Management Indicator Species
Project Report for Aquatic Habitat

for the

Bald Fire Salvage and Restoration Project

On

Hat Creek Ranger District
Lassen National Forest
Shasta and Lassen Counties, California

Prepared By: s/ Melanie McFarland
Melanie McFarland
Forest Fisheries Biologist

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1. Introduction

The purpose of this report is to evaluate and disclose the impacts of the Bald Fire Salvage and Restoration Project (hereafter referred to as the Bald Project) on the aquatic habitat for two Management Indicator Species (MIS) identified in the Forest (NF) Land and Resource Management Plan (LRMP) (USDA 1992) as amended by the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (USDA Forest Service 2007a). This report documents the effects of the proposed action and alternatives on the habitat of selected project-level MIS. Detailed descriptions of the Bald Project alternatives are found in the Bald Project NEPA document (USDA Forest Service 2015, pages 9-19).

MIS are animal species identified in the SNF MIS Amendment Record of Decision (ROD) signed December 14, 2007, which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the Lassen LRMP as amended by the 2007 SNF MIS Amendment ROD directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of MIS, as identified in the Lassen LRMP as amended.

1.a. Direction Regarding the Analysis of Project-Level Effects on MIS Habitat

Project-level effects on MIS habitat are analyzed and disclosed as part of environmental analysis under the National Environmental Policy Act (NEPA). This involves examining the impacts of the proposed project alternatives on MIS habitat by discussing how direct, indirect, and cumulative effects will change the habitat in the analysis area.

These project-level impacts to habitat are then related to broader scale (bioregional) population and/or habitat trends. The appropriate approach for relating project-level impacts to broader scale trends depends on the type of monitoring identified for MIS in the LRMP as amended by the SNF MIS Amendment ROD. Hence, where the Lassen NF LRMP as amended by the SNF MIS Amendment ROD identifies distribution population monitoring for an MIS, the project-level habitat effects analysis for that MIS is informed by available distribution population monitoring data, which are gathered at the bioregional scale. The bioregional scale monitoring identified in the Lassen NF LRMP, as amended, for MIS analyzed for the Bald Project is summarized in Section 3 of this report.

Adequately analyzing project effects to MIS generally involves the following steps:

- Identifying which habitat and associated MIS would be either directly or indirectly affected by the project alternatives; these MIS are potentially affected by the project.
- Summarizing the bioregional-level monitoring identified in the LRMP, as amended, for this subset of MIS.
- Analyzing project-level effects on MIS habitat for this subset of MIS.

- Discussing bioregional scale habitat and/or population trends for this subset of MIS.
- Relating project-level impacts on MIS habitat to habitat and/or population trends at the bioregional scale for this subset of MIS.

These steps are described in detail in the Pacific Southwest Region's draft document "MIS Analysis and Documentation in Project-Level NEPA, R5 Environmental Coordination" (May 25, 2006) (USDA Forest Service 2006a). This Management Indicator Species (MIS) Report documents application of the above steps to select project-level MIS and analyze project effects on MIS habitat for the Bald Project.

1.b. Direction Regarding Monitoring of MIS Population and Habitat Trends at the Bioregional Scale.

The bioregional scale monitoring strategy for the Lassen NF's MIS is found in the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (ROD) of 2007 (USDA Forest Service 2007a). Bioregional scale habitat monitoring is identified for all twelve of the terrestrial MIS. In addition, bioregional scale population monitoring, in the form of distribution population monitoring, is identified for all of the terrestrial MIS except for the greater sage-grouse. For aquatic macroinvertebrates, the bioregional scale monitoring identified is Index of Biological Integrity and Habitat. The current bioregional status and trend of populations and/or habitat for each of the MIS is discussed in the 2010 Sierra Nevada Forests Bioregional Management Indicator Species (SNF Bioregional MIS) Report (USDA Forest Service 2010a).

- **MIS Habitat Status and Trend.**

All habitat monitoring data are collected and/or compiled at the bioregional scale, consistent with the LRMP as amended by the 2007 SNF MIS Amendment ROD (USDA Forest Service 2007a).

Habitats are the vegetation types (for example, early seral coniferous forest) or ecosystem components (for example, snags in green forest) required by an MIS for breeding, cover, and/or feeding. MIS for the Sierra Nevada National Forests represent 10 major habitats and 2 ecosystem components (USDA Forest Service 2007a), as listed in Table 1. These habitats are defined using the California Wildlife Habitat Relationship (CWHR) System (CDFG 2005). The CWHR System provides the most widely used habitat relationship models for California's terrestrial vertebrate species (ibid). It is described in detail in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

Habitat status is the current amount of habitat on the Sierra Nevada Forests. Habitat trend is the direction of change in the amount or quality of habitat over time. The methodology for assessing habitat status and trend is described in detail in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

- **MIS Population Status and Trend.**

All population monitoring data are collected and/or compiled at the bioregional scale, consistent with the LRMP as amended by the 2007 SNF MIS Amendment ROD (USDA Forest Service 2007a). The information is presented in detail in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

Population monitoring strategies for MIS of the Lassen NF are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment ROD (USDA Forest Service 2007a). Population status is the current condition of the MIS related to the population monitoring data required in the 2007 SNF MIS Amendment ROD for that MIS. Population trend is the direction of change in that population measure over time.

There are a myriad of approaches for monitoring populations of MIS, from simply detecting presence to detailed tracking of population structure (USDA Forest Service 2001, Appendix E, page E-19). A distribution population monitoring approach is identified for all of the terrestrial MIS in the 2007 SNF MIS Amendment, except for the greater sage-grouse (USDA Forest Service 2007a). Distribution population monitoring consists of collecting presence data for the MIS across a number of sample locations over time. Presence data are collected using a number of direct and indirect methods, such as surveys (population surveys), bird point counts, tracking number of hunter kills, counts of species sign (such as deer pellets), and so forth. The specifics regarding how these presence data are assessed to track changes in distribution over time vary by species and the type of presence data collected, as described in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

- **Aquatic Macroinvertebrate Status and Trend.**

For aquatic macroinvertebrates, condition and trend is determined by analyzing macroinvertebrate data using the predictive, multivariate River Invertebrate Prediction And Classification System (RIVPACS) (Hawkins 2003) to determine whether the macroinvertebrate community has been impaired relative to reference condition within perennial water bodies. This monitoring consists of collecting aquatic macroinvertebrates and measuring stream habitat features according to the Stream Condition Inventory (SCI) manual (Frasier et al. 2005). Evaluation of the condition of the biological community is based upon the "observed to expected" (O/E) ratio, which is a reflection of the number of species observed at a site versus the number expected to occur there in the absence of impairment. Sites with a low O/E scores have lost many species predicted to occur there, which is an indication that the site has a lower than expected richness of sensitive species and is therefore impaired.

2. Selection of Project level MIS

Management Indicator Species (MIS) for the Lassen NF are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA Forest Service 2007a). The habitats and ecosystem components and associated MIS analyzed for the project were selected from this list of MIS, as indicated in Table 1. In addition to identifying the habitat or ecosystem components (1st column), the CWHR type(s) defining each habitat/ecosystem component (2nd column), and the associated MIS (3rd column), the Table discloses whether or not the habitat of the MIS is potentially affected by the Bald Project (4th column).

Table 1. Selection of MIS for Project-Level Aquatic Habitat Analysis for the Bald Project.

Habitat or Ecosystem Component	Mapping Type(s) defining the habitat or ecosystem component	Sierra Nevada Forests Management Indicator Species *Scientific Name*	Category for Project Analysis [3]
Riverine & Lacustrine	Perennial lakes and streams[1]	aquatic macroinvertebrates	3
Wet Meadow	Wet meadow (WET), freshwater emergent wetland[2] (FEW)	Pacific tree (chorus) frog *Pseudacris regilla*	3

[1] Habitat GIS query for lacustrine used the National Hydrography Dataset (NHD) Waterbody layer Fcodes 39004 and 39009 [only 39004 was in the Bald Project area, however]. NHD layer does not distinguish reservoirs from natural lakes/ponds so this analysis, by default, considered both. Most, if not all, are man-made features. For streams, NHD for perennials was used.

[2] Habitat GIS query for wet meadows used the USFWS layer for wetland/freshwater emergent.

[3] **Category 1:** MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.
Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.
Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

The MIS whose habitat would be either directly or indirectly affected by the Bald Project, identified as Category 3 in Table 1, are carried forward in this analysis, which will evaluate the direct, indirect, and cumulative effects of the proposed action and alternatives on the habitat of these MIS. The aquatic habitat associated MIS selected for project-level MIS analysis for the Bald Project are: aquatic macroinvertebrates and Pacific tree (chorus) frog (hereafter referred to as the Pacific treefrog).

3. Bioregional Monitoring Requirements for MIS Selected for Project-Level Analysis

3.a. MIS Monitoring Requirements.

The Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA Forest Service 2007a) identifies bioregional scale habitat and/or population monitoring for the Management Indicator Species for ten National Forests, including the Lassen NF. The habitat and/or population monitoring requirements for Lassen NF's MIS are described in the 2010 Sierra Nevada Forests Bioregional Management Indicator Species (SNF Bioregional MIS) Report (USDA Forest Service 2010a) and are summarized below for the MIS being analyzed for the Bald Project. The applicable habitat and/or population monitoring results are also described in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a) and are summarized in Section 5 below for the MIS being analyzed for the Bald Project.

Habitat monitoring at the bioregional scale is identified for all the habitats and ecosystem components, including the following analyzed for the Bald Project: wet meadow.

Bioregional Monitoring for aquatic macroinvertebrates: Index of Biological Integrity (IBI) and habitat condition and trend are measured by collecting aquatic macroinvertebrates, and analyzing the resulting data using the River Invertebrate Prediction And Classification System (RIVPACS) (Hawkins 2003) to determine whether the macroinvertebrate community has been impaired relative to reference condition within perennial water bodies. In addition, stream habitat features are measured according to the Stream Condition Inventory (SCI) manual (Frasier et al. 2005).

Population monitoring at the bioregional scale for Pacific tree frog: Distribution population monitoring. Distribution population monitoring consists of collecting presence data for the MIS across a number of sample locations over time (also see USDA Forest Service 2001, Appendix E).

3.b. How MIS Monitoring Requirements are Being Met.

Habitat and/or distribution population monitoring for all MIS is conducted at the Sierra Nevada scale. Refer to the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a) for details by habitat and MIS.

4. Description of Proposed Project (Alternative 1) and Alternative 2 and 3.

Alternative 1 – Proposed Action

The proposed action was developed to accomplish the purpose and need for the Bald Project by evaluating existing vegetation conditions, fire burn patterns and intensities, and land allocations within the fire perimeter. Treatments proposed under Alternative 1 include hazard tree removal, area salvage, area fuels treatments, and planting only treatments. Treatments would use a combination of mechanical, hand, and prescribed fire.

Snag retention differs in the the riparian conservation area (RCA) land allocation to provide for future coarse woody recruitment that would provide aquatic habitat structural diversity and hydrologic function such as sediment routing. No treatment would occur within the RCA of the Beaver Creek mainstem with the exception of limited hand treatments of fuels within one sensitive area, hazard tree felling adjacent to fences that require repair, and possibly small patches of site prep prior to planting riparian vegetation (if monitoring deems artificial regeneration necessary). Within the RCA of the tributaries to Beaver Creek, other ephemeral and intermittent drainages within the project area, and the special aquatic features at Sheeps' Flat and Negro Gulch, integrated design features would be implemented. No treatments are proposed around Willow, Coble, and Gibbs Springs.

More details on the proposed action can be found in the Bald Fire Salvage and Restoration Project Environmental Assessment, 2015.

Alternative 2 – No Action
Under the No Action alternative, none of the activities proposed under Alternative 1 would be implemented. No fuels treatments, site preparation, or reforestation would occur. Current management practices such as road maintenance and fire suppression would continue.

Hazard tree felling could occur along roads currently open to the public as part of road maintenance as per LRMP direction. These hazard trees would be felled and left in place.

Alternative 3 – Road Hazard Only
Alternative 3 proposes limiting treatment to hazard tree removal (along approximately 129 miles of NFS roads and approximately 10 miles of the Burlington Northern Santa Fe railway). Commercial sized hazards would be felled and removed along maintenance level 2 and higher roads. Sub-merchantable hazards would be felled and left in place or piled and burned. No other site preparation or reforestation would occur along these roads. Existing roads used under this alternative would be repaired and maintained.

Integrated Design Features – Alternative 1 and 3
The integrated design features incorporated as part of the Action Alternatives (1 and 3) are described in detail in the Bald Fire Salvage and Restoration Project Environmental Assessment, 2015.

Table 2. Summary of existing waterbodies acres/miles and associated Riparian Conservation Areas and post-treatment acres/miles potentially affected from the proposed Bald Project alternatives.

Habitat or Ecosystem Component	Total Existing Acres/Miles and Post-Treatment Affected Acres/Miles within the Bald Project Area (approximate and rounded to near nearest acre)							
	Existing		Vegetation Treatments* Alt 1		Deferred Grazing Alt 1 and 3		No Action (Possible Hazard Tree Felling) Alt 2	Road side Hazard Tree Felling/Removal and Fuels Alt 3
	Acres	Miles	Acres	Miles	Acres	Miles	Acres	Acres
Wet Meadows	97	--	0	--	97	--	--	--
Wet Meadow RCAs (300')	996	--	309	--	--	--	126	126
Perennial Lake RCAs (300')	104	--	19	--	--	--	8	8
Perennial Stream	--	5.1	--	0.56	--	5.1**	--	--
Perennial Stream RCAs (300' each side)	374	--	39	--	--	--	26	26

* Includes salvage harvest, fuels treatments, reforestation, and/or hazard tree removal. No new road construction is proposed in the project area.

** Upstream of the project area, there is approximately 1.5 miles of perennial stream within existing exclosures unaffected by the fire. Outside of the exclosures, there is approximately 0.3 miles that would be deferred from grazing since management of livestock to keep them outside the fire perimeter would be done at the allotment scale (primarily Willow springs allotment).

5. Effects of Proposed Project on the Habitat for the Selected Project-Level MIS.

The following section documents the analysis for the following 'Category 3' aquatic associated species: aquatic macroinvertebrates and Pacific (chorus) treefrog. The analysis of the effects of the Bald Project on the MIS habitat for the selected project-level MIS is conducted at the project scale. Detailed information on the MIS is documented in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

The footnotes 1 and 2 under Table 1 identify the data sources used for aquatic macroinvertebrate and Pacific treefrog habitat analyses. In addition, applicable RCA widths associated with each of the waterbody types (and shown in Table 2) were queried and used as an indicator for the effects

analysis. RCAs were selected as a key indicator for assessing potential effects (direct and/or indirect) to aquatic biota habitat. This is because RCAs are land allocations adjacent to aquatic features (e.g. 300 feet on both sides of a perennial stream) that serve the purpose of maintaining, protecting, and/or restoring riparian processes important to aquatic and riparian communities, through active and/or passive management of functional processes important to the communities associated with them.

The cumulative effects area for macroinvertebrate habitat includes Beaver Creek/RCA (perennial), its tributaries and their associated RCAs, plus perennial Beaver Creek/RCA upstream of the project area to Beaver springs, and all lacustrine waterbodies (hereafter referred to as lakes) within the project area. The primary future action associated with perennial Beaver Creek within the project area/fire perimeter and upstream to Beaver Springs is deferral of livestock grazing within the Willow Springs allotment in the near term, but eventual return of livestock grazing (approximately 3.7 miles of stream) and continued exclusion (approximately 3.2 miles of stream total) following reconstruction of exclosure fences within the fire perimeter along Beaver Creek after ecological conditions have been met. The cumulative effects area was selected because it represents the area of primary concern for potential hydrologic connectivity and influences to the perennial stream in the given landscape.

For Pacific treefrog habitat, the cumulative effects area includes all wet meadows within the project area.

Cumulative effects at the bioregional scale are tracked via the SNF MIS Bioregional monitoring, and detailed in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

Lacustrine/Riverine Habitat (Aquatic Macroinvertebrates)

Habitat/Species Relationship.
Aquatic or Benthic Macroinvertebrates (BMI) were selected as the MIS for riverine and lacustrine habitat in the Sierra Nevada. They have been demonstrated to be very useful as indicators of water quality and aquatic habitat condition (Resh and Price 1984; Karr et al. 1986; Hughes and Larsen 1987; Resh and Rosenberg 1989). They are sensitive to changes in water chemistry, temperature, and physical habitat; aquatic factors of particular importance are: flow, sedimentation, and water surface shade.

Project-level Effects Analysis – Lacustrine/Riverine Habitat

Habitat Factor(s) for the Analysis: Flow; Sedimentation; and Water surface shade.

Current Condition of the Habitat Factor(s) in the Project Area:
There are approximately 5.1 miles of perennial stream and 374 acres of associated RCA (300' either side) within the Bald Project area and approximately 104 acres of RCAs (300' width) associated with perennial lakes.

Alternative 1 (Proposed Action)

The primary action categories proposed in the Bald Project and considered for analysis include proposed vegetation treatments that involve mechanical and/or hand treatments (salvage harvest, fuels treatments, reforestation, and hazard tree removal). These are the primary actions addressed as these activities have the greatest potential to create soil disturbance that could lead to increased erosion and sedimentation. In addition to the primary action categories proposed, deferral of livestock grazing (IDF # 24) is also considered in the cumulative effects analysis since implementation of this action affects aquatic features and associated riparian vegetation.

Direct Effects to Habitat.

Flow - There would be no direct negative effect to the stream flow habitat factor as there are no activities (e.g. water drafting) proposed within the perennial stream reaches.

Indirect Effects to Habitat.

Sedimentation: The potential risk of indirect effects to the sedimentation habitat indicator to both perennial streams and lakes is considered low. This is because proposed ground disturbing actions associated with the perennial Beaver Creek RCA are limited to hand treatment of fuels and hazard tree removal along roads. Combined, both are limited in scope (maximum of 39 acres) and extent in *potential proximity* to the perennial reaches (maximum of approximately 0.56 linear miles). Additionally, salvage and fuels treatments proposed along ephemeral and intermittent tributaries that drain into the perennial reaches include integrated design features which would minimize the potential for sediment delivery (e.g. no treatment within the inner 25 feet of RCAs). For perennial lakes, the scope of treatment around lakes is also small, with approximately 19 RCA associated acres with ground disturbing activities (salvage, fuels treatments, reforestation, and/or hazard tree removal). Integrated design features around lakes would also minimize the potential for sediment delivery (e.g. no mechanical treatment within the inner 25 feet of RCAs). With livestock grazing deferred on up to 5.1 miles of perennial stream within the project area, the risk of generating sediment from direct disturbance of streambanks already disturbed by the fire is eliminated. Riparian vegetation would be expected to improve over the short term and help trap sediment and rebuild streambanks.

*Water surface shade***:** Water surface stream shade would not be negatively affected from the proposed Bald Project. This is because water surface stream shade has been reduced already by the trees that have now died from the effects of the fire and the felling of hazard trees is very limited in scope (approximately 26 RCA stream acres and 8 RCA lake acres). Additionally, only minimal hand treatment of fuels (smaller trees on approximately 14 acres) is proposed in *potential proximity* to perennial reaches of Beaver Creek (approx. 0.22 linear miles). Potential beneficial effects to localized water surface stream shade along 5.1 miles of perennial Beaver Creek is possible over the short term

and potentially long term from deferral of livestock grazing as increased riparian plant growth and vigor would be expected along Beaver Creek where nearstream riparian vegetation was consumed by the fire.

For perennial lakes, water surface stream shade would also not be negatively affected because the approximately 19 RCA acres proposed for treatment are not contiguous and are limited to hand treatment of fuels (smaller trees). The acres of potential treatment closest to the water feature are even smaller in scale.

Cumulative Effects to Habitat in the Analysis Area.

The cumulative effects would be undetectable and/or low risk for the habitat factors analyzed. This is because there would be no direct effect to stream flows and few activities are proposed within RCAs of perennial water bodies (maximum of 39 acres, or 10% of the total 374 RCA acres for streams; maximum of 19 acres, or 18% of the 104 RCA acres for lakes).

Overall, the proposed actions would have low potential for additional incremental negative indirect effects given the very high proportion of untreated RCAs associated with the perennial features; and, there could be potential improvement of reduced sediment and localized water surface shade over the short term with increased riparian plant growth and vigor expected along perennial stream reaches where livestock would be deferred from grazing (potentially up to 5.4 stream miles). Over the long term, the potential for increased sediment should be minimized with proper implementation of Forest Plan standards and guidelines for grazing in riparian areas once livestock are returned to the allotment and exclosure fences are in place.

Alternative 2 (No Action)

Direct Effects to Habitat.

Flow - There would be no direct effect to the stream flow habitat factor as there are no activities proposed.

Indirect Effects to Habitat.
Sedimentation: No indirect effects to perennial waterbodies would occur from increases in sediment as felling of hazard trees that *might* occur is limited to along roads (approximately 26 RCA stream acres and 8 RCA lake acres) and the trees would be left in place.

*Water surface shade***:**
Water surface stream shade would not be affected as it has been reduced already by the trees that have now died from the effects of the fire and any felling of hazard trees that

might occur is very limited in scope (approximately 26 RCA stream acres and 8 RCA lake acres).

Cumulative Effects to Habitat in the Analysis Area.

There are no proposed actions in Alternative 2, therefore there are no direct or indirect effects that would result in cumulative effects.

However, there are reasonably foreseeable future actions under Alternative 2 that are related to deferral of livestock grazing within the Willow Springs allotment in the near term (see Range Report 2015). Eventually livestock grazing would return to the allotment (on approximately 3.7 miles of stream) and continue to be excluded (approximately 3.2 miles of stream total) following reconstruction of exclosure fences within the fire perimeter along Beaver Creek after ecological conditions have been met. There may be potential short term and possibly long term benefits to streambank conditions with an increase in riparian plant growth and vigor. Improved riparian vegetation would help trap sediment and contribute to streambank building. There may be a cumulative and localized beneficial effect to water surface shade along approximately 5.4 miles of perennial Beaver Creek with potential for riparian vegetation conditions to improve.

Alternative 3 (Hazard Tree Removal)

Direct Effects to Habitat.

Flow - There would be no direct negative effect to the stream flow habitat factor as there are no activities (e.g. water drafting) proposed within the perennial stream reaches.

Indirect Effects to Habitat.

Sedimentation: The potential risk of indirect negative effects to the sedimentation habitat indicator to both perennial streams and lakes is considered extremely low. This is because proposed ground disturbing actions (hazard tree removal along roads and associated fuels treatments) within the perennial Beaver Creek RCA is limited in scope (approximately 26 RCA acres). For perennial lakes, the scope of treatment around lakes is also extremely small with approximately 8 RCA associated acres of hazard tree removal. With livestock grazing deferred on up to 5.1 miles of perennial stream within the project area, the risk of generating sediment from direct disturbance of streambanks already disturbed by the fire is eliminated. Riparian vegetation would be expected to improve over the short term and would help trap sediment and build streambanks.

*Water surface shade***:**

Water surface stream shade would not be negatively affected as water surface stream shade has been reduced already by the trees that have now died from the effects of the

fire and the felling of hazard trees is very limited in scope (approximately 26 RCA stream acres and 8 RCA lake acres). Potential beneficial effects to localized water surface stream shade along 5.1 miles of perennial Beaver Creek is possible over the short term and potentially long term from deferral of livestock grazing as increased riparian plant growth and vigor would be expected along Beaver Creek where nearstream riparian vegetation was consumed by the fire.

Cumulative Effects to Habitat in the Analysis Area.
The cumulative effects would be undetectable and/or very low risk for the habitat factors analyzed. This is because there would be no direct effect to stream flows and actions are very limited within the RCAs of perennial water bodies (26 acres, or 7% of the total 374 RCA acres for streams; maximum of 8 acres, or 8% of the 104 RCA acres for lakes).

Overall, the proposed actions would have extremely low potential for additional incremental negative indirect effects given the very high proportion of untreated RCAs associated with the perennial features; plus, there could be potential improvement of reduced sediment and localized water surface shade over the short term with increased riparian plant growth and vigor expected along perennial stream reaches where livestock would be deferred from grazing (potentially up to 5.4 stream miles). Over the long term, the potential for increased sediment should be minimized with proper implementation of Forest Plan standards and guidelines for grazing in riparian areas once livestock are returned to the allotment and exclosure fences are in place.

Summary of Aquatic Macroinvertebrate Status and Trend at the Bioregional Scale
The Lassen NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale Index of Biological Integrity and Habitat monitoring for aquatic macroinvertebrates; hence, the lacustrine and riverine effects analysis for the Bald Project must be informed by these monitoring data. The sections below summarize the Biological Integrity and Habitat status and trend data for aquatic macroinvertebrates. This information is drawn from the detailed information on habitat and population trends in the 2010 Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat and Index of Biological Integrity Status and Trend. Aquatic habitat has been assessed using Stream Condition Inventory (SCI) data collected since 1994 (Frasier et al. 2005) and habitat status information from the Sierra Nevada Ecosystem Project (SNEP) (Moyle and Randall 1996). Moyle and Randall (1996) developed a watershed index of biotic integrity (IBI) based on distributions and abundance of native fish and amphibian species, as well as extent of roads and water diversions. According to this analysis, seven percent of the watersheds were in excellent condition, 36 percent were in good condition, 47 percent were in fair condition and nine percent were in poor condition.

Sierra Nevada MIS monitoring for aquatic (benthic) macroinvertebrates (BMI) was conducted in 2009 and 2010 (Furnish 2010). Benthic macroinvertebrates were collected from stream sites during both the 2009 and 2010 field seasons according to the Reachwide Benthos (Multihabitat) Procedure (Ode 2007). The initial BMI data from

2009 and 2010 found 46% (6 of 13) of the surveyed streams indicate an impaired condition and 54% (7 of 13) indicate a non-impaired condition (see USDA Forest Service 2010a, Table BMI-1). This is similar to the IBI conditions estimated by Moyle and Randall (1996). Therefore, current data from the Sierra Nevada indicate that status and trend in the RIVPACS scores appears to be stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Aquatic Macroinvertebrate Habitat Trend. As there would be no direct change in stream flow, no change in water surface shade (though some potential for localized improvement along approximately 5.4 miles with deferred grazing), and low risk of increased sediment, the Bald Project action alternatives (Alt 1 and 3) would not alter the existing status and trend in the riverine/lacustrine habitat (aquatic macroinvertebrates) across the Sierra Nevada bioregion.

Wet Meadow Habitat (Pacific tree (chorus) frog)

Habitat/Species Relationship.
The Pacific tree frog (now known as the Pacific chorus frog) was selected as an MIS for wet meadow habitat in the Sierra Nevada. This broadly distributed species requires standing water for breeding; tadpoles require standing water for periods long enough to complete aquatic development, which can be as long as 3 or more months at high elevations in the Sierra Nevada (CDFG 2005). During the day during the breeding season, adults take cover under clumps of vegetation and surface objects near water; during the remainder of the year, they leave their breeding sites and seek cover in moist niches in buildings, wells, rotting logs or burrows (ibid).

Project-level Effects Analysis – Wet Meadow Habitat

Habitat Factor(s) for the Analysis: (1) Acres of wet meadow habitat [CWHR wet meadow (WTM) and freshwater emergent wetland (FEW)]. (2) Acres with changes in CWHR herbaceous height classes [short herb (<12”), tall herb (>12”)]. (3) Acres with changes in CWHR herbaceous ground cover classes (Sparse=2-9%; Open=10-39%; Moderate=40-59%; Dense=60-100%) (4) Changes in meadow hydrology.

Current Condition of the Habitat Factor(s) in the Project Area:

There are approximately 97 acres of wet meadows and 996 acres of associated RCAs (300’ width) within the Bald Project area.

Alternative 1 (Proposed Action)

Direct and Indirect Effects to Habitat.

Acres of wet meadow. There would be no net loss or change in wet meadow acres under the proposed action as no activities are proposed within them.

Acres of changes in herbaceous vegetation/ground cover. No activities are proposed within wet meadows; thus, there would be no change to height/ground cover of herbaceous vegetation. However, herbaceous vegetation/ground cover could potentially indirectly improve on up to 97 acres of wet meadows as livestock grazing is proposed for deferral within the project area.

Changes in meadow hydrology. While there is potential for minor changes in meadow hydrology at the site level (e.g. with improved herbaceous vegetation from deferred grazing), no change in meadow hydrology is anticipated from proposed vegetation treatments within 309 acres of wet meadow RCAs. This is because integrated design features around wet meadows would minimize the potential for hydrologic changes (e.g. no mechanical treatments within the inner 25 feet of the RCA)

Cumulative Effects to Habitat in the Analysis Area.
The cumulative effects would be undetectable and/or low risk for the habitat factors analyzed because there would be no net loss or change in wet meadow acres, upwards of 97 acres could potentially improve in herbaceous vegetation height/ground cover with deferred grazing from the project area over the short term, and no change in meadow hydrology is anticipated from proposed vegetation treatments within 309 acres of wet meadow RCAs (or 31% of the total existing RCA acres associated with wet meadows).

Overall, the proposed actions would have a low potential for additional incremental negative indirect effects to wet meadow habitat given the proportion of untreated RCAs associated with the wet meadows, plus the potential for improvement of herbaceous vegetation height/ground cover on 97 acres over the short term. Over the long term, herbaceous vegetation height/ground cover would be expected to return to pre-fire conditions once desired ecological conditions have been met and livestock are returned to the allotment.

Alternative 2 (No Action)

Direct and Indirect Effects to Habitat.

Acres of wet meadow. There would be no net loss or change in wet meadow acres under the proposed action as no activities are proposed within them.

Acres of changes in herbaceous vegetation/ground cover. The felling of hazard trees that *might* occur would not affect herbaceous vegetation/ground cover.

Changes in meadow hydrology. The felling of hazard trees that *might* occur within 126 acres of wet meadow RCAs would not change meadow hydrology as the trees would be left in place.

Cumulative Effects to Habitat in the Analysis Area.

There are no proposed actions in Alternative 2, therefore there are no direct or indirect effects that would result in cumulative effects.

However, there are reasonably foreseeable future actions under Alternative 2 that are related to deferral of livestock grazing within the Willow Springs allotment in the near term (see Bald Project Range Report 2015). Up to 97 acres could potentially improve in herbaceous vegetation height/ground cover with deferred grazing from the project area over the short term. Once desired ecological conditions have been met and livestock are returned to the allotment, herbaceous vegetation height/ground cover would be expected to return to pre-fire conditions over the long term.

Alternative 3 (Hazard Tree Removal)

Direct and Indirect Effects to Habitat.

Acres of wet meadow. There would be no net loss or change in wet meadow acres under the proposed action as no activities are proposed within them.

Acres of changes in herbaceous vegetation/ground cover. Herbaceous vegetation/ground cover could potentially improve on up to 97 acres of wet meadows as deferred livestock grazing is proposed within the project area.

Changes in meadow hydrology. While there is potential for minor changes in meadow hydrology at the site level (e.g. with improved herbaceous vegetation from deferred grazing), no change in meadow hydrology is anticipated from the limited area proposed for hazard tree removal (126 acres of wet meadow RCAs). This is because the potential ground disturbing area is limited in scope and integrated design features around wet meadows would minimize the potential for hydrologic changes (e.g. no mechanical treatments within the inner 25 feet of the RCA).

Cumulative Effects to Habitat in the Analysis Area.
The cumulative effects would be undetectable and/or extremely low risk for the habitat factors analyzed because there would be no net loss or change in wet meadow acres, upwards of 97 acres could potentially improve in herbaceous vegetation height/ground cover with deferred grazing from the project area over the short term, and no change in meadow hydrology is anticipated from hazard tree removal in 126 acres of wet meadow RCAs (or 13% of the total existing RCA acres associated with wet meadows).

Overall, the proposed actions would have an extremely low potential for additional incremental negative indirect effects to wet meadow habitat given the proportion of untreated RCAs associated with the wet meadows, plus the potential for improvement of herbaceous vegetation height/ground cover on 97 acres over the short term. Over the long term, herbaceous vegetation height/ground cover would be expected to return to pre-fire conditions once desired ecological conditions have been met and livestock are returned to the allotment.

Summary of Pacific Tree (Chorus) Frog Status and Trend at the Bioregional Scale
The Lassen NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the Pacific tree (chorus) frog; hence, the wet meadow effects analysis for the Bald Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the Pacific tree (chorus) frog. This information is drawn from the detailed information on habitat and population trends in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

> **Habitat Status and Trend.** There are currently 61,247 acres of wet meadow habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is stable.
>
> **Population Status and Trend.** Since 2002, the Pacific tree (chorus) frog has been monitored on the Sierra Nevada forests as part of the Sierra Nevada Forest Plan Amendment (SNFPA) monitoring plan (USDA Forest Service 2006b, 2007b, 2009, 2010b; Brown 2008). These data indicate that Pacific tree (chorus) frog continues to be present at these sample sites, and current data at the range wide, California, and Sierra Nevada scales indicate that the distribution of Pacific tree (chorus) frog populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Pacific Tree Frog Trend.

With no change in total wet meadow acres or meadow hydrology, combined with the potential positive short term increase in herbaceous vegetation/ground cover on up to 97 of the 61,247 acres of wet meadow currently estimated on National Forest System lands in the Sierra Nevada bioregion, the proposed Bald Project action alternatives (Alt 1 and 3) would not alter the existing trend in wet meadow habitat, nor would they lead to a change in the distribution of Pacific treefrogs across the Sierra Nevada bioregion.

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