil and Kuntz creeks) or involve crossings (Gard Creek and Cliff Valley Creek). In O'Neil and Kuntz drainages, alternative 2 proposes to use existing road beds near the streams that currently have erosion related problems. Alternative 2 proposes to temporarily re-open segments of decommissioned road in Gard and Cliff Valley creeks which involve several crossings in Gard Creek area and one intermittent stream crossing of Cliff Valley Creek. The banks will likely show effects of temporary crossings for the long-term. As these roads have been appropriately decommissioned and stabilized, there is no potential long term benefit involved in opening and using them for the project (no legacy sediment sites to address).

There are five new landings in Riparian Reserves for this watershed that have been approved for use by watershed specialists. These landings are within Riparian Reserve associated with Grider Creek, Cliff Valley Creek, and the Klamath River. They were approved for use because they would occur on stable landforms and slope positions in the outer zone of the Riparian Reserve, and/or they are separated from critical habitat channels by existing, stable road segments. Landings were not approved for use if they would require removal of mature vegetation or significant earthwork or fill. For these reasons, the construction, use, and hydrologic stabilization of these landings is not likely to result in meaningful negative impacts to the integrity of aquatic systems. Use of these temporary roads and landings facilitates quicker reforestation and recovery of forests over the long term and thus does not prevent the attainment of the objective. The project does not prevent the attainment of the objective in this watershed.

#### *Lower Scott River*

The ERA risk ratio for this watershed is 0.57 including the effects of alternative 2, which indicates a low risk to channel geomorphology at the watershed scale due to increase in peak flows. The ERA will be nearly recovered from the fire effects and the project effects in about 10 years.

There are 2 salvage units and 15 site preparation units that contain Riparian Reserves and have ground based harvest proposed. Both the salvage and the site preparation are preparing the area for planting which will speed up the recovery of the forest. This will, in turn, increase the stability of the stream banks and channels because living forests have a positive influence on stream integrity. There are no temporary road actions that involve stream crossings in this watershed.

There is one new landing proposed in Riparian Reserves for this watershed. It is located near the mouth of the Scott River, on an existing flat with road access through private land. New landings in Riparian Reserves can have unstable fills which may have small landslides affecting the stream banks or the banks can be disturbed by heavy equipment while constructing the landings. Because this landing would occur on an already compacted stable landform and substantial earth work would not be involved, it is not likely to have any impact to the bed or banks of the Scott River. Use of this landing would allow for helicopter logging in the area which constitutes the least ground disturbing means to conduct fire salvage. The project does not prevent the attainment of the objective in this watershed.

#### *Thompson Creek-Klamath River*

The ERA risk ratio for this watershed is 0.49 including the effects of alternative 2, which indicates a low risk to channel geomorphology at the watershed scale due to increase in peak flows. The ERA will be nearly recovered from the fire effects and the project effects in about 10 years.

There are 3 salvage units and 5 site preparation units that contain Riparian Reserves and have ground based harvest proposed. Both the salvage and the site preparation are preparing the area for planting which will speed up the recovery of the forest. This will, in turn, increase the stability of the stream banks and channels because living forests have a positive influence on stream integrity.

Within this watershed there is one location, in the upper China Creek drainage, where alternative 2 proposes to reopen a decommissioned road (46N78) involving several intermittent stream crossings. The use of the temporary road access will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective. There are no new landings proposed in Riparian Reserves for this watershed. The project does not prevent the attainment of the objective in this watershed.

### *Elk Creek Watershed*

The ERA risk ratio for this watershed is 0.98 including the effects of alternative 2, which indicates a low risk to channel geomorphology at the watershed scale due to increase in peak flows. The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are no salvage units or site preparation units that contain Riparian Reserves and have ground based harvest proposed. There are no near stream temporary roads or crossings in the watershed (see fisheries report). There are no new landings in the Riparian Reserve. The project does not prevent the attainment of the objective in this watershed.

### *Ukonom Creek- Klamath River*

The ERA risk ratio for this watershed is 0.56 including the effects of alternative 2, which indicates a low risk to channel geomorphology at the watershed scale due to increase in peak flows. The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are no salvage units or site preparation units that contain Riparian Reserves and have ground based harvest proposed. There are no near stream temporary roads or crossings in the watershed (see fisheries report). There are no new landings in the Riparian Reserve. The project does not prevent the attainment of the objective in this watershed.

### *South Fork Salmon River*

The ERA risk ratio for this watershed is 0.40 including the effects of alternative 2, which indicates a low risk to channel geomorphology at the watershed scale due to increase in peak flows. The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are no salvage units or site preparation units that contain Riparian Reserves and have ground based harvest proposed. There are no near stream temporary roads or crossings in the watershed (see fisheries report). There are no new landings in the Riparian Reserve. The project does not prevent the attainment of the objective in this watershed.

### *North Fork Salmon River*

The ERA risk ratio for this watershed is 0.73 including the effects of alternative 2, which indicates a low risk to channel geomorphology at the watershed scale due to increase in peak flows. The ERA will be nearly recovered from the fire effects and the project effects in about 10 years.

There are 2 salvage units and 4 site preparation units that contain Riparian Reserves and have ground based harvest proposed. Both the salvage and the site preparation are preparing the area for planting which will speed up the recovery of the forest. This will, in turn, increase the stability of the stream banks and channels because trees have a positive influence on stream integrity.

There are no near stream temporary roads or crossings in the watershed (see fisheries report). There is one new landing proposed in Riparian Reserve for this watershed, near a perennial tributary to Whites Gulch. New landings in Riparian Reserves can have unstable fills which may have small landslides affecting the stream banks or the banks can be disturbed by heavy equipment while constructing the landings. Landing L072 currently remains in alternatives 2, 3, and 5 but has not been approved by watershed specialists as an exception to project design feature Watershed-5. Concerns related to potential need for substantial earth work and falling of green trees and the associated short and long term impacts to shade (Whites Gulch is an important thermal refugia for salmonids in NF Salmon River), sediment, and large wood recruitment, due to the close proximity of the landing location to a perennial stream. Logging system specialists are working to find alternate locations for this helicopter landing in an effort to find a reasonable method to facilitate helicopter logging in this area while protecting aquatic systems. Use of landings facilitates quicker reforestation and recovery of forests over the long term and thus does not prevent the attainment of the objective. The project does not prevent the attainment of the objective in this watershed.

**Objective 4:** *Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.*

The North Fork Salmon River, the Scott River and the Klamath River are listed in the 303 (d) Clean Water Act for stream temperature impairment (Hydrology report and Water Quality section of DEIS). The Total Maximum Daily Loads (TMDLs) for the Klamath, Scott, and Salmon Rivers contain numeric targets that represent attainment of State water quality standards for temperature and sediment. The water quality analysis for this objective will focus on the effects to temperature of the stream. Sediment is covered in Objective 5.

The Water Quality report assesses risk to stream temperature at the 7<sup>th</sup> field watershed scale using an estimation of stream shade along with landslide likelihood. Shade is used as a proxy for temperature. Riparian shade buffers water temperatures from solar insolation and warming. The mass-wasting model is used to assess landslide risk and potential resulting debris flows that can scour shade-producing streamside vegetation and affect water temperature. The analysis in the Water Quality report is translated to the 5<sup>th</sup> field and sites scales for this assessment. A low risk means that the stream temperatures will remain within the range of natural variability. A moderate risk means that the stream temperatures will be affected on the short-term until shrubs and hardwoods re-sprout in the Riparian Reserve. A high risk means that the temperature will be measurably affected and it will take more than 10 years to recover.

**Action Influence on Objective:**

- **Salvage.** No effects to shade as a result of salvage harvest are expected because salvage would not occur within hydrologic Riparian Reserves (Water Quality report). Removing dead trees, which no longer provide for slope stability, has no effect to landslide likelihood

(Geology report). For these reasons, there would be no effect to stream temperature from salvage harvesting.

- **Roadside Hazard.** The analysis assumed that roadside harvest may affect shade in areas where green hazard trees would be removed in the riparian reserve (Water Quality report). This may affect shade at the site scale, but not at the watershed scale because clumps of green trees are not likely to be removed and dead trees do not provide for shade. There is no effect to landslide likelihood from roadside hazard removal (see Geology report)
- **Hazard Fuels.** These treatments would occur within Riparian Reserve and may remove dead and live trees only up to 12 inches in diameter. No meaningful effect to shade is likely due to hazardous fuels treatment, at the site or watershed scale. There is no effect to landslide likelihood from hazardous fuels treatments.
- **Site prep and plant.** Only hand cutting of dead trees up to 16 inches in diameter, and lop and scatter, would occur within Riparian Reserve. These actions would not impact shade in the short term and may speed the development of shade providing vegetation in the Riparian Reserve. There is no effect to landslide likelihood from site preparation.
- **Temporary road actions.** The effects to shade from temporary road actions in Riparian Reserves will likely be at the crossings and very localized. The temporary roads on existing roadbeds will not require the removal of large trees in the Riparian Reserve for use. It might require the removal of small trees, but if the over story remains intact shade wont' be affected by temporary road access. The landslide likelihood at the 5<sup>th</sup> field watershed and site scale is increased by temporary road actions whether it is in the Riparian Reserve or upslope because of the re-arrangement of weight on the hillslope and hillslope hydrology (see Geology report).
- **New landings.** Because the project allows for new landings in Riparian Reserve only where they have been approved for use by watershed specialists, there are only 6 project-wide and the effects would not be meaningful at the watershed scale. There is potential to impact shade as a result of building one new landing in Riparian Reserve, L072 which is near Whites Gulch. The landslide likelihood at the 5<sup>th</sup> field watershed scale is increased by new landing construction whether it is in the Riparian Reserve or upslope because of the re-arrangement of weight on the hillslope and hillslope hydrology (see Geology report).

## 5<sup>th</sup> Field Watershed Analysis

### *Humbug Creek-Klamath River*

There are about 90 acres of roadside hazard treatments in the Riparian Reserves of the watershed. There are no temporary road crossings in the watershed or new landings. The risk for

alternative 2 to water temperature is low to moderate for the 7<sup>th</sup> field watersheds in Humbug Creek 5<sup>th</sup> field in the project area (See Water Quality Report).

#### *Beaver Creek Watershed*

There are about 335 acres of roadside hazard treatments in the Riparian Reserves of the watershed. There are two temporary road crossings that might affect shade at the site scale. These are on existing temporary roads 39 and 40. There are long-term benefits of using the road because of the legacy sediment source mitigation to connectivity, physical integrity of aquatic systems; sediment regimes (see other objective descriptions). The use of the temporary road access will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective. There are no new landings proposed in Riparian Reserves for this watershed. The risk for alternative 2 to water temperature is low to moderate for the 7<sup>th</sup> field watersheds in the Beaver Creek 5<sup>th</sup> field with Buckhorn Gulch being high due to the fire effects not the alternative (See Water Quality Report). It is likely that overall the risk to stream temperature for the 5<sup>th</sup> field watershed is low. The project does not prevent the attainment of the objective in this watershed

#### *Horse Creek-Klamath River*

There are about 360 acres of roadside hazard treatments in the Riparian Reserves of the watershed. There is one temporary road crossing on existing temp 9 that involves a crossing on a perennial reach of Doggett Creek. Short term impacts to shade may occur during implementation and will be minimized by BMPs and project design features. Long term benefits of properly stabilizing this old road prism and crossing are expected. Also, use of the temporary road access will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective. There are no new landings in Riparian Reserves. The risk for alternative 2 to water temperature is low to moderate for the 7<sup>th</sup> field watersheds in the Horse Creek 5<sup>th</sup> field watershed with Kohl Creek being high due to the fire effects not the alternative (See Water Quality Report). It is likely that overall the risk to stream temperature for the 5<sup>th</sup> field watershed is low. The project does not prevent the attainment of the objective in this watershed.

#### *Seiad Creek-Klamath River*

The risk for alternative 2 to water temperature is low to moderate for the 7<sup>th</sup> field watersheds in the Seiad Creek 5<sup>th</sup> field watershed in the project area with Lower Grider Creek, Walker Creek, Caroline Creek, and O'Neil Creek being high due to the fire effects not the alternative (See Water Quality Report). There are about 905 acres of roadside hazard treatments in the Riparian Reserves of the watershed. Within this watershed, there are several locations where temporary road actions are near streams (O'Neil and Kuntz creeks) or involve crossings (Gard Creek and Cliff Valley Creek). In O'Neil and Kuntz drainages, use and improvement of these existing roads

will not involve removal of any trees that provide shade to streams. There are long-term benefits of using these roads because of the legacy sediment source mitigation to connectivity, physical integrity of aquatic systems; sediment regimes (see other objective descriptions). Temporary road crossings along decommissioned roads in Cliff Valley Creek and Gard Creek may negatively affect stream shade at the site scale during project implementation and for several years until shade providing vegetation recovers from the disturbance. These impacts at several sites would be highly localized at the crossings and would not be meaningful at the watershed scale.

There are 5 new landings in Riparian Reserves within this watershed; each was evaluated in the field for potential effects to shade to stream channels at the site scale. Watershed specialists determined that construction and use of them would not impact shade over the nearby streams (Grider Cr, Cliff Valley Cr, and Klamath River); therefore these actions would also not affect stream temperature at the watershed scale. The use of the temporary road access and new landings will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective. It is likely that overall the risk to stream temperature for the 5<sup>th</sup> field watershed is moderate. The project does not prevent the attainment of the objective in this watershed.

#### *Lower Scott River*

There are about 925 acres of roadside hazard treatment in the Riparian Reserves of the watershed, and no near stream temporary roads or crossings. There is one new landing in the Riparian Reserve approved for use which could reduce shade if mature green trees between the landing location and the Scott River needed to be removed, which cannot be ruled out at this point. These impacts would likely persist over the long-term at the site scale but would not affect stream temperature at the watershed scale because of the small footprint. Use of this new landing would facilitate helicopter logging (which constitutes the least ground disturbing logging) and allow for reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective. The risk for alternative 2 to water temperature is low to moderate for all of the 7<sup>th</sup> field watersheds in the Lower Scott River 5<sup>th</sup> field watershed in the project area (See Water Quality Report). It is likely that overall the risk to stream temperature for the 5<sup>th</sup> field watershed is moderate. The project does not prevent the attainment of the objective in this watershed.

#### *Thompson Creek-Klamath River*

There are about 475 acres of roadside hazard treatments in the Riparian Reserves of the watershed. Within this watershed there is one location, in the upper China Creek drainage, where alternative 2 proposes to reopen a decommissioned road (46N78) involving several intermittent stream crossings. The use of the temporary road access will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the

attainment of the objective. The stream crossings may require tree removal that would reduce shade over the intermittent stream channels for the long-term at the site scale, but would not affect water temperature at the watershed scale because of their location and small footprint. There are no new landings proposed in Riparian Reserves for this watershed. The use of the temporary road access and new landings will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective. The risk for alternative 2 to water temperature is low for all of the 7<sup>th</sup> field watersheds in the Thompson Creek 5<sup>th</sup> field watershed in the project area (See Water Quality Report). It is likely that overall the risk to stream temperature for the 5<sup>th</sup> field watershed is low. The project does not prevent the attainment of the objective in this watershed.

#### *Elk Creek Watershed*

There are about 950 acres of roadside hazard treatment in the Riparian Reserves of the watershed. There are temporary road actions in this watershed but they are ridgetop segments that do not involve crossings. The use of the temporary road access will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective. Also, legacy sediment site treatment in this watershed will reduce diversion potential and thereby protect water quality including temperature. The risk for alternative 2 to water temperature is low for all of the 7<sup>th</sup> field watersheds in the Elk Creek 5<sup>th</sup> field watershed in the project area with Granite Creek and Middle Elk Creek being high due to the fire not the project (See Water Quality Report). It is likely that overall the risk to stream temperature for the 5<sup>th</sup> field watershed is moderate. The project does not prevent the attainment of the objective in this watershed.

#### *Ukonom Creek- Klamath River*

There are about 90 acres of roadside hazard treatments in the Riparian Reserves of the watershed. There are no temporary road crossings in the watershed or new landings. The risk for alternative 2 to water temperature is low for the one 7<sup>th</sup> field watersheds in Ukonom Creek 5<sup>th</sup> field in the project area with (See Water Quality Report). It is likely that overall the risk to stream temperature for the 5<sup>th</sup> field watershed is low. The project does not prevent the attainment of the objective in this watershed.

#### *South Fork Salmon River*

There are about 2 acres of roadside hazard treatments in the Riparian Reserves of the watershed. There are no temporary road crossings in the watershed or new landings. The risk for alternative 2 to water temperature is low for the two 7<sup>th</sup> field watersheds in South Fork Salmon Creek 5<sup>th</sup> field in the project area with (See Water Quality Report). It is likely that overall the risk to stream temperature for the 5<sup>th</sup> field watershed is low. The project does not prevent the attainment of the objective in this watershed.

## *North Fork Salmon River*

The risk for alternative 2 to water temperature is low for the two 7<sup>th</sup> field watersheds in South Fork Salmon Creek 5<sup>th</sup> field in the project area with (See Water Quality Report). It is likely that overall the risk to stream temperature for the 5<sup>th</sup> field watershed is low. There are about 907 acres of roadside hazard treatments in the Riparian Reserves of the watershed. There are no temporary road crossings in the watershed. There is one new landing in the Riparian Reserve which may reduce shade along a perennial tributary of Whites Gulch, at the site scale. This landing is currently not approved for use by watershed specialists as it is currently being evaluated to ensure the project sufficiently minimizes potential effects to stream shade at this location to the greatest extent possible. While this action could affect stream shade at this site long term, it is not likely to affect temperature at the watershed scale because of small extent of impact. Use of this new landing will facilitate helicopter logging (which constitutes the least ground disturbance for salvage) and allows for reforestation which will lead to a quicker recovery of the forest over the long-term. Therefore this action does not prevent the attainment of the objective.

***Objective 5:*** *Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the regime include the timing, volume, rate, and character of sediment input, storage, and transport.*

The sediment regime analysis will consider the effects to sediment delivery to streams estimated by the Universal Soil Loss Equation and landslide models; and site level analysis of near stream actions.

All streams in the project area are listed as impaired under section 303(d) of the Clean Water Act, which means that current conditions do not meet water quality standards and streams are not supporting their beneficial uses (USEPA 2010). The 303(d) list identified stream temperature and sediment as the pollutants causing impairment in small tributary streams. Water quality monitoring conducted by the Forest Service prior to 2014 wildfires found that streambed sediment is elevated for at least one of the three indices in all sampled watersheds in the project area except for Whites Gulch and North Russian Creek (see Water Quality report).

One cause of impairment on National Forest System lands has been attributed to legacy sediment sites from past management including historic mining, road building, and silviculture (NCRWQCB 2010, NCRWQCB 2005). A majority of the legacy sediment sites are associated with the road system, most of which was constructed in the 1960s and 1970s prior to modern best management practices (BMPs). Culverts were commonly designed to pass a 25-year flood rather than the 100-year flood required by current road standards. Road construction often did not avoid unstable slopes or riparian areas that are protected by today's BMPs. As a result, some of the current road system is not resilient to natural disturbance by fire and floods. A flood in

1997 caused road failures which triggered debris torrents that traveled miles downstream. Some of the impact to water quality occurred when landslides and debris flows removed riparian vegetation, reduced stream shade, and increased water temperatures (De La Fuente and Elder 1998, NCRWQCB 2010). To minimize or eliminate water quality impacts by future floods the Total Maximum Daily Loads for the Klamath, Scott, and Salmon Rivers set load allocations that require road stream crossings to pass a 100-year flood without diverting or failing.

**Action Influence on Objective:**

Activities proposed in alternative 2 do not change the results of the USLE model at the 5<sup>th</sup> field scale (Table 9).

**Table 9. CWE model results at the 5<sup>th</sup>-field scale comparing pre-fire conditions, no action and Alternative 2, the proposed action.**

<b>5th-Field Watershed Name</b>	<b>Post-Fire, No Action</b>	<b>Alternative2</b>
Humbug Creek-Klamath River	0.5	0.5
Beaver Creek	1.2	1.2
Horse Creek-Klamath River	0.8	0.8
Seiad Creek-Klamath River	0.7	0.7
Lower Scott River	0.5	0.5
Thompson Creek-Klamath River	0.3	0.3
Elk Creek	0.3	0.3
Ukonom Creek-Klamath River	0.6	0.6
South Fork Salmon River	0.4	0.4
North Fork Salmon River	0.3	0.3

- Salvage.** Riparian Reserves have been established along all streams to protect riparian function (project design feature Watershed-3) including sediment retention capacity. Cutting of trees for salvage harvest will not occur within Riparian Reserves. The sediment retention function of Riparian Reserves will not be impacted by salvage harvest at the site scale. At the watershed scale (5<sup>th</sup>- and 7<sup>th</sup>-field watersheds), the 2014 fires resulted in significant impacts to sediment in some watersheds as described above. However, Alternative 2 adds only a slight incremental increase in disturbance to the baseline disturbance conditions and will remove burned trees and include reforestation to restore these areas quicker than taking no action because of the increased pace of forest recovery (see Silviculture report). Based on

Watershed project design features that will minimize effects at the site-scale, we conclude that salvage harvest and site preparation under Alternative 2 will have discountable effects on sediment regimes and minor effects on aquatic species at the site and watershed scale. This action will not prevent the attainment of the objective at the site or watershed scale on the short or long term.

- **Roadside Hazard.** Based on implementation of the Watershed project design features for hazard tree removal that require felled hazard trees to be left on site in near-stream zones, and field review of hazard tree removal areas, hazard tree abatement along roadsides will have discountable effects to sediment regimes and site level sediment production and transport.
- **Hazard Fuels.** Project design features are intended to minimize the sediment delivered to stream channels as a result of hazardous fuels treatments. Project fuels treatments are designed to reduce the adverse effects of future wildfires, therefore, would provide some protection for future watershed condition and function, especially if/when fires occur greater than 5 years in the future. The reduction of the risk of high severity fire will reduce the risk to the sediment regime at the site and watershed scale on the long term. This action will maintain and restore this objective at the site and watershed scale for the short and long term.
- **Site prep and plant.** Approximately 1,100 acres of Riparian Reserves will be treated with lop and scatter within site preparation and planting units which is intended to increase soil cover and sediment retention capacity of the Riparian Reserves, as well as improve soil productivity, reducing erosion and sedimentation. This action will maintain and restore the objective at the site and watershed scale for the short and long term.
- **Temporary road actions.** Disturbance associated with temporary roads were accounted for in the CWE analysis. At the watershed scale there would be no meaningful impact to sediment regimes because temporary roads will be hydrologically stabilized and closed post-project, and because there will be no net increase in road density or drainage network after the project is complete. At the site scale crossings may increase the sediment delivered to streams. However, project design features including the requirement to hydrologically stabilize temporary roads, fix legacy sites and following the wet weather operation standards will minimize effects to the sediment regime for this action. The use of the temporary road access will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective. The activity will not prevent the attainment of the objective at the site or watershed scale for the short or long term.
- **New landings.** Although the CWE modelling indicates that the proposed action will not add incremental increases to disturbance at the 5<sup>th</sup>-field watershed scale, and only a slight

incremental increase in some watersheds at the 7<sup>th</sup>-field scale, landings constructed within Riparian Reserves has a high risk of impacts to sediment supply and delivery at the site-scale. At the site scale new landings in the Riparian Reserve may delivered to streams. However, project design features including the requirement of erosion control and following the wet weather operation standards will minimize effects to the sediment regime for this action. The use of the landings will facilitate reforestation which will lead to a quicker recovery of the forest over the long-term and thus does not prevent the attainment of the objective. The activity will not prevent the attainment of the objective at the site or watershed scale for the short or long term.

## **5<sup>th</sup> Field Watershed Analysis**

### *Humbug Creek-Klamath River*

Project actions are limited to roadside hazard and fuels treatments. These actions would have only discountable effects to sediment at the site scale and beneficial effects to watershed condition long term.

### *Beaver Creek Watershed*

Project actions are minimal in this watershed which has been highly disturbed by the 2014 fires and private timber harvest (and associated road building). At the site level, two crossings on a non-fish bearing face drainage to Beaver Creek would result in short term negative effects and long term benefits as active erosion would be addressed by appropriate hydrologic stabilization.

### *Horse Creek-Klamath River*

Proposed ground based harvest and one temporary road action are likely to result in short term site level impacts to sediment in Doggett Creek during implementation and post project storms. These impacts would be additive to current and future sediment related impacts in this watershed due to heavy fire impacts and private timber harvest (and associated road building).

### *Seiad Creek-Klamath River*

The southern portion of this watershed was heavily affected by 2014 wildfires. Many riparian areas burned at moderate to high severity; key riparian functions, including sediment retention capacity and stream shade, are assumed to be lost in these areas. Watershed specialists reviewed heavily impacted areas relative to the proposed units and found that, particularly in Upper Grider Creek 7<sup>th</sup> field watershed, there is potential for adverse effects related to sediment from salvage harvest due to heavily impacted riparian areas within and downstream of project units: 520, 521, 522, 524, 525, and 528.

Site level impacts to sediment are expected due to temporary road actions in O'Neil, Kuntz, Caroline Cr-Klamath River, Lower Grider Cr, and Cliff Valley Cr drainages. Potential short term effects would be minor in O'Neil, Kuntz, and Lower Grider Cr drainages, and road-related sediment delivery would be reduced post project by hydrologic stabilization. There would be no long term benefits associated with temporary road actions in Caroline Cr-Klamath River and Cliff Valley Cr drainages as these are stabilized decommissioned roads where reopening them constitutes setting back recovery of hillslope processes in these areas by 15 years. Reopening the mid slope decommissioned road in Caroline Cr-Klamath River drainage may have short term adverse effects to aquatic habitat in Gard Creek, Caroline Creek, and the Klamath River.

#### *Lower Scott River*

The western portion of this watershed was affected by 2014 wildfires; stand replacing high severity burns occurred in several headwater drainages but riparian areas lower in the watershed were less affected and in some areas unaffected. The project does not propose near stream actions in this watershed that may have site level effects. Long term benefits from reducing fuels and speeding reforestation are expected with the project.

#### *Thompson Creek-Klamath River*

The western portion of this watershed was affected by 2014 wildfires; stand replacing high severity burns occurred in several headwater drainages but riparian areas lower in the watershed were less affected and in some areas unaffected. The project does not propose near stream actions in this watershed that may have site level effects. Long term benefits from reducing fuels and speeding reforestation are expected with the project.

#### *Elk Creek Watershed*

The southern portion of this watershed was affected by the fires with stand replacing high severity burns dominating the headwater areas near Frying Pan Ridge. Project actions comprise a minor portion of the watershed and are expected to have mostly beneficial effects for fuels reduction and accelerating the recovery of large trees on the landscape. There is one temporary road action with the potential to cause site level sediment impacts; proposed reopening of a decommissioned road in upper China Creek drainage. Opening this road involves several intermittent stream crossings which are well decommissioned currently. While there is no long term benefit for using this road (no legacy sediment sites to address), the impact of using it poses little risk to aquatic habitat as it is well above perennial stream habitat on stable landforms.

#### *Elk Creek Watershed*

The 2014 fires affected a large proportion of this watershed with some areas of high severity and many low and mixed severity burns. Site level sediment related impacts are expected in areas

where legacy sediment site treatments are proposed, however these actions will also result in long term benefits in terms of improved aquatic organism passage, improved connectivity of aquatic habitat and watershed products, and reduced sediment delivery from roads as well as reduced risk of road failures and large sediment inputs.

#### *Ukonom Creek- Klamath River*

Project actions are limited to roadside hazard and fuels treatments. These actions would have only discountable effects to sediment at the site scale and beneficial effects to watershed condition long term.

#### *South Fork Salmon River*

Project actions are limited to roadside hazard and fuels treatments. These actions would have only discountable effects to sediment at the site scale and beneficial effects to watershed condition long term.

#### *North Fork Salmon River*

This watershed was affected by wildfires in 2013 and 2014. Project related sediment impacts at the site level are of concern only around one proposed new landing within Riparian Reserve of Whites Gulch. The project includes several large underburns designed to reduce fuels and build resilience on this fire adapted landscape. There is one new landing in Riparian Reserve (L072), in Whites Gulch, that remains in alternatives 2, 3, and 5 but has not been approved as an exception to project design feature Watershed-5. Watershed specialists have concerns about potential short and long term impacts to shade (Whites Gulch is an important thermal refugia for salmonids in NF Salmon River) and large wood recruitment, due to the close proximity of the landing location to a perennial stream and the potential need to remove mature green trees to allow for use in the project. Logging system specialists are working to find alternate locations for this helicopter landing to determine the best method to facilitate helicopter logging in this area while protecting shade over streams and the vulnerable post fire condition.

***Objective 6:*** *Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats, and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.*

The water quantity analysis considers the effect to base flow using a qualitative assessment and peak flow using the Equivalent Roaded Acres model.

The historical range of variability for base and peak flow falls from 100 year flood events like the flood of 1964-1965 to drought years where the snow pack is less than 10% of normal in some areas. The spring-fed perennial streams have less variation in their base flows than snow-melt

driven intermittent streams from year to year. Large fires can increase peak flows because of the reduction in precipitation interception, infiltration, and roughness over the landscape; these functions are provided by live vegetation and soil cover which naturally slow water and sediment movement over the hillslope in unburned areas.

#### **Action Influence on Objective:**

- **Salvage.** Peak flows are not a site specific measure – they are only measurable at the watershed scale. Salvage harvest will remove only dead or dying trees which do not mediate peak flows in the watershed. The activities related to logging such as ground-based disturbance due to tractors and skyline yarding will add about 0.8 ERA/acre of treatment (from ERA model outputs – see Hydrology report). Grant et al (2008)<sup>2</sup> shows that there is a correlation between ERAs and peak flows.
- **Roadside Hazard.** The effects to peak flow are the same as for salvage harvest. There is the felling of trees in Riparian Reserves in roadside hazard units.
- **Hazard Fuels.** The effects to peak flow are the same as for salvage harvest. There will be fuels treatments in the Riparian Reserves.
- **Site prep and plant.** The effects to peak flow are the same as for salvage harvest.
- **Temporary road actions.** Each acre of temporary access will increase ERAs by 0.7 ERAs because they are hydrologically stabilized after use.
- **New landings.** Each acre of landings will increase the ERA by 0.12 ERAs.
- **Water Drafting.** At the site scale, in-stream flows would only be affected by project related water drafting. Water drafting will be implemented according to NOAA specifications (when within Coho Salmon critical habitat) and Forest Best Management Practices (outside of critical habitat) that minimize potential impacts to flows and eliminate the likelihood that sites could be dewatered. Project design features also require that fisheries biologists are involved in decisions on where water drafting occurs so that potential impacts to critical thermal refugia habitat are avoided. No more than 10% of streamflow can be taken within NOAA specifications and no more than 50% per Forest Best Management Practices. Water drafting will result in only slight temporary decreases in flow, which will be undetectable both a short distance downstream and short-term. This will not measurably affect base and peak flows at the 5<sup>th</sup> field watershed scale.

#### **5<sup>th</sup> Field Watershed Analysis**

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<sup>2</sup> Grant, G.E., S.L. Lewis, F.J. Swanson, J.H. Cissel, and J.J. McDonnell. 2008. Effects of forest practices on peak flows and consequent channel response: a state-of-science report for western Oregon and Washington. USDA, Forest Service, Pacific Northwest Research Station, GTR-760. Pages i-iii, 34-41.

### *Humbug Creek-Klamath River*

The ERA risk ratio for this watershed is 0.84 including the effects of alternative 2, which is below the threshold of concern of 1.0 (see Water Quality Report). The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are an estimated 27 potential water drafting sites in this watershed. Any water drafting will likely occur during the summer or fall, so base flow will be decreased at the site scale while the water is actively being pumped. Once pumping ceases the base flow will recover in a few minutes at the site. The project will not prevent the attainment of this objective in this watershed.

### *Beaver Creek Watershed*

The ERA risk ratio for this watershed is 1.07 including the effects of alternative 2, which indicates a moderate risk to channel geomorphology. The increased risk is due to the fire effects and past private land harvest activities. The alternative increases the risk ratio by 0.02. The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are an estimated 64 potential water drafting sites in this watershed. Any water drafting will likely occur during the summer or fall, so base flow will be decreased at the site scale while the water is actively being pumped. Once pumping ceases the base flow will recover in a few minutes at the site. The project will not prevent the attainment of this objective in this watershed.

### *Horse Creek-Klamath River*

The ERA risk ratio for this watershed is 0.84 including the effects of alternative 2, which is below the threshold of concern of 1.0 (see Water Quality Report). The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are an estimated 108 potential water drafting sites in this watershed. Any water drafting will likely occur during the summer or fall, so base flow will be decreased at the site scale while the water is actively being pumped. Once pumping ceases the base flow will recover in a few minutes at the site. The project will not prevent the attainment of this objective in this watershed.

### *Seiad Creek-Klamath River*

The ERA risk ratio for this watershed is 0.82 including the effects of alternative 2, which is below the threshold of concern of 1.0 (see Water Quality Report). The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are an estimated 87 potential water drafting sites in this watershed. Any water drafting will likely occur during the summer or fall, so base flow will be decreased at the site scale while the water is actively being pumped. Once pumping ceases the base flow will recover in a few minutes at the site. The project will not prevent the attainment of this objective in this watershed.

### *Lower Scott River*

The ERA risk ratio for this watershed is 0.57 including the effects of alternative 2, which is below the threshold of concern of 1.0 (see Water Quality Report). The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are an estimated 29 potential water drafting sites in this watershed. Any water drafting will likely occur during the summer or fall, so base flow will be decreased at the site scale while the water is actively being pumped. Once pumping ceases the base flow will recover in a few minutes at the site. The project will not prevent the attainment of this objective in this watershed.

#### *Thompson Creek-Klamath River*

The ERA risk ratio for this watershed is 0.49 including the effects of alternative 2, which is below the threshold of concern of 1.0 (see Water Quality Report). The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are an estimated 42 potential water drafting sites in this watershed. Any water drafting will likely occur during the summer or fall, so base flow will be decreased at the site scale while the water is actively being pumped. Once pumping ceases the base flow will recover in a few minutes at the site. The project will not prevent the attainment of this objective in this watershed.

#### *Elk Creek Watershed*

The ERA risk ratio for this watershed is 0.98 including the effects of alternative 2, which is below the threshold of concern of 1.0 (see Water Quality Report). The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are an estimated 39 potential water drafting sites in this watershed. Any water drafting will likely occur during the summer or fall, so base flow will be decreased at the site scale while the water is actively being pumped. Once pumping ceases the base flow will recover in a few minutes at the site. The project will not prevent the attainment of this objective in this watershed.

#### *Ukonom Creek- Klamath River*

The ERA risk ratio for this watershed is 0.56 including the effects of alternative 2, which is below the threshold of concern of 1.0 (see Water Quality Report). The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are an estimated 41 potential water drafting sites in this watershed. Any water drafting will likely occur during the summer or fall, so base flow will be decreased at the site scale while the water is actively being pumped. Once pumping ceases the base flow will recover in a few minutes at the site. The project will not prevent the attainment of this objective in this watershed.

#### *South Fork Salmon River*

The ERA risk ratio for this watershed is 0.40 including the effects of alternative 2, which is below the threshold of concern of 1.0 (see Water Quality Report). The ERA will be nearly

recovered from the fire effects and the project effects in about 10 years. There are an estimated 34 potential water drafting sites in this watershed. Any water drafting will likely occur during the summer or fall, so base flow will be decreased at the site scale while the water is actively being pumped. Once pumping ceases the base flow will recover in a few minutes at the site. The project will not prevent the attainment of this objective in this watershed.

#### *North Fork Salmon River*

The ERA risk ratio for this watershed is 0.73 including the effects of alternative 2, which is below the threshold of concern of 1.0 (see Water Quality Report). The ERA will be nearly recovered from the fire effects and the project effects in about 10 years. There are an estimated 32 potential water drafting sites in this watershed. Any water drafting will likely occur during the summer or fall, so base flow will be decreased at the site scale while the water is actively being pumped. Once pumping ceases the base flow will recover in a few minutes at the site. The project will not prevent the attainment of this objective in this watershed.

***Objective 7:*** *Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows.*

Floodplain inundation is a large scale process. Activities that could influence this objective are dam installation and removal, large water diversions, modification of floodplains, and modifications of streams channels with floodplains (such as dredging, infilling, and channel relocation). Water tables in meadows can be influenced by development of springs for domestic or agriculture use, dewatering the meadow via diversion, modification of the stream in a meadow or disturbance to the surface of the meadow. None of these activities are being proposed for this project. Therefore, there is no influence on this objective at any scale by the Westside Fire Recovery project.

***Objective 8:*** *Maintain and restore the species composition and structural diversity of plant communities in riparian areas.*

This analysis will consider the expected response of conifer and hardwood trees in the Riparian Reserves including species diversity and structural components.

Historically, the project area was rich in species and structural diversity. It was likely dominated by mixed conifer-hardwood forests at lower elevations which transitioned to primarily conifer dominated forests as elevation gradients increased. Stumps in the project area indicate that large trees were historically well distributed in and out of Riparian Reserves throughout the project area. Timber harvest, tree planting, and fire exclusion have led to modifications in species composition and structural diversity. In order to facilitate timber production, past activities have likely caused a reduction in species diversity by contributing to the conversion of historically shrub or hardwood dominated vegetative assemblages to more conifer oriented communities. Additionally, these past actions have created dense, stands that are of a more uniform age and composition.

### Action Influence on Objective:

- **Salvage.** Salvage harvest of dead trees is not proposed within stream course Riparian Reserves, which are designated as one site tree height or greater from stream channels. The removal of dead trees from the landscape surrounding RR would have no effect on species composition in the short or long-term at the site or watershed scale because dead trees cannot produce offspring which are a necessary component for the maintenance and/or restoration of species composition. Large trees and snags will be maintained within Riparian Reserve, so the effects of salvage activities on structural diversity would be negligible at the site and watershed scale at both short and long-term time frames. This action will not prevent the attainment of the objective at the site or watershed scale for the short or long term.
- **Roadside Hazard.** Roadside hazard tree removal may occur within Riparian Reserve. The removal of green hazard trees may have a minor short-term effect on site scale species recruitment and thus composition because a potential seed source would be removed. However, the ability of many hardwoods to re-sprout quickly from root-stock following wildfires would help facilitate the short-term restoration of species composition at the site and watershed scale. Additionally, planting prescriptions and the natural regeneration process would ensure that long-term species composition continues to be restored and maintained at the site and watershed scale. The effect of hazard tree removal on structural diversity will be minor on the site and watershed scale at both the long and short-term time frames because large hazardous trees (26" or greater) felled within Riparian Reserve will be left on site and thus will continue to contribute to structural diversity. This action will not prevent the attainment of the objective at the site or watershed scale for the short or long term.
- **Hazard Fuels.** Fuel treatments would occur within Riparian Reserve and would be aimed at thinning dense stands and reducing hazardous fuel loads. Reduction in stand density would reduce short and long-term competition for resources generating a positive effect on species composition and structural diversity by increasing the growth and vigor of the remaining vegetation. Thinning treatments would also increase the long-term health and resiliency of Riparian Reserve to disturbance by moving them towards more historic stocking levels. The retention of snags greater than 16" DBH during thinning treatments would contribute to the maintenance of structural diversity within Riparian Reserve at the site and watershed scale in the short and long-term time frames by preserving the larger elements of the stand structure. Prescribed burns within Riparian Reserve would mimic a low-intensity backing fire and thus would add to the heterogeneity of the forest structure by consuming surface fuels and small understory vegetation. Reduction in hazardous fuels would protect watershed level species composition and structural diversity in the long-term by reducing

the risk of a future high severity wildfire. This action will maintain and restore the objective at the site and watershed scale for the short and long term.

- **Site prep and plant.** Site preparation treatments would occur within Riparian Reserve and include hand thinning treatments aimed at achieving near term ground cover and encouraging natural regeneration of riparian vegetation. Increased ground cover would help create microsite characteristics favorable for native, riparian-dependent species through the retention of moisture, and improvement of soil productivity and stability subsequently promoting the long-term development of diverse species composition at the site and watershed scale. Increased availability of light and nutrients from thinning treatments would encourage the establishment of pioneering plant species common following disturbance which would foster short-term diversity in species composition at the site and watershed scale as dormant seed banks are revitalized. The retention of snags greater than 16" DBH during thinning treatments would contribute to the maintenance of structural diversity within Riparian Reserve at the site and watershed scale in the short and long-term time frames by preserving the larger elements of the stand structure. Planting would not occur within Riparian Reserves. However, as planted seedlings outside Riparian Reserve mature and begin producing seed they would contribute to long-term species composition and structural diversity at the site and watershed scale through the natural recruitment process. Additionally, burned areas within Riparian Reserve provide the habitat characteristics necessary for the unique and less frequent elements of the California flora known as fire followers, to come to life and establish a seed bank for the next event further promoting species diversity. This action will maintain and restore the objective at the site and watershed scale for the short and long term.
- **Temporary road actions.** Actions relating to temporary roads are proposed both outside of, and within, Riparian Reserve. Within Riparian Reserve, no new temporary roads will be built and the use of existing roadbeds in Riparian Reserve would not require the removal of any large trees or snags. Within no large trees or snags be removed, there would be no effect from these actions on species composition or structural diversity at the site or watershed scale in either the short or long-term time frame. This action will not prevent the attainment of the objective at the site or watershed scale for the short or long term.
- **New landings.** Several new landings would be constructed on the outer portion of Riparian Reserve; however they will not require the removal of mature vegetation. Because these landings will not require the removal of mature stand elements there would be no short or long-term effects to species composition or structural diversity at the site scale. New landing creation outside of Riparian Reserve may require the removal of large trees and/or snags which could have a minor effect on short and long-term species composition and structural diversity at the watershed scale through the removal mature stand elements that could

provide a seed source or contribute to stand heterogeneity. This action will not prevent the attainment of the objective at the site or watershed scale for the short or long term.

## **5<sup>th</sup> Field Watershed Analysis**

### *Humbug Creek-Klamath River*

There are 410 acres of roadside hazard treatments and 350.6 acres of hazardous fuel treatments proposed within this watershed. The removal of roadside hazard trees may affect species composition at the site scale within Riparian Reserve through the removal of green, cone-bearing trees; however, this action will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. There would be no site scale affects to structural diversity from roadside hazard treatments because project design features would ensure that large hazard trees are felled and left on site and thus could continue to contribute to stand heterogeneity. Site scale affects to species composition and structural diversity from hazardous fuel treatments would be beneficial and include: reduced stand density, reduced competition for resources, and increased heterogeneity (through retention of snags greater than 16" DBH). At the watershed level and site scale, alternative 2 would not prevent the attainment of this objective.

### *Beaver Creek Watershed*

There are 105.4 acres of salvage treatments, 1,318.6 acres of roadside hazard treatments, 724.8 acres of hazardous fuel treatments, 689.6 acres of site preparation and planting treatments, 1.5 miles of temporary road access, and 6 landings proposed within this watershed. There would be no site scale affects to species composition from salvage activities because dead trees cannot produce seed which is necessary for the maintenance of species composition. There would be no site scale affects to structural diversity from salvage activities because project design features would ensure that large tree and snags are retained within Riparian Reserve. The potential removal of green, cone-bearing, roadside hazard trees from within Riparian Reserve may affect species composition at the site scale; however, this action will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. There would be no site scale affects to structural diversity from roadside hazard treatments because project design features would ensure that large hazard trees are felled and left on site and thus could continue to contribute to stand heterogeneity. Site scale affects to species composition and structural diversity from hazardous fuel and site preparation and planting treatments would be beneficial and include: reduced stand density, reduced competition for resources, and increased heterogeneity (through retention of snags greater than 16" DBH). Temporary road and landing actions will not affect site scale species composition or structural diversity because they will not remove large trees, mature vegetation, or snags from within Riparian Reserve. The potential removal of green, mature cone-bearing trees outside of Riparian Reserve for temporary road or

landing actions may affect species composition at the watershed level; however, these actions will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. At the watershed level and site scale, alternative 2 would not prevent the attainment of this objective.

#### *Horse Creek-Klamath River*

There are 575 acres of salvage treatments, 1,387.8 acres of roadside hazard treatments, 1,016.1 acres of hazardous fuel treatments, 1,092.6 acres of site preparation and planting treatments, 1.4 miles of temporary road access, and 15 landings proposed within this watershed. There would be no site scale affects to species composition from salvage activities because dead trees cannot produce seed which is necessary for the maintenance of species composition. There would be no site scale affects to structural diversity from salvage activities because project design features would ensure that large tree and snags are retained within Riparian Reserve. The potential removal of green, cone-bearing, roadside hazard trees from within Riparian Reserve may affect species composition at the site scale; however, this action will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. There would be no site scale affects to structural diversity from roadside hazard treatments because project design features would ensure that large hazard trees are felled and left on site and thus could continue to contribute to stand heterogeneity. Site scale affects to species composition and structural diversity from hazardous fuel and site preparation and planting treatments would be beneficial and include: reduced stand density, reduced competition for resources, and increased heterogeneity (through retention of snags greater than 16" DBH). Temporary road and landing actions will not affect site scale species composition or structural diversity because they will not remove large trees, mature vegetation, or snags from within Riparian Reserve. The potential removal of green, mature cone-bearing trees outside of Riparian Reserve for temporary road or landing actions may affect species composition at the watershed level; however, these actions will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. At the watershed level and site scale, alternative 2 would not prevent the attainment of this objective.

#### *Seiad Creek-Klamath River*

There are 6,056.4 acres of salvage treatments, 4,570.2 acres of roadside hazard treatments, 2,532.5 acres of hazardous fuel treatments, 1,371.5 acres of site preparation and planting treatments, 13 miles of temporary road access, and 50 landings proposed within this watershed. There would be no site scale affects to species composition from salvage activities because dead trees cannot produce seed which is necessary for the maintenance of species composition. There

would be no site scale affects to structural diversity from salvage activities because project design features would ensure that large tree and snags are retained within Riparian Reserve. The potential removal of green, cone-bearing, roadside hazard trees from within Riparian Reserve may affect species composition at the site scale; however, this action will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. There would be no site scale affects to structural diversity from roadside hazard treatments because project design features would ensure that large hazard trees are felled and left on site and thus could continue to contribute to stand heterogeneity. Site scale affects to species composition and structural diversity from hazardous fuel and site preparation and planting treatments would be beneficial and include: reduced stand density, reduced competition for resources, and increased heterogeneity (through retention of snags greater than 16" DBH). Temporary road and landing actions will not affect site scale species composition or structural diversity because they will not remove large trees, mature vegetation, or snags from within Riparian Reserve. The potential removal of green, mature cone-bearing trees outside of Riparian Reserve for temporary road or landing actions may affect species composition at the watershed level; however, these actions will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. At the watershed level and site scale, alternative 2 would not prevent the attainment of this objective.

#### *Lower Scott River*

There are 1,631.6 acres of salvage treatments, 3,810.5 acres of roadside hazard treatments, 1,096.4 acres of hazardous fuel treatments, 1,293.4 acres of site preparation and planting treatments, 1.5 miles of temporary road access, and 23 landings proposed within this watershed. There would be no site scale affects to species composition from salvage activities because dead trees cannot produce seed which is necessary for the maintenance of species composition. There would be no site scale affects to structural diversity from salvage activities because project design features would ensure that large tree and snags are retained within Riparian Reserve. The potential removal of green, cone-bearing, roadside hazard trees from within Riparian Reserve may affect species composition at the site scale; however, this action will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. There would be no site scale affects to structural diversity from roadside hazard treatments because project design features would ensure that large hazard trees are felled and left on site and thus could continue to contribute to stand heterogeneity. Site scale affects to species composition and structural diversity from hazardous fuel and site preparation and planting treatments would be beneficial and include: reduced stand density, reduced competition for resources, and increased heterogeneity (through retention of snags greater than 16" DBH). Temporary road and landing actions will not affect site scale species composition or structural diversity because they will not

remove large trees, mature vegetation, or snags from within Riparian Reserve. The potential removal of green, mature cone-bearing trees outside of Riparian Reserve for temporary road or landing actions may affect species composition at the watershed level; however, these actions will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. At the watershed level and site scale, alternative 2 would not prevent the attainment of this objective.

#### *Thompson Creek-Klamath River*

There are 400.1 acres of salvage treatments, 2,448.1 acres of roadside hazard treatments, 1,667.3 acres of hazardous fuel treatments, 902.8 acres of site preparation and planting treatments, 1.6 miles of temporary road access, and 26 landings proposed within this watershed. There would be no site scale affects to species composition from salvage activities because dead trees cannot produce seed which is necessary for the maintenance of species composition. There would be no site scale affects to structural diversity from salvage activities because project design features would ensure that large tree and snags are retained within Riparian Reserve. The potential removal of green, cone-bearing, roadside hazard trees from within Riparian Reserve may affect species composition at the site scale; however, this action will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. There would be no site scale affects to structural diversity from roadside hazard treatments because project design features would ensure that large hazard trees are felled and left on site and thus could continue to contribute to stand heterogeneity. Site scale affects to species composition and structural diversity from hazardous fuel and site preparation and planting treatments would be beneficial and include: reduced stand density, reduced competition for resources, and increased heterogeneity (through retention of snags greater than 16" DBH). Temporary road and landing actions will not affect site scale species composition or structural diversity because they will not remove large trees, mature vegetation, or snags from within Riparian Reserve. The potential removal of green, mature cone-bearing trees outside of Riparian Reserve for temporary road or landing actions may affect species composition at the watershed level; however, these actions will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. At the watershed level and site scale, alternative 2 would not prevent the attainment of this objective.

#### *Elk Creek Watershed*

There are 660.7 acres of salvage treatments, 3,771.5 acres of roadside hazard treatments, 3,336.2 acres of hazardous fuel treatments, 1,902.8 acres of site preparation and planting treatments, 2.7 miles of temporary road access, and 20 landings proposed within this watershed. There would be

no site scale affects to species composition from salvage activities because dead trees cannot produce seed which is necessary for the maintenance of species composition. There would be no site scale affects to structural diversity from salvage activities because project design features would ensure that large tree and snags are retained within Riparian Reserve. The potential removal of green, cone-bearing, roadside hazard trees from within Riparian Reserve may affect species composition at the site scale; however, this action will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. There would be no site scale affects to structural diversity from roadside hazard treatments because project design features would ensure that large hazard trees are felled and left on site and thus could continue to contribute to stand heterogeneity. Site scale affects to species composition and structural diversity from hazardous fuel and site preparation and planting treatments would be beneficial and include: reduced stand density, reduced competition for resources, and increased heterogeneity (through retention of snags greater than 16" DBH). Temporary road and landing actions will not affect site scale species composition or structural diversity because they will not remove large trees, mature vegetation, or snags from within Riparian Reserve. The potential removal of green, mature cone-bearing trees outside of Riparian Reserve for temporary road or landing actions may affect species composition at the watershed level; however, these actions will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. At the watershed level and site scale, alternative 2 would not prevent the attainment of this objective.

#### *Ukonom Creek- Klamath River*

There are 64.7 acres of roadside hazard treatments, and 155.6 acres of hazardous fuel treatments proposed within this watershed. The removal of roadside hazard trees may affect species composition at the site scale within Riparian Reserve through the removal of green, cone-bearing trees; however, this action will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. There would be no site scale affects to structural diversity from roadside hazard treatments because project design features would ensure that large hazard trees are felled and left on site and thus could continue to contribute to stand heterogeneity. Site scale affects to species composition and structural diversity from hazardous fuel treatments would be beneficial and include: reduced stand density, reduced competition for resources, and increased heterogeneity (through retention of snags greater than 16" DBH). At the watershed level and site scale, alternative 2 would not prevent the attainment of this objective.

#### *South Fork Salmon River*

There is 232 acres of roadside hazard treatments, 523 acres of hazardous fuel treatments, 0.2 miles of temporary road access, and 1 new landing proposed within this watershed. The potential removal of green, cone-bearing, roadside hazard trees from within Riparian Reserve may affect species composition at the site scale; however, this action will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. There would be no site scale affects to structural diversity from roadside hazard treatments because project design features would ensure that large hazard trees are felled and left on site and thus could continue to contribute to stand heterogeneity. Site scale affects to species composition and structural diversity from hazardous fuel and site preparation and planting treatments would be beneficial and include: reduced stand density, reduced competition for resources, and increased heterogeneity (through retention of snags greater than 16" DBH). Temporary road and landing actions will not affect site scale species composition or structural diversity because they will not remove large trees, mature vegetation, or snags from within Riparian Reserve. The potential removal of green, mature cone-bearing trees outside of Riparian Reserve for temporary road or landing actions may affect species composition at the watershed level; however, these actions will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. At the watershed level and site scale, alternative 2 would not prevent the attainment of this objective.

#### *North Fork Salmon River*

There are 361 acres of salvage treatments, 2,485 acres of roadside hazard treatments, 10,823 acres of hazardous fuel treatments, 654 acres of site preparation and planting treatments, 1.0 miles of temporary road access, and 11 new landings proposed within this watershed. There would be no site scale affects to species composition from salvage activities because dead trees cannot produce seed which is necessary for the maintenance of species composition. There would be no site scale affects to structural diversity from salvage activities because project design features would ensure that large tree and snags are retained within Riparian Reserve. The potential removal of green, cone-bearing, roadside hazard trees from within Riparian Reserve may affect species composition at the site scale; however, this action will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. There would be no site scale affects to structural diversity from roadside hazard treatments because project design features would ensure that large hazard trees are felled and left on site and thus could continue to contribute to stand heterogeneity. Site scale affects to species composition and structural diversity from hazardous fuel and site preparation and planting treatments would be beneficial and include: reduced stand density, reduced competition for resources, and increased heterogeneity (through retention of snags greater than 16" DBH). Temporary road and landing actions will not affect site scale species composition or structural diversity because they will not

remove large trees, mature vegetation, or snags from within Riparian Reserve. The potential removal of green, mature cone-bearing trees outside of Riparian Reserve for temporary road or landing actions may affect species composition at the watershed level; however, these actions will not prevent the attainment of this objective because planting prescriptions and the natural regeneration process would ensure that species composition continues to be restored and maintained. At the watershed level and site scale, alternative 2 would not prevent the attainment of this objective.

**Objective 9:** *Maintain and restore habitat to support well-distributed populations of native plant and invertebrate riparian dependent species.*

This analysis will consider the effect of the types of vegetation in Riparian Reserves (RR) and the risk of spreading and introducing non-native invasive species (NNIS).

Native riparian-dependent communities were historically well distributed within riparian areas and likely consisted of a mix of willow, alder, dogwood, and maple that transitioned into old-growth conifer forests. Logging and mining operations have led to a modification of riparian vegetative communities. Non-native invasive species were not present in riparian areas prior to introduction by humans.

**Action Influence on Objective:**

- **Salvage.** Salvage harvest of dead trees is not proposed within stream course Riparian Reserve. The removal of dead trees from the landscape surrounding Riparian Reserve would have no short or long-term effect on the distribution of native riparian vegetation at the site or watershed scale since these trees are dead. Ground disturbance associated with salvage actions may increase the risk of spreading NNIS in the short-term at the site and watershed scale; however, project design features have been incorporated in order to reduce the risk and limit spread. This action will not prevent the attainment of the objective at the site or watershed scale for the short or long term.
- **Roadside Hazard.** Roadside hazard tree removal may occur within Riparian Reserve. The removal of green hazard trees may have a minor short-term effect on site scale species recruitment because a potential seed source would be removed. However, planting prescriptions and the natural regeneration process would help facilitate the continued restoration of native riparian-dependent communities in the short and long-term at both the site and watershed scale. Many NNIS populations are located along roads and subsequently these treatments may increase the short-term risk of spreading NNIS at the site and watershed scale; however, project design features have been incorporated in order to reduce this risk and limit spread. This action will not prevent the attainment of the objective at the site or watershed scale for the short or long term.
- **Hazard Fuels.** Hazardous fuel treatments would occur within Riparian Reserve and would be aimed at thinning dense stands and reducing hazardous fuel loads. Reduction in stand

density would reduce short and long-term competition for resources subsequently increasing the growth and vigor of riparian-dependent vegetative communities. Reduction in hazardous fuels would protect riparian dependent communities at the watershed scale in the long-term by reducing the risk of a future high severity wildfire. Hazardous fuel treatments are not anticipated to have a high risk of spreading NNIS and project design features intended to reduce the likelihood of spread will help further limit this risk at both the site and watershed scale. This action will not prevent the attainment of the objective at the site or watershed scale for the short or long term.

- **Site prep and plant.** Site preparation treatments would occur within Riparian Reserve and include hand thinning treatments aimed at achieving near term ground cover and encouraging natural regeneration of riparian vegetation. Increased ground cover would help create microsite characteristics favorable for native, riparian-dependent species through the retention of moisture, and improvement of soil productivity and stability subsequently promoting the long-term development of well-distributed, native, riparian communities. Increased ground cover may also provide a barrier to the establishment of NNIS in the short and long-term at the site scale. Increased availability of light and nutrients from thinning treatments would encourage the establishment of pioneering plant species further contributing to the distribution of native, riparian plant communities at the watershed scale. Ground disturbance associated with site preparation and planting actions may increase the risk of spreading NNIS in the short-term at the site and watershed scale; however, project design features have been incorporated in order to reduce the risk and limit spread. This action will maintain and restore the objective at the site and watershed scale for the short and long term.
- **Temporary road actions.** Actions relating to temporary roads are proposed both outside of, and within, Riparian Reserve. Within Riparian Reserve, no new temporary roads will be built and the use of existing roadbeds in Riparian Reserve would not require the removal of any large trees or snags. There would be no effect on short or long term distribution of native riparian-dependent communities at the site or watershed scale from these actions since no roads will be constructed within riparian areas. The movement of soil associated with these actions has the potential to spread NNIS; however, project design features have been incorporated in order to reduce the risk and limit spread. This action will not prevent the attainment of the objective at the site or watershed scale for the short or long term.
- **New landings.** Several new landings would be constructed on the outer portion of Riparian Reserve; however they will not require the removal of mature vegetation. Therefore, there would be no short or long-term effect from actions associated with landings on the distribution of native, riparian-dependent species at the site scale. New landing creation outside of Riparian Reserve would not affect the distribution of native, riparian-dependent communities because they would not be occurring within riparian areas. The movement of

soil associated with these actions has the potential to spread NNIS; however, project design features have been incorporated in order to reduce the risk and limit spread. This action will not prevent the attainment of the objective at the site or watershed scale for the short or long term.

## **5<sup>th</sup> Field Watershed Analysis**

### *Humbug Creek-Klamath River*

There are 410 acres of roadside hazard treatments and 350.6 acres of hazardous fuel treatments proposed within this watershed. The removal of green hazard trees may have a minor short-term effect on site scale species recruitment because a potential seed source would be removed. However, planting prescriptions and the natural regeneration process would help facilitate the continued restoration of native riparian-dependent communities in the short and long-term at both the site and watershed scale. Site scale affects to native, riparian-dependent communities from hazardous fuel treatments would be beneficial and include: reduced competition for resources and decreased risk of a future high-severity wildfires. Project design features have been incorporated into the project to reduce the risk of introducing and spreading NNIS from project related activities in the short and long-term at both the site and watershed scale. Alternative 2 would not prevent the attainment of this objective at the site or watershed scale.

### *Beaver Creek Watershed*

There are 105.4 acres of salvage treatments, 1,318.6 acres of roadside hazard treatments, 724.8 acres of hazardous fuel treatments, 689.6 acres of site preparation and planting treatments, 1.5 miles of temporary road access, and 6 landings proposed within this watershed. There would be no site scale affects to native-riparian dependent vegetative communities in the short or long-term from salvage activities because the trees being removed are already dead and because this activity will not be occurring in riparian areas. The removal of green hazard trees may have a minor short-term effect on site scale species recruitment because a potential seed source would be removed. However, planting prescriptions and the natural regeneration process would help facilitate the continued restoration of native riparian-dependent communities in the short and long-term at both the site and watershed scale. Site scale affects to native, riparian-dependent communities from hazardous fuel treatments would be beneficial and include: reduced competition for resources and decreased risk of a future high-severity wildfires. Site preparation and planting treatments would help promote the long-term development of well-distributed, native, riparian communities at the site level by increasing ground cover and the amount of available light and nutrients. Temporary road and landing actions will not affect the distribution of riparian-dependent communities at the site scale, because, if constructed within Riparian Reserve, they will not remove mature vegetation, large trees, or snags. Project design features have been incorporated into the project to reduce the risk of introducing and spreading NNIS

from project related activities in the short and long-term at both the site and watershed scale. Alternative 2 would not prevent the attainment of this objective at the site or watershed scale.

#### *Horse Creek-Klamath River*

There are 575 acres of salvage treatments, 1,387.8 acres of roadside hazard treatments, 1,016.1 acres of hazardous fuel treatments, 1,092.6 acres of site preparation and planting treatments, 1.4 miles of temporary road access, and 15 landings proposed within this watershed. There would be no site scale effects to native-riparian dependent vegetative communities in the short or long-term from salvage activities because the trees being removed are already dead and because this activity will not be occurring in riparian areas. The removal of green hazard trees may have a minor short-term effect on site scale species recruitment because a potential seed source would be removed. However, planting prescriptions and the natural regeneration process would help facilitate the continued restoration of native riparian-dependent communities in the short and long-term at both the site and watershed scale. Site scale effects to native, riparian-dependent communities from hazardous fuel treatments would be beneficial and include: reduced competition for resources and decreased risk of a future high-severity wildfires. Site preparation and planting treatments would help promote the long-term development of well-distributed, native, riparian communities at the site level by increasing ground cover and the amount of available light and nutrients. Temporary road and landing actions will not affect the distribution of riparian-dependent communities at the site scale, because, if constructed within Riparian Reserve, they will not remove mature vegetation, large trees, or snags. Project design features have been incorporated into the project to reduce the risk of introducing and spreading NNIS from project related activities in the short and long-term at both the site and watershed scale. Alternative 2 would not prevent the attainment of this objective at the site or watershed scale.

#### *Seiad Creek-Klamath River*

There are 6,056.4 acres of salvage treatments, 4,570.2 acres of roadside hazard treatments, 2,532.5 acres of hazardous fuel treatments, 1,371.5 acres of site preparation and planting treatments, 13 miles of temporary road access, and 50 landings proposed within this watershed. There would be no site scale effects to native-riparian dependent vegetative communities in the short or long-term from salvage activities because the trees being removed are already dead and because this activity will not be occurring in riparian areas. The removal of green hazard trees may have a minor short-term effect on site scale species recruitment because a potential seed source would be removed. However, planting prescriptions and the natural regeneration process would help facilitate the continued restoration of native riparian-dependent communities in the short and long-term at both the site and watershed scale. Site scale effects to native, riparian-dependent communities from hazardous fuel treatments would be beneficial and include: reduced competition for resources and decreased risk of a future high-severity wildfires. Site preparation and planting treatments would help promote the long-term development of well-distributed,

native, riparian communities at the site level by increasing ground cover and the amount of available light and nutrients. Temporary road and landing actions will not affect the distribution of riparian-dependent communities at the site scale, because, if constructed within Riparian Reserve, they will not remove mature vegetation, large trees, or snags. Project design features have been incorporated into the project to reduce the risk of introducing and spreading NNIS from project related activities in the short and long-term at both the site and watershed scale. Alternative 2 would not prevent the attainment of this objective at the site or watershed scale.

#### *Lower Scott River*

There are 1,631.6 acres of salvage treatments, 3,810.5 acres of roadside hazard treatments, 1,096.4 acres of hazardous fuel treatments, 1,293.4 acres of site preparation and planting treatments, 1.5 miles of temporary road access, and 23 landings proposed within this watershed. There would be no site scale affects to native-riparian dependent vegetative communities in the short or long-term from salvage activities because the trees being removed are already dead and because this activity will not be occurring in riparian areas. The removal of green hazard trees may have a minor short-term effect on site scale species recruitment because a potential seed source would be removed. However, planting prescriptions and the natural regeneration process would help facilitate the continued restoration of native riparian-dependent communities in the short and long-term at both the site and watershed scale. Site scale affects to native, riparian-dependent communities from hazardous fuel treatments would be beneficial and include: reduced competition for resources and decreased risk of a future high-severity wildfires. Site preparation and planting treatments would help promote the long-term development of well-distributed, native, riparian communities at the site level by increasing ground cover and the amount of available light and nutrients. Temporary road and landing actions will not affect the distribution of riparian-dependent communities at the site scale, because, if constructed within Riparian Reserve, they will not remove mature vegetation, large trees, or snags. Project design features have been incorporated into the project to reduce the risk of introducing and spreading NNIS from project related activities in the short and long-term at both the site and watershed scale. Alternative 2 would not prevent the attainment of this objective at the site or watershed scale.

#### *Thompson Creek-Klamath River*

There are 400.1 acres of salvage treatments, 2,448.1 acres of roadside hazard treatments, 1,667.3 acres of hazardous fuel treatments, 902.8 acres of site preparation and planting treatments, 1.6 miles of temporary road access, and 26 landings proposed within this watershed. There would be no site scale affects to native-riparian dependent vegetative communities in the short or long-term from salvage activities because the trees being removed are already dead and because this activity will not be occurring in riparian areas. The removal of green hazard trees may have a minor short-term effect on site scale species recruitment because a potential seed source would be removed. However, planting prescriptions and the natural regeneration process would help

facilitate the continued restoration of native riparian-dependent communities in the short and long-term at both the site and watershed scale. Site scale affects to native, riparian-dependent communities from hazardous fuel treatments would be beneficial and include: reduced competition for resources and decreased risk of a future high-severity wildfires. Site preparation and planting treatments would help promote the long-term development of well-distributed, native, riparian communities at the site level by increasing ground cover and the amount of available light and nutrients. Temporary road and landing actions will not affect the distribution of riparian-dependent communities at the site scale, because, if constructed within Riparian Reserve, they will not remove mature vegetation, large trees, or snags. Project design features have been incorporated into the project to reduce the risk of introducing and spreading NNIS from project related activities in the short and long-term at both the site and watershed scale. Alternative 2 would not prevent the attainment of this objective at the site or watershed scale.

#### *Elk Creek Watershed*

There are 660.7 acres of salvage treatments, 3,771.5 acres of roadside hazard treatments, 3,336.2 acres of hazardous fuel treatments, 1,902.8 acres of site preparation and planting treatments, 2.7 miles of temporary road access, and 20 landings proposed within this watershed. There would be no site scale affects to native-riparian dependent vegetative communities in the short or long-term from salvage activities because the trees being removed are already dead and because this activity will not be occurring in riparian areas. The removal of green hazard trees may have a minor short-term effect on site scale species recruitment because a potential seed source would be removed. However, planting prescriptions and the natural regeneration process would help facilitate the continued restoration of native riparian-dependent communities in the short and long-term at both the site and watershed scale. Site scale affects to native, riparian-dependent communities from hazardous fuel treatments would be beneficial and include: reduced competition for resources and decreased risk of a future high-severity wildfires. Site preparation and planting treatments would help promote the long-term development of well-distributed, native, riparian communities at the site level by increasing ground cover and the amount of available light and nutrients. Temporary road and landing actions will not affect the distribution of riparian-dependent communities at the site scale, because, if constructed within Riparian Reserve, they will not remove mature vegetation, large trees, or snags. Project design features have been incorporated into the project to reduce the risk of introducing and spreading NNIS from project related activities in the short and long-term at both the site and watershed scale. Alternative 2 would not prevent the attainment of this objective at the site or watershed scale.

#### *Ukonom Creek- Klamath River*

There are 64.7 acres of roadside hazard treatments, and 155.6 acres of hazardous fuel treatments proposed within this watershed. The removal of green hazard trees may have a minor short-term effect on site scale species recruitment because a potential seed source would be removed.

However, planting prescriptions and the natural regeneration process would help facilitate the continued restoration of native riparian-dependent communities in the short and long-term at both the site and watershed scale. Site scale affects to native, riparian-dependent communities from hazardous fuel treatments would be beneficial and include: reduced competition for resources and decreased risk of a future high-severity wildfires. Project design features have been incorporated into the project to reduce the risk of introducing and spreading NNIS from project related activities in the short and long-term at both the site and watershed scale. Alternative 2 would not prevent the attainment of this objective at the site or watershed scale.

#### *South Fork Salmon River*

There is 232 acres of roadside hazard treatments, 523 acres of hazardous fuel treatments, 0.2 miles of temporary road access, and 1 new landing proposed within this watershed. Site scale affects to native, riparian-dependent communities from hazardous fuel treatments would be beneficial and include: reduced competition for resources and decreased risk of a future high-severity wildfires. Temporary road and landing actions will not affect the distribution of riparian-dependent communities at the site scale, because, if constructed within Riparian Reserve, they will not remove mature vegetation, large trees, or snags. Project design features have been incorporated into the project to reduce the risk of introducing and spreading NNIS from project related activities in the short and long-term at both the site and watershed scale. Alternative 2 would not prevent the attainment of this objective at the site or watershed scale.

#### *North Fork Salmon River*

There are 631 acres of salvage treatments, 2,485 acres of roadside hazard treatments, 10823 acres of hazardous fuel treatments, 654 acres of site preparation and planting treatments, 1.0 miles of temporary road access, and 11 landings proposed within this watershed. There would be no site scale affects to native-riparian dependent vegetative communities in the short or long-term from salvage activities because the trees being removed are already dead and because this activity will not be occurring in riparian areas. The removal of green hazard trees may have a minor short-term effect on site scale species recruitment because a potential seed source would be removed. However, planting prescriptions and the natural regeneration process would help facilitate the continued restoration of native riparian-dependent communities in the short and long-term at both the site and watershed scale. Site scale affects to native, riparian-dependent communities from hazardous fuel treatments would be beneficial and include: reduced competition for resources and decreased risk of a future high-severity wildfires. Site preparation and planting treatments would help promote the long-term development of well-distributed, native, riparian communities at the site level by increasing ground cover and the amount of available light and nutrients. Temporary road and landing actions will not affect the distribution of riparian-dependent communities at the site scale, because, if constructed within Riparian Reserve, they will not remove mature vegetation, large trees, or snags. Project design features

have been incorporated into the project to reduce the risk of introducing and spreading NNIS from project related activities in the short and long-term at both the site and watershed scale. Alternative 2 would not prevent the attainment of this objective at the site or watershed scale.

## Summary and Conclusion

The 2014 wildfires burned about 4,885 acres of the 5<sup>th</sup> field watershed analyzed with high soil burn severity, about 45,025 acres with moderate, about 111,155 acres of low and 21,690 with very low soil burn severity. The project is proposing salvage logging, roadside hazard treatments, hazardous fuels treatments, and site preparation treatments. These require temporary road access, landing construction and water drafting for implementation of the proposed action. Chapter 2 of the DEIS has a detailed description of the activities proposed. Legacy sediment source mitigation is proposed for the Elk Creek 5<sup>th</sup> field watershed to meet the Total Daily Maximum Load requirements. The project meets all of the Watershed Assessment recommendations including the reduction of fuel loading and reforestation efforts.

The activities proposed either maintain and restore the objectives or at the least do not prevent attainment of the objectives (Forest Plan Standard and Guideline MA10-3 pg. 4-108). The decrease in the risk of high severity fire due to the fuels reduction will maintain and restore objectives on the long term. The site preparation and planting will decrease the time needed to recovery conifer forest cover in the project area. This will maintain and restore objectives on the long term as well.

Project design and project design features will minimize the effects of the actions on the objectives and are designed to ensure the project will not prevent the attainment of the objectives on either the short or long term. The mitigation of legacy sediment sources will help to maintain and restore the sediment regime in the Elk Creek 5<sup>th</sup> field (Objective 5). Water drafting will not prevent the attainment of Objective 6 because of the short duration and project design features. The rest of the influences on the Objectives by proposed action are in Table 10.

**Table 10: Summary of influence of activities on the objectives.**

<b>Objective</b>	<b>Salvage</b>	<b>Roadside Hazard</b>	<b>Hazardous Fuels</b>	<b>Site Preparation</b>	<b>Temporary Roads</b>	<b>Landings</b>
1	Not Prevent Attainment	Not Prevent Attainment	Maintain and Restore	Maintain and Restore	Not Prevent Attainment	Not Prevent Attainment
2	Not Prevent Attainment	Not Prevent Attainment	Maintain and Restore	Maintain and Restore	Not Prevent Attainment	Not Prevent Attainment
3	Not Prevent Attainment	Not Prevent Attainment	Not Prevent Attainment	Not Prevent Attainment	Not Prevent Attainment	Not Prevent Attainment

4	Not Prevent Attainment	Not Prevent Attainment	Maintain and Restore	Maintain and Restore	Not Prevent Attainment	Not Prevent Attainment
5	Not Prevent Attainment	Not Prevent Attainment	Maintain and Restore	Maintain and Restore	Not Prevent Attainment	Not Prevent Attainment
6	Not Prevent Attainment	Not Prevent Attainment	Not Prevent Attainment	Not Prevent Attainment	Not Prevent Attainment	Not Prevent Attainment
7	This objective is not influenced by any of the activities proposed.					
8	Not Prevent Attainment	Not Prevent Attainment	Maintain and Restore	Maintain and Restore	Not Prevent Attainment	Not Prevent Attainment
9	Not Prevent Attainment	Not Prevent Attainment	Not Prevent Attainment	Maintain and Restore	Not Prevent Attainment	Not Prevent Attainment

**Table 11: Near stream temporary road and landing actions in the project area.**

Road Type	Road #	Fire Area	Alt 2	Alt 3	Alt 4	Alt 5	Comments	Crossings per field review	Nepa decision to decomm	MIS river/stream habitat affected	Long term beneficial effects from treating legacy sites
Existing Temp	8	Beaver	Yes	Yes	No	Yes	Doggett Cr. Old road bed is not outsloped in most places and almost bermed in spots. Hasnt seen use since maybe 1960s? Draws are ephemeral, except for drainage just before the proposed harvest unit at end. Crossing is legacy site where road has captured the stream in a wetland like feature, then drains in oversteep drop to channel. Drainage is heavily fire affected mostly throughout. LWD and riparian veg are lacking and high sediment load in channels evident (water visibly turbid in Doggett Cr just below project units at 12 road crossing).	1 perennial (heavily affected by post fire condition)		1.5 miles stream, 0 resident and 0 STHD, 0 turtle	1.5 miles
Existing Temp	39 and 40	Beaver	Yes	Yes	No	Yes	Face drainage to Beaver Cr off 47N44 in site prep unit - two temps with stacked crossings on same channel - heavily fire affected drainage with active features involved in top crossing, a crossing of this drainage on each temp road segment. Both crossings are legacy sites with road related fill in various stages of moving downhill. Surface water evident in several areas around the higher crossing and they coalesce just below this crossing to one channel. The lower crossing is partially blown out and substantial work would be involved to bring both of these crossings into usable condition, and to address legacy sediment sources on the way out. These temps access site prep units.	2 (intermittent)		1.1 miles stream, 0 resident and 0 STHD, 0 turtle	1.1 miles
Decom	46N41Y A	Happy Camp	Yes	Yes	No	No	Grider Cr - reopen decom - 2 perennial crossings at beginning of road, one is legacy site with flow going under crossing in French drain effect on upper crossing. Lower crossing has fill removed and is armored and not actively eroding. Seems that road has been pulled back to contour marginally in some spots (or natural processes caused it), no active erosion.	2 (perennial)	2003-Grider Watershed Restoration	0.5 mile stream, 0 resident and 0 STHD, 0 turtle	0.5 miles

Decom	46N62	Happy Camp	Yes	Yes	No	Yes	Gard Cr and Caroline Cr - First segment of road (up to Gard Xing) is primarily decomposed granite with multiple sandy pulled ephemeral crossings, and one intermittent, most which have been armored just below crossing with large cobble (this segment, up to Gard Xing, was opened during 2014 fires then closed/bermed). Gard Cr Xing involves two channels, one perennial and other appears intermittent. These decommissioned crossings have no fill, fabric then large cobble armoring parts of where channel crosses old roadbed and just below. Crossings are not actively eroding and fire effects throughout the Gard Cr drainage were not severe - there are patches of unburned trees and LWD in creek. Past this crossing, road is outsloped but not pulled back. Most ephemeral crossings appear fairly stable, except one active slump/landslide just before the intermittent crossing. Need input from geo on implementation and effects of road reconstruction on this active feature. We walked to the intermittent crossing of Caroline (think this is the only one), then back. That crossing had live stream trickling from rock above road, then live stream about 50 feet down the hill.	1 (perennial), 3 (intermittent), many ephemeral	2001-Walker Flood DN	3.5 miles stream, 1 mile for resident and STHD and turtle, 0 Cascades frog	0
Decom	46N77	Happy Camp	Yes	Yes	No	No	Cliff Valley Cr - last crossing we saw on way out is only crossing proposed for reopening - its rockd and well stabilized as part of outsloped road prism. Probably intermittent channel but post fire may flow more perennially.	1 (intermittent)	1999 - HC Road decommissioned	0.5 mile stream, 0 resident and 0 STHD and 0 turtle	0
Decom	46N78	Happy Camp	Yes	Yes	No	No	China Cr (SF 3 Biscuit Cr) - multiple crossings of intermittent channels. Crossings are pulled and rockd and not actively eroding at all. Road outsloped and pulled back to contour marginally at beginning.	3 (intermittent)	1999 - HC Road decommissioned	0.25 mile stream, 0 resident and 0 STHD and 0 turtle	0

New Temp	16	Happy Camp	Yes	Yes	Yes	Yes	Bottom of Kuntz Cr - proposed road use is at the end of a private road. No crossings involved (except private diversion ditch crossing under the road at one point). The road has drainage problems and is near the top of inner gorge to Kuntz Cr. Proposed road work and use would have a moderate risk of affecting aquatic habitat, and long term aquatic habitat benefits in terms of improving drainage and hydro stabilizing the road. The proposed landing site appears to be outside or nearly out, of the RR.	0		0.5 mile resident, 0 STHD and 0 turtle	0.5 miles
Existing Temp	2	Happy Camp	Yes	Yes	No	No	Bottom of O'Neil Cr - temp road in RR - proposed road use is at the end of a private road. On FS land the road parallels the creek then switches back and loops back around to meet the lower road. Topography is not steep and fire effects are patchy and moderate in the drainage. The road has drainage problems and at one point the intermittent channel is on the road bed for several hundred feet. Proposed road work and use would have a low risk of affecting aquatic habitat, and long term benefits in term of improving drainage and hydro stabilizing the road. Proposed landing site is nearly outside of the RR and, with bringing the road in compliance with BMPs, is not likely to affect aquatic habitat in O'Neil Cr.	0		0.60 mile resident and STHD, 0.25 turtle	0.6 miles
New landing	L072	Whites	Yes	Yes	No	Yes	Existing landing in RR next to tributary to Whites Gul - about 1/4 acre flat next to creek with mature green trees that would need to be cut to create new helicopter landing. Expansion would require substantial earth work that would probably impact mining created gulches (one which appears to be perennial stream).	new landing in RR		2 miles resident, 1.5 miles STHD, 0 turtle	0