Mt. Ashland LSR Habitat Restoration Project
Addendum to Fishery Specialist Report

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This document is an addendum to the Mt. Ashland LSR Habitat Restoration Project Fishery Specialist Report. This addendum documents direct, indirect, and Cumulative Watershed Effects (CWE) stemming from the Preferred Alternative and the differences in the Preferred Alternative vs. Alt 2. Only effects from the Preferred Alternative are reported in this document.

Table 1 below shows alternative actions comparison.

	Alt. 2	**Alt.4**	**Alt. 5**	**Preferred Alternative**
Acres Treated	3875	3361	3781	3601
Cable	1602	1552	1471	1610
Helicopter	1071	861	1245	935
Tractor	428	220	376	579
Com. Grd. Base	555	541	494	403
Mech. Harv.	219	187	195	50
Fuels Treatment	4706	4202	4612	5765
Road Segments	22	16	9	8
Miles	6.72	4.96	2.27	1.7
Landings	40	34	31	43
Acres	25	22.5	22	22

The fuels treatment under the Preferred Alternative reflects an additional 1297 acres of underburning, to accomplish needed fuels reduction. The increase in the number of landings is needed to accommodate an increase in the number of tractor and skyline landings needed.

The Preferred Alternative also yields a decrease in road construction miles and road clearing acres, with 8 segments totaling 1.7 miles.

Project Design Measures

No spur roads will cross riparian reserves.

Skid roads may cross ephemeral (no indication of intermittent and seasonal flow) draws. Clean out of the swale will occur when this occurs.

Cable and helicopter yarding will utilize tops-attached tree yarding to minimize project related fuels.
Opening in harvest units will be limited to a ¼ acre in size.

Effects to anadromous fish habitat (including coho CH and EFH) from the Preferred Alternative:

Direct Effects

Potential **direct effects** are associated only with water withdrawal used to reduce dust to maintain safe driving conditions; there are no other activities occurring within flowing streams. The water withdrawal has resource protection measures to minimize direct effects to insignificant levels and there are no long term direct or indirect effects since the disturbance is short term and stream flow returns to background levels after drafting is completed.

The effects of water drafting for the Preferred Alternative are the same as Alternative 2. The effects of alternative 2 are discussed at length in the Mt. Ashland LSR Habitat Restoration Project Fisheries Biological Assessment (USDA Forest Service 2007) and in the Mt. Ashland LSR Habitat Restoration Project Fisheries Specialist Report (USDA Forest Service 2007a).

Indirect Effects of Preferred Alternative

The Mt. Ashland LSR Habitat Restoration Project Fisheries Biological Assessment (USDA Forest Service 2007) analyzes eighteen fish habitat indicators. Three of those indicators were chosen for analysis: Temperature and substrate embeddedness (settleable material) are objectives in the Basin Plan. Peak flow is a hydrologic condition that directly affects sediment delivery and channel condition. The effects of **the Preferred Alternative** discussed below for each indicator are **indirect** effects.

Stream Temperature

The potential to reduce stream canopy shade from thinning is negligible to non-existent, because there is no variable density thinning within the first site potential tree height in riparian reserves adjacent to flowing or standing water. Canopy shade will not be affected by removal of trees <9" DBH and hand piling of material <9" DBH (USDA Forest Service 2007a).

Removal of individual hazard trees along roads or in work areas may result in localized reduction of shade cover over streams in the immediate area, especially where hazard trees are removed from road fill surfaces at crossings. This loss of shade will be limited to fill surfaces on either side of crossings. Vegetation cover is expected to quickly recover at these sites. With the exception of these localized and short-term reductions in stream shade at crossings, Project activities will not reduce stream shade/canopy below 80%. Where localized reduction in canopy cover below 80% is unavoidable, field review

by a fisheries biologist will ensure that these reductions are minimized, so that water temperature will not be adversely affected.

The slight amount of riparian vegetation removed by hazard tree removal activities at stream crossings, and the addition of cool water entering the stream systems downstream of these activities crossings will result in neutral/undetectable stream temperature effects to anadromous fish and their habitat (USDA Forest Service 2007).

The effects of vegetation clearing during construction of the 43 new landings under the Preferred Alternative will not affect stream temperature, since all new landings will be located at least 170 feet from intermittent or non-fish bearing stream channels and 340 feet from fish-bearing stream channels in the Project area (i.e., outside of RRs).

Several tributaries will provide cool water that more than compensates for any possible small reductions in flow caused by water drafting in tributaries to Grouse Creek and Long John Creek. Affected flows are not reduced from levels otherwise naturally occurring at the point of diversion by more than 10%. The effect of water drafting on stream temperature will be neutral.

Substrate and Embeddedness

The following is a discussion comparing the effects of the Preferred Alternative versus Alternative 2. The effects of Alternative 2 on this indicator are discussed at length in the Mt. Ashland LSR Habitat Restoration Project Fisheries Biological Assessment (USDA Forest Service 2007) and in the Mt. Ashland LSR Habitat Restoration Project Fisheries Specialist Report (USDA Forest Service 2007a).

Yarding

Yarding has the potential to create quantities of fine sediment and turbidity sufficiently to adversely affect fish habitat. For example, soil infiltration capacity can be impacted by yarding activities, and bare mineral soil can become exposed. When such occurs, the slope angle of the area being yarded influences the degree of soil exposure. Soil disturbance can be minimized regardless of site attributes when the harvest and yarding systems are well matched to the particular site characteristics (Chamberlin, et al 1991).

Helicopter Yarding

Preferred Alternative: Approximately 935 acres will be harvested by helicopter yarding which is 136 acres less than in Alternative 2. The effects are slightly less than those described for Alternative 2 in the Mt. Ashland LSR Habitat Restoration Project Fisheries Biological Assessment (USDA Forest Service 2007).

Tractor Yarding and Tractor endlining

Preferred Alternative: Approximately 579 acres will be harvested by tractor yarding which is 151 acres more than in Alternative 2. The effects are slightly greater than those described for Alternative 2 (USDA Forest Service 2007).

No tractor yarding equipment will enter any RR buffer, which are in intact condition and 340 feet wide on either side of fish bearing stream channels and 170 feet on either side of perennial non-fish bearing streams and intermittent streams. Only 14 tractor yarding stands are located adjacent to anadromous fish habitat and the distance of these stands from the stream channel ranges from 0.1 to 0.6 miles. The remaining 28 tractor yarding stands and one tractor endlining stand are located 0.4 to 2.4 miles upstream or upslope of anadromous fish habitat.

Project design standards, including properly functioning RR buffers adjacent to harvest units, BMPs, and compliance with S&Gs during project execution, is expected to result in insignificantly small (not meaningfully measured or detected) amounts of sediment mobilization out of tractor stands.

The anticipated small amounts of sediment resulting from tractor yarding are expected to be diluted and dispersed by discharge volumes during 'first flush' precipitation events occurring in the fall season. If any mobilized sediment were to actually reach a stream course, it would be diluted to insignificant amounts by increasing tributary flows downstream through the reaches containing anadromous fish habitat, being indistinguishable from baseline level conditions (USDA Forest Service 2007).

The tractor yarding proposed in the Preferred Alternative will therefore have no adverse effects on stream substrate and embeddedness, anadromous fish or their habitat.

Skyline Cable Yarding

Skyline cable yarding (17.5% of harvest) will cause a relatively small degree of soil displacement in the yarding corridors resulting from dragging logs. When properly waterbarred (BMP 1.11), no significant erosion will leave the units (Laurent, T. 2003).

Preferred Alternative: Approximately 1610 acres will be harvested by skyline cable yarding which is 8 acres more than in Alternative 2. The effects are the same as those described in the Mt. Ashland LSR Habitat Restoration Project Fisheries Biological Assessment (USDA Forest Service 2007) for Alternative 2. No adverse effects on stream substrate and embeddedness, anadromous fish or their habitat are expected.

Combination Ground-Based Systems.

Preferred Alternative: Approximately 403 acres will be harvested by combination ground-based systems which is 152 acres less than in Alternative 2. The effects are slightly less than those described for Alternative 2 (USDA Forest Service 2007).

These stands will experience ground disturbance similar to that described above under Tractor Yarding. Project design features and BMPs for these areas are the same as those described under tractor yarding in the Mt. Ashland LSR Habitat Restoration Project Fisheries Biological Assessment (USDA Forest Service 2007). Only four of these stands are located adjacent to anadromous fish habitat. The distances of these stands from the stream channel ranges from 0.06 to 0.3 miles. The other eleven stands are located 0.25 to 1.2 miles upstream or upslope of anadromous fish habitat. Some sediment may reach stream channels by this method but this amount is expected to be insignificantly small, and will be further diluted during transport down stream.

The combination ground-based systems yarding proposed in Preferred Alternative will therefore have no adverse affects on stream substrate and embeddedness, anadromous fish or their habitat.

Mastication

Only 50 acres of mastication are proposed in the Preferred Alternative. This is 169 acres less than in Alternative 2.

Mastication will involve ground disturbance in two treatment areas in Preferred Alternative outside of RRs. This disturbance will remain localized, however, and the masticator will create a bed of mulch on which it operates. This mulching will protect any soil disturbed during mastication operations. Masticated mulch is expected to prohibit sediment mobilization from masticated areas down slope towards stream channels. If any mobilized sediment were to actually reach a stream course, it would be diluted to insignificant amounts by increasing tributary flows downstream through the reaches containing anadromous fish habitat (USDA Forest Service 2007).

With BMPs and Project Design Measures in place and with the two units being approximately two miles upstream of anadromous fish habitat, neutral effects to stream substrate and embeddedness, anadromous fish or their habitat are expected

Underburning

The effects of underburning on substrate and embeddedness, anadromous fish and their habitat for the **Preferred Alternative** are the same as for alternative 2 (USDA Forest Service 2007).

Underburns will be conducted at low intensity and soil cover requirements will be met on site to minimize erosion. Burning outside RRs is not likely to adversely affect anadromous fish in their habitat. There is a low probability of effects to suspended sediment, turbidity, and stream substrate from underburning since no underburning will be initiated in RRs, though fire will be allowed to back down into RRs from ignition points higher on the hillslopes (Mt. Ashland LSR Watershed Report (USDA Forest Service 2007b)).

Firelines will be constructed by hand outside of RRs. The intact and fully functioning RRs will buffer any sediment generated from fireline construction. If any mobilized sediment were to actually reach a stream course, it would be diluted to insignificant amounts by increasing tributary flows downstream through the reaches containing anadromous fish habitat.

No adverse effects on stream substrate and embeddedness, anadromous fish or their habitat are expected.

Landings

Landing construction could elevate local surface erosion, but sediment delivery to streams would be minimal, because of size and location. Riparian buffers would filter sediment and landing runoff would not enter road drainage systems (USDA Forest Service 2007a).

The effects of new landing construction and maintenance of existing landings on substrate and embeddedness, anadromous fish and their habitat for the Preferred Alternative are the same as for alternative 2 (USDA Forest Service 2007).

Construction of 43 new landings under the **Preferred Alternative**, and the use of, and leveling and blading of the remaining existing landings under this alternative will have a neutral effect on anadromous fish or their habitat because the activity is of low intensity, BMPs will be followed (see Appendix B in the Mt. Ashland LSR Habitat Restoration Project Fisheries Biological Assessment (USDA Forest Service 2007) for list of BMPs applicable to landings) and confined to specific areas outside of RRs and away from anadromous fish habitat, so neutral effects to stream substrate and embeddedness, anadromous fish or their habitat are expected.

Temporary Spur Road Construction

The **Preferred Alternative** yields a decrease in road construction miles and road clearing acres, with 8 segments totaling 1.7 miles (see table 1). None of these temporary roads are located within RRs.

Construction and subsequent decommissioning of these temporary roads will not occur within RRs, so these activities will not be hydraulically connected to any stream course. Neutral effects to stream substrate and embeddedness, anadromous fish and their habitat are expected.

For the **Preferred Alternative**, the effects of decommissioning of existing un-authorized Forest Service roads on stream substrate and embeddedness, anadromous fish or their habitat are the same as discussed in Mt. Ashland LSR Habitat Restoration Project Fisheries Specialist Report (USDA Forest Service 2007a) for Alternative 2 (no adverse effects and a long term positive effect on this indicator).

Haul Road Use/Maintenance

For the Preferred Alternative the effects on stream substrate and embeddedness, anadromous fish or their habitat are the same as discussed in the Mt. Ashland LSR Habitat Restoration Project Fisheries Specialist Report (USDA Forest Service 2007a) for Alternative 2. Due to the wet weather operations plan and BMPs, no adverse effects to anadromous fish and their habitat are expected.

Water Drafting

For the Preferred Alternative the effects on stream substrate and embeddedness, anadromous fish or their habitat are the same as discussed in the Mt. Ashland LSR Habitat Restoration Project Fisheries Specialist Report (USDA Forest Service 2007a) for Alternative 2.

Sediment disturbance and mobilization from water withdrawal is expected to be insignificant, due to flows in Beaver and Cow Creek that dilute low suspended sediment concentrations to levels undetectable from background conditions. No adverse effects to stream substrate and embeddedness, anadromous fish or their habitat are expected (USDA Forest Service 2007a).

Peak Flow

Yarding

In all four 7th field watersheds the thinning increases the modeled values for ERA, the Indicator that best accounts for change's in flow. The Project has resource protection measures and BMPs built into the project design (such as the stand prescriptions, layout, and mark) that minimizes risk of changes to flows. After field review of the thinning treatments, the hydrologist concluded that the prescription will serve to retain binding root strength of the residual vegetation and increase evapo-transpiration potential [water potential] in the soil, by decreasing competition for water and nutrients in the soil in the short term. This also will reduce peak flows by tying up groundwater in the longer term (USDA Forest Service 2007a).

Table 2. ERA Model Results

7th-field Drainage	ERA No Action	ERA No Action w/Wildfire	Alt 2	Alt. 4	Alt. 5	Preferred Alternative
Beaver-Grouse	0.53	0.80	0.78	0.74	0.76	0.79
Deer-Beaver	0.69	0.71	0.83	0.83	0.83	0.86
Long John	0.38	0.60	0.76	0.70	0.74	0.76
Upper Cow	0.32	0.32	0.35	0.35	0.35	0.33
5th-field Drainage	**ERA No Action**	**ERA No Action**	**Alt 2**	**Alt. 4**	**Alt. 5**	**Preferred**

		w/Wildfire				Alternative
Beaver Creek	0.76	0.82	0.86	0.85	0.86	.85

No Action with Wildfire

The "No Action w/Wildfire" column models a wildfire with no alternative actions. With wildfire, there is slight elevation in project 7th Field watershed ERA risk ratios in which the wildfire was modeled to occur (Grouse and Long John). The increase in risk shown in Deer-Beaver reflect the Timber Harvest Plans (THP's) submitted by private industry landholders since publication of the draft EIS. This was done using the Klamath CWE model. The project watershed report utilized a WEPP (Watershed Erosion Probability Program) model to simulate the erosion impacts of a wildfire. The project soils report addresses the increase in erosion resulting from a wildfire (USDA Forest Service 2008).

The tables above indicate that under the No Action with Wildfire scenario there could be a slight elevation of risk in the disturbance portion (ERA) of the CWE model. The soil loss (USLE) table indicates an increase in risk in all affected watersheds. An escaped wildfire would cause loss of soil and canopy cover; and create hydrophobic soil conditions, all factors in erosion and sedimentation (USDA Forest Service 2008).

Monitoring on the Klamath National Forest indicates a typical wildfire would burn approximately 14% with a high burn severity, 33% with a moderate severity, and 53% would be low severity (USDA Forest Service 2008).

Preferred Alternative

Under the **Preferred Alternative**, road actions, i.e. decommissioning and stormproofing, as well as new construction, give a net decrease of -21.1 ERA's (Mt. Ashland LSR Watershed Report Addendum (USDA Forest Service 2007c)).

Project actions under the **Preferred Alternative** will not raise the ERA in any of the four 7th field watersheds beyond the inference point of 1.0.

The ERA model shows the greatest degree of proposed action impacts in the Beaver-Grouse, Deer-Beaver and Long John watersheds. Once again this is because of the amount of non-cohesive granitic soils. This can be largely mitigated by project design measures. Since none of the 7th field watersheds reach their inference points of 1.0 in this model, these modeled changes are considered insignificant (USDA Forest Service 2007a).

At the 5th Field watershed scale the Preferred Alternative would raise the risk to 0.85, primarily as a result of the private lands THP's, aforementioned. A wildfire could raise the risk at the 5th Field scale to 0.82. The reason that the wildfire scenario risk ratio is less than the preferred alternative is because there is a recovery factor built into the ERA portion of the model for all disturbance types, except roads. An escaped wildfire low

intensity burns have a total recovery in about 2 years. The model may have recovered portions of the modeled fire before other input disturbances (THP's, and alternative, actions were calculated (USDA Forest Service 2007a).

After consideration of the ERA modeled values, past conditions and site level review by the hydrologist, no adverse effects to peak flows are expected in all four 7th field watersheds and Beaver Creek 5th field watershed for the Preferred Alternative. There should be benefits throughout the project area from thinning in the long term by reducing risk of high intensity wildfires that could significantly alter stream flows (USDA Forest Service 2007a).

Underburning

In the **Preferred Alternative** underburning occurs within thinned areas (approximately 2639 acres), two underburn stands totaling 156 acres, and in six batched areas totaling 1297 acres. There is a low probability of causing changes to surface flows through underburning because of the regrowth in remaining vegetation that occurs after low intensity fires. The underburning will occur over several years, after thinning has created safe burning conditions, reducing the probability of effects to surface flow (USDA Forest Service 2007a).

Underburning is expected to have a neutral effect on flows because existing vegetation will take up water made available by the vegetation removed by burning. There are neutral effects to anadromous fish and their habitat and watershed condition in the short term, with long term benefits to anadromous fish and watershed conditions in the long term by reducing risk of high intensity wildfires that could significantly alter stream flows USDA Forest Service 2007a).

The fire lines are not built in RRs and therefore have a low probability of affecting flows. The hand-constructed fire lines will be obliterated after use and therefore will not change drainage patterns that may affect flows.

The fire lines will be covered with slash and dirt so that erosion is minimized; no adverse effects to peak flow, anadromous fish or their habitat are expected.

Landings

Landing construction could elevate local surface flows, but runoff delivery to streams would be minimal, because of size and location. Riparian buffers would filter sediment and landing runoff would not enter road drainage systems (USDA Forest Service 2007c).

The use of, and leveling and blading, of the remaining existing landings under this alternative will not cause a change in flows; there is no causal mechanism for such a change. No new landings will be constructed within RRs.

The 43 new landings to be constructed under Preferred Alternative outside the RRs have been accounted for within the ERA modeling and those results have been clarified by the hydrologist's field reviews. These landings are not hydrogically connected to any stream course so there is no probability that these landings will cause a change in flows. BMPs 1.12, 1.16, 2.3 and Resource Protection Measures are part of the project design.

A neutral effect on peak flows, anadromous fish or their habitat is expected because the activity is of low intensity, BMPs will be followed (see Appendix B in the Mt. Ashland LSR Habitat Restoration Project Fisheries Biological Assessment (USDA Forest Service 2007) for list of BMPs applicable to landings) and confined to specific areas outside of RRs and away from anadromous fish habitat.

The size of individual landings is guided by safety requirements and landings are kept to the smallest size practical, approximately 0.33 acres each. The construction and use of the new landings will have neutral effects to peak flows in Beaver Creek, Cow Creek, Grouse Creek and Long John Creek due to the small size of the landings, no new landings constructed in RRs, and the distance between the landing construction and anadromous fish habitat in Cow Creek, Long John Creek, Grouse Creek, and Beaver Creek.

Temporary Spur Road Construction

The Preferred Alternative yields a decrease in road construction miles and road clearing acres, with 8 segments totaling 1.7 miles (see table 1). None of these temporary roads are located within RRs.

Construction and subsequent decommissioning of these temporary roads will not occur within RRs, so these activities will not be hydraulically connected to any stream course. BMPs will be followed, so neutral effects to peak flows, anadromous fish or their habitat are expected.

For The Preferred Alternative, the effects of decommissioning of 30 existing un-authorized Forest Service roads on peak flows, anadromous fish or their habitat are the same as discussed in Mt. Ashland LSR Habitat Restoration Project Fisheries Specialist Report (USDA Forest Service 2007a) for Alternative 2 (no adverse effects and a long term positive effect on this indicator).

Hazard Tree Removal

Impacts to peak flows from hazard tree removal are discountable. Because removal of LWD is limited in extent and intensity, per the Resource Protection Measures. When hazard trees must be felled, large trees recruitable to the stream will be left in RRs (USDA Forest Service 2007a).

Hazard tree removal is done to meet safety requirements and has Resource Protection Measures to minimize effects on fish and fish habitat to insignificant levels (USDA Forest Service 2007).

Neutral effects to peak flow, anadromous fish or their habitat are expected.

Water Drafting

At the site level, water drafting has the potential for short term, indirect effects downstream. Pumping rate will not exceed 350 gallons per minute or 10% of the flow of any anadromous stream and pumping is done in short periods (for example, six trips per day to a site and drafting for 20 minutes each time). Water drafting will result in only slight temporary decreases in flow over the course of a 24-hour period that is considered insignificant when drafting from Cow Creek and Beaver Creek because of their large flows. Therefore, the effects to flow (and to anadromous fish and their habitat) are considered insignificant in the short term and neutral in the long term. Screening and restricting withdrawal rates will minimize the potential for effects to anadromous fish and their habitat.

Cumulative Effects

A number of projects are *currently* being implemented (ongoing) to reduce the fire risk around the Project area. These burning and mechanical thinning actions were considered part of the baseline for fish habitat conditions (USDA Forest Service 2007a).

Table 2 indicates that under the Preferred Alternative there are across the board reductions in the ERA's stemming from alternative actions with the exception of Deer-Beaver 7th field watershed. The increases in risk shown in Deer-Beaver reflect the Timber Harvest Plans (THP's) submitted by private industry landholders to the California Division of Forestry since publication of the draft EIS.

At the 5th Field watershed scale The Preferred Alternative would raise the risk to 0.84, primarily as a result of the private lands THP's, aforementioned. This is still below the inference point of 1.0. The project actions, particularly underburning, will not take place in one year. Commercial harvest and associate fuels treatment. As well as analyzed additional underburning, would take place over a 7 year period. This allows some degree of recovery to occur during the life of the project (USDA Forest Service 2007c).

It must be noted that the CWE model overstates some disturbance impacts. For instance, in some areas scheduled for skyline yarding, the cable reach will not extend to the mapped unit boundary. If it is not economically feasible to helicopter yard the lower portions of those units, that area will remain undisturbed. In most cases, areas scheduled for underburning, will in reality have up to 25% of the area in an unburned pockets, rather than the modeled clean burn of all areas (USDA Forest Service 2007c).

The model-derived differences of a few hundredths do not reflect any meaningfully measured, detected, or evaluated differences in risks to watershed conditions between alternatives.

The Preferred Alternative has a low risk of impacting fish or their habitat and has long term beneficial effects by reducing the fire risk around portions of the Project area. The present, ongoing, and future foreseeable projects modeled and qualitatively evaluated all have resource protection measures so that the fisheries resource is not adversely affected. Each of these actions are of low intensity across the landscape, have no or insignificant effects to fish and their habitat and are typically separated by time or space, or both. Many of the past, ongoing and proposed future projects compliment the Preferred Alternative by reducing the risk of high intensity wildfires and therefore protect life, property, and natural resources in and around the Beaver Creek Watershed. Because of the low intensity of these actions, cumulative short-term effects to anadromous fish and their habitat are considered insignificant. When considered together, the long-term effects of all these actions and the Preferred Alternative will be beneficial because the actions reduce fuels and improve forest health conditions.

An analysis for EFH is contained in the Project Fisheries Biological Assessment for Anadromous Fish (USDA Forest Service 2007) for anadromous fish by proxy through the evaluation of impacts to Chinook and coho salmon habitat. The distribution of EFH is equivalent to the distribution of SONCC Coho Salmon Critical Habitat (CH). The KNF has determined that there are no adverse effects to EFH from the Preferred Alternative through its ESA determination for alternative 2 of “May Affect, is not Likely to Adversely Affect” coho salmon or its Critical Habitat.

References:

Chamberlin, Harr and Everest 1991. Timber Harvesting, Silviculture, and Watershed Processes. American Fisheries Society Special Publication, W. R.. Meehan, Editor.

- **Klamath National Forest. Specialist Reports for Mt Ashland LSR Habitat Restoration and Fuels Reduction Project: 2007:**

    - USDA Forest Service. 2007. Biological Assessment/Evaluation For Threatened, Endangered, And Sensitive Anadromous Fish Species That May Be Affected By Mt. Ashland LSR Habitat Restoration and Fuels Reduction Project. Prepared by Brian Thomas.
    - USDA Forest Service. 2007a**.** Klamath National Forest. Mt. Ashland LSR Habitat Restoration and Fuels Reduction Project Fisheries Specialist Report. Prepared By Brian Thomas.
    - USDA Forest Service. 2007b**.** Klamath National Forest. Mt. Ashland LSR Habitat Restoration and Fuels Reduction Project Watershed Report. Prepared By William Snavely.
    - USDA Forest Service. 2007c**.** Klamath National Forest. Mt. Ashland LSR Habitat Restoration and Fuels Reduction Project Watershed Report Addendum. Prepared By William Snavely.

Appendix I.

The LRMP contains the components, objectives and standards and guidelines for the ACS as recommended by the ROD.

The four components of the ACS, as given on pages 4-34 through 4-36 of the LRMP, are: 1) Riparian Reserves, 2) Key Watersheds, 3) Watershed Analysis and 4) Watershed Restoration. None of the treatment areas are within key watersheds. Watershed Restoration, which includes decommissioning and storm damage repair, is an ongoing program on the District and the Forest.

Of the nine ACS objectives on pages 4-6 and 4-7 of the LRMP, the following are applicable to the proposed fuels reduction and thinning project:

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.

Thinning with fuel treatment would occur where wildfire, and resulting fire suppression activities, may alter features to which species are uniquely adapted. Thinning of some of the stands, while underburning in others, would reduce fuel loading and simultaneously leave material to provide diversity and complexity. Reduced fuel loading would help stands progress to toward conditions where the natural fire regime is restored.

Maintain and restore spatial and temporal connectivity between watersheds.

Within harvest areas, 2–5 snags/acre and 5–20 pieces of Coarse Woody Debris (CWD) would be maintained. Fuel treatment within Riparian Reserves would be designed to create conditions that minimize disturbance of riparian ground cover and vegetation.

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

Opportunities to deliver key wood to streams would be maintained by leaving at least 5 – 8 snags/acre in upslope riparian reserves. All snags would be left in those riparian reserves well connected to suspected fisheries habitats. Any hazard trees felled within RRs would be left on site to provide LWD.

Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.

The Preferred Alternative is consistent with riparian reserve guidelines, which prohibit and regulate activities in the riparian reserves that may prevent or retard attainment of the Aquatic Conservation Strategy. Water quality is expected to remain at pre-fire conditions. Maintenance of water quality would be achieved through minimizing sediment delivery to stream courses.

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.

Reducing the risk of stand replacing fire and implementing a natural fire regime in the long term would have the most influence on maintenance and restoration of the sediment regime. Soil erosion occurs when soil cover is burned off. In the short term, post-fire soil erosion could show an increase. This is being mitigated to a certain extent by the Project Design Measures presently as proposed. The long term total sediment production is predicted to be lower if areas are thinned and burned under controlled conditions, as compared to another wildfire.

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 Preferred Alternative includes the thinning of fire stands, controlled introduction of fire, and post harvest fuel treatment, no activities are planned that would directly divert or reduce stream flows. There may be a short term lessening of evapo-transpiration levels in the area, resulting in an increase in phreatic and vadose flows. This will be countermanded in the long term by increased stand vigor and fire resiliency

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

Since the Preferred Alternative only proposes the harvest of thinned timber, any effects to the water table would negligible, because the remaining stand would be more vigorous and efficient as evapo-transpiration mechanism**.**

Maintain and restore the species composition and structural diversity of plant communities in riparian areas.

Species composition of plant communities in riparian areas would be maintained or restored through reducing the risk of stand replacing fire, in riparian areas. Structural diversity would be maintained or restored by leaving snags in areas connected to the aquatic system.

Maintain and restore habitat to support well distributed populations of native plant and invertebrate riparian dependent species.

A well-distributed mix of riparian habitats would maintain the riparian distributed species. Reducing the risk of a stand replacing fire would increase the likelihood of a well-distributed mix of habitats.