United States
Department of
Agriculture

Forest
Service

March 2015

Management Indicator Species Report

Westside Fire Recovery Project

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

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Management Indicator Species Report

Introduction

The purpose of this report is to evaluate and disclose the impacts of the Westside Fire Recovery Project ("Project") on the Management Indicator Species (MIS) identified in the Klamath National Forest Land and Resource Management Plan (Forest Plan) (USDA 1995) which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). This report documents the effects for all alternatives.

Direction Regarding the Analysis of Project-Level Effects on MIS

The Monitoring Requirements in Chapter 5 of the Forest Plan do not require population monitoring on any MIS except for steelhead trout and rainbow trout. For MIS listed on Forest Plan Page 4-38 to 4-41, project-level MIS effects analyses are informed by project- and landscape-scale habitat analyses alone. Project-level effects on MIS are analyzed and disclosed as part of environmental analysis under the National Environmental Policy Act. This involves examining the impacts of the proposed project alternatives on MIS habitat by discussing how direct, indirect, and cumulative effects will change the quantity and/or quality of habitat in the landscape and project area (Forest Plan pg.4-39).

The Forest Plan analysis requirements for MIS in the Westside Fire Recovery Project are summarized in Part I of the MIS Report. Adequately analyzing project effects to MIS, involves the following steps:

- Identifying which MIS have habitat that would be either directly or indirectly affected by the project alternatives; (Forest Plan Standards and Guidelines (S&G) 8-21 through and including 8-34). This information is documented in Part I of the MIS Report.
- Identifying the Forest Plan forest-level monitoring requirements for this subset of forest MIS (Forest Plan Ch. 5, Table 5-1).
- Analyzing landscape- and project-level effects on habitats for which the MIS was selected to indicate in the Forest Plan.
- Relating project-level impacts on MIS habitat to habitat and population trends for fish MIS, per the Forest Plan.

The Management Indicator Species Report Part I and II document applies the above steps to select and analyze MIS for the Project.

Direction Regarding Monitoring of MIS Population and Habitat Trends at the Forest Scale

Forest scale monitoring requirements for the Klamath National Forest MIS are found in Table 5-1 of Monitoring Plan by Resource of the Forest Plan.

Habitat Status and Trend

The requirement to evaluate landscape and project-level impacts to habitat conditions associated with the Species Associations and related MIS is identified in the Forest Plan on Page 4-39. Habitat monitoring requirements are summarized in the MIS Report Part I. "Habitats" are the vegetation types (for example, mixed conifer forest) and/or ecosystem components (for example,

river and ponds) and special habitat elements (for example, snags) as identified in the Forest Plan. “Habitat status” is the current amount of habitat on the Forest. “Habitat trend” is the direction of change in the amount of habitat between the time the Forest Plan was approved and the present. The methodology for assessing habitat status and trend is

1. Use the GIS vegetation layers to describe the location of habitat for non-fish MIS within a project area,
2. Determine the distribution of fish MIS species using the Forest GIS layer for fish distribution,
3. Consider the reason the MIS habitat was selected as an Indicator, and determine the potential effects to that habitat for which an MIS was selected for.
4. Identify the indicated habitat using habitat relationships data or models in the Forest Plan Appendix I and California Wildlife Habitat Relationship (CWHR) System (CWHR 2005). The CWHR System is considered “a state-of-the-art information system for California’s wildlife” and provides the most widely used habitat relationship models for California’s terrestrial vertebrate species.
5. Detailed information on the habitat relationships for MIS on the Forest and on the CWHR System can be found in the project MIS Report Part I.
6. MIS habitat trend is monitored using ecological and vegetation data for the Forest and stream surveys. These data include spatial ecological and vegetation layers created from remote-sensing imagery obtained at various points in time, which are verified using photo-imagery, on-the-ground measurements, and tracking of events that change vegetation and stream conditions (for example, vegetation management, floods, and wildland fires).

Population Status and Trend

“Population status” is the current condition of the steelhead trout and rainbow trout. “Population trend” is the direction of change in that population measure over time. Population monitoring data are collected and/or compiled at the stream scale rather than the project scale because site specific monitoring or surveying of a proposed project or activity area is not required” (36 CFR 219.14(f) and the actual treatment areas of an action may not contain streams, but may affect streams through sediment delivery or flow changes.

Forest Plan Monitoring Requirements for MIS Selected for Project-Level Analysis

MIS Monitoring Requirements MIS are animal species identified in the Forest Plan. Guidance regarding MIS is described in the Forest Plan .

How MIS Monitoring Requirements are Being Met

Project level assessment of northern spotted owls and goshawks is not required for northern spotted owl and goshawks as an MIS species per Forest Plan S&G 8-21 through 8-34. Impacts to northern spotted owls are evaluated as a species listed under the Endangered Species Act and the impacts to goshawks are evaluated as a species designated as Sensitive by the Forest Service.

There are several ways that spotted owl presence on the Forest is being determined: 1) Surveys have been conducted on the Forest in coordination with the US Fish and Wildlife Service, 2) Habitat evaluations have been conducted by USDI Fish and Wildlife Service (in coordination with the Forest Service Research Station) to predict northern spotted owl presence, 3) Habitat

loss and potential "Take" throughout the Forest is reported to USDI Fish and Wildlife Service through project analysis, wildfire consultations, and reporting requirements, and 4) Monitoring is accomplished through the formal monitoring programs of the Northwest Forest Plan area and the Forest level monitoring program. Northern spotted owl monitoring across the species range is available in other documents (http:// http://www.reo.gov/monitoring/reports/northen-spotted-owl-reports-publications.shtml). The monitoring results can be used to adapt management practices, as coordinated with the US Fish and wildlife Service.

Chapter 5 of the Forest Plan states that goshawk occupancy in suitable habitat will be determined. Surveys are done at the project level where a potential for impacts (to habitat or noise disturbance) may be significant. The majority of habitat and survey work has been completed throughout most of the Forest and goshawk nest sites and habitat is re-evaluated for each project. Also, Goshawk Management Areas have been identified throughout the Forest, with specific a Standards and Guideline (8-20) to project goshawks. Chapter 5 of the Forest Plan states that the variation from the Standard requiring further action will be determined in a Regional Conservation Strategy, which has not yet been completed. Therefore, there is no standard to measure against.

Population trend data for steelhead trout is collected and consolidated by the Forest in cooperation with State, tribal, and Federal agency partners such as the California Department of Fish and Game, Karuk Tribe, USDI Geological Survey, and USDI Fish and Wildlife Service and other conservation partners such Universities and watershed restoration councils. Fish presence data for steelhead trout and rainbow trout are collected using a number of direct and indirect methods, such as stream surveys and fishing results (creel census). The Forest's MIS monitoring program for species typically hunted, fished, or trapped (such as steelhead and rainbow trout) was designed to be implemented in cooperation with California Department of Fish and Wildlife (CDFW), consistent with direction in the 1982 Planning Rule to monitor forest-level MIS population trends in cooperation with state fish and wildlife agencies to the extent practicable (36 CFR 219.19(a)(6)). To be biologically meaningful for wide-ranging MIS, presence data are collected and tracked not only at the forest scale, but also at larger scales, such as range-wide (range of the northern spotted owl), state, province (Northern California), or important species management unit (for example, Klamath River Basin).

Methodology

Each species association is intended to represent a particular habitat type and even though some species many occur in more than one habitat type, each species will only be analyzed for the association it is representing. It is not the intent of this analysis to fully analyze all the needs for each species within an association; rather this analysis will present the potential effects to the habitat type. For example, the snag association was intended to represent the varying use of snags (e.g. size class and decay class) by a range of bird species and maintaining a specific level of snags by size and decay class will provide sufficient habitat for many snag associated species not analyzed here.

The following species associations and MIS **were selected** for analysis for the Westside Fire Recovery Project due to the presence of suitable habitat that may be impacted by the project activities, as described in the Westside Fire Recovery Project Level Assessment Part I. Species associations and MIS associated with habitats that may be affected by project activities are analyzed below.

Snag Association
Downy woodpecker
Red breasted woodpecker
Hairy woodpecker
Black-backed woodpecker
White-headed woodpecker
Pileated woodpecker
Vaux's swift
Hardwood Species Association
Acorn woodpecker
Western gray squirrel

River/Stream Species Association
Rainbow trout
Steelhead
Tailed frog
Cascades frog
American dipper
Northern water shrew
Long-tailed vole

Marsh/Lake/Pond Species Association
Western pond turtle

Analysis Indicators

Project-level effects on MIS were 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 quantity and/or quality of habitat in the analysis area for each habitat association. For this analysis, the following analysis indicators will be used to determine the level of effects for each habitat association.

Snag Species Association

- Change in snag habitat abundance

Hardwood Species Association

- Change in hardwood habitat abundance

River/Stream Species Association

- Change in water quality (sediment, temperature, large wood)

Marsh/Lake/Pond Species Association

- Change in water quality (sediment, temperature, large wood)

Analysis Process

Snag and Hardwood Species Association

Current habitat conditions create habitat that is favorable for snag associated species. The black-backed woodpecker is a well-studied species that has resulted in the clear use of high fire severity affected stands of dense conifer trees. This report doesn't dispute this relationship, but

the black-backed woodpecker was selected for the snag association in the Forest Plan to represent the use of true fir habitat and not the use of fire affected areas. Therefore, for the snag associated species, the snag associated species will be analyzed based on the assigned habitat type for each species as described in the Forest Plan.

The MIS habitat distribution was determined using the California Wildlife Habitat Relationship system (CWHR). The CWHR is a habitat relationship model for terrestrial vertebrates. In addition, spatial ecological and vegetation layer were created using remote sensing imagery and the accuracy of this data was confirmed using aerial photos (NAIP) and on-the-ground verification. Overlaying treatment prescriptions for a defined treatment unit with the defined habitat resulted in estimating the acres of habitat affected by the treatment and the levels of effects to the habitat (degrade or remove). Degraded habitat is when the physical structures of the habitat are changed by project activities, but the habitat will remain functional at the level as determined before treatment. Removed habitat is habitat that will no longer function as habitat as a result of the proposed activities. For each alternative, the acres of habitat affected will be reported as acres of degraded or removed habitat for each habitat association.

For the post-fire assessment of habitat, we used Rapid Assessment of Vegetation Condition after Wildfire (RAVG) data to estimate the level of effects to habitat. RAVG is a vegetation burn severity modeling approach to assess the change in vegetation condition. The RAVG data shows the tree basal area loss due to fire throughout the burned area. Therefore, in any given spot in the fire perimeter, the fire effects can be estimated using the RAVG level of basal area loss. For this analysis the RAVG data was split into five classes: no burn (<1%), very low (1-25%), low (25-50%), moderate (50-75%), and high (>75% basal area loss) to represent the fire severity.

Using the RAVG data and the habitat GIS data, pre-fire habitat was overlaid with the level of basal area loss based on RAVG. Then, using on-the-ground habitat verification, the accuracy of the RAVG and habitat GIS data was assessed through multiple field visits in 2014 and 2015.

Analysis Assumptions

- For the species within the hardwood species association, high fire severity will remove hardwood habitat and longer provide habitat for the western gray squirrel and acorn woodpecker.
- Roadside hazard and salvage treatment will degrade snag associated species habitat
- Cumulative effects considered for this analysis on non-Forest Service land are considered a removal of snag and hardwood habitat.
- Cumulative effects occurring on Forest Service land considered for this analysis is considered a degrade because projects must meet the Forest Plan Standards and guidelines (none of the Forest Service projects considered in this analysis have a Forest Plan amendment to deviate from the Plan)

River/Stream and Marsh/Lake/Pond Species Association

Analysis of potential effects to river/stream MIS habitat is based on three components: (1) a review of existing information for streams in the analysis area; (2) post-fire field review of proposed treatment units, Riparian Reserves and stream channels; and (3) a review of best available information related to aquatic resources present and potential impacts of the various actions proposed.

Potential project impacts to river/stream habitat are discussed using key habitat indicators (sediment, temperature, and large wood) that reflect the quantity and quality of suitable habitat for these species pre and post-project.

Spatial and Temporal Bounding of Analysis Area

Snag and Hardwood Species Association

The spatial bounding for the hardwood and snag associated species is defined by the project area. The project area contains all the proposed activities for this project plus surrounding habitat. The temporal bounds for the hardwood and snag associated species is 5 years for the short-term to include the time during expected to complete the project. The long-term spatial bound is 10 years which will capture the anticipated fire affected vegetation response (e.g. hardwood regeneration and snag fall over).

River/Stream and Marsh/Lake/Pond Species Association

The spatial bounding for the river/stream associated species includes the project area, and stream reaches downstream of proposed actions (even if they fall outside of the project area boundary). The watershed level analysis of project impacts to aquatic habitat found that, at the 5th and 7th field watershed scale, the project would have only minor and discountable effects to aquatic habitat but site level negative effects may occur (see project aquatics resource report). Therefore this analysis is focused at, and downstream of, sites where in channel or near channel actions are proposed (water drafting, culvert upgrades, temporary road crossings, and new landings in Riparian Reserves). Spatial bounding for marsh/lake/pond associated species includes all perennial streams and lentic waterbodies within the project area. The temporal bounds for the river/stream MIS habitat analysis is the first 2 years post project for short term effects, and beyond 2 years post project for long term effects.

Affected Environment

Snag Species Association

The importance of recently burned forests to breeding cavity-nesting birds is well known (Hutto 1995, Saab 2009). Primary cavity excavators are important members of forest ecosystems because the cavities they excavate may be used by secondary cavity nesters, including bats, American marten, many owl species, and other birds. Saab and Dudley (1998) found primary cavity excavating species such as black backed and hairy woodpeckers to be most abundant in stands with a high density of snags. Bird species that are considered to be more habitat generalists and are generally more abundant throughout their range, were found to be more abundant in the stands with the lower snag densities.

The highest densities of black-backed woodpeckers have been found in recently burned forests (Murphy and Lehnhausen 1998). Black-backed woodpeckers are considered habitat specialists, relying on post-fire conditions (particularly moderate to severely burned coniferous forests). Black-backed woodpeckers obtain their insect prey from wood and rapidly colonize post fire forests, but population decline tend to decline as time since fire increases, likely due to declines in bark and wood-boring beetles (Saab 2007). The strength of the association of black backed woodpeckers with post fire snag conditions makes it a useful indicator for wildlife associated with this habitat (Hutto 1995).

Researchers have concluded that salvage logging negatively impacts snag habitat processes with the intensity of effects dependent upon the level of logging activity (Noss et al. 2006). Salvage logging of burned forests can affect the availability of snags, especially for primary cavity excavators such as black-backed woodpeckers (Kotliar et al. 2002, Swanson et al. 2010). Snag density appears to be an important habitat characteristic for black-backed woodpecker nesting; snags are pole size (6-11 inches) with nest trees ranging in size from 7 to 20 inches diameter at breast height (Saab et al. 2009, Seavy et al. 2012). Salvage harvest can reduce snag density; even partially salvaged areas can affect the use by black-backed woodpeckers and snag retention within salvage areas may be insufficient for this species (Kotliar et al. 2002).

Partial snag retention in salvage areas can benefit other bird species. Overall, retention of a diversity of snag species, sizes (≥9 inches in diameter), and spatial distribution is needed for bird species diversity (Kotliar et al. 2002, Saab et al. 2009) which may result from varying fire severity (Smucker et al. 2005).

The Westside Fire Recovery project area is within the possible range of the black-backed woodpecker, but observations of this species west of Interstate Highway 5 are rare in Northern California (project area is located west of this interstate highway). Other primary cavity excavator woodpecker species such as the hairy, downy, and white headed woodpecker (and the mountain bluebird, though while not a cavity excavator, uses cavities excavated in previous years by black-backed and hairy woodpeckers) have strong, but not exclusive, associations with the post fire habitat type, and are discussed in this analysis.

The fires occurring in 2014, affected over 200,000 acres of the Forest and private land which contained a variety of habitat prior to the fires. The snag associated species habitat is most likely to occur within mid- to late-seral conifer forest, but these species may use other habitat types. The project area contained about 130,000 acres of mid to late-seral forest, but the fires burned about 40% of the mid- to late-seral forest at moderate and high fire severity thus resulting in the habitat shifting to lower quality habitat or the complete shift to early seral habitat.

Hardwood Species Association

Hardwoods burned at high severity are usually a complete loss of habitat for the hardwood associated species (i.e. western gray squirrel and acorn woodpecker). This doesn’t mean that gray squirrels wouldn’t enter a high severity burn hardwood stand to retrieve their food caches, but the lack of canopy cover doesn’t provide much escape cover to avoid predation. Plus, these species rely on the acorn mast as a food source and without live hardwoods, these species may need to move to other areas in search of food.

The fires occurring in 2014, affected about 10,000 acres of hardwood habitat. The fire resulted in about 50% of the hardwoods burned at moderate and high severity thus resulting in the habitat shifting to lower quality habitat or the complete shift to early seral habitat. However, some of the hardwood species do re-sprout after a fire and may produce a mast in about ten years. Hardwood re-sprouting is already evident in the project area.

River/Stream Species Association

The project area contains about 802 miles of perennial stream habitat, and 1012 miles of intermittent stream habitat. Resident trout occur in approximately 338 miles of stream in the project area drainages, and steelhead in approximately 224 miles. Cascades frogs may occur in approximately 314 miles of stream in project area drainages, and tailed frogs may occur

throughout perennial streams in the project area. American dipper, Northern water shrew, and long-tailed vole may occur in streamside habitat within and adjacent to perennial streams in the project area.

It is reasonable to assume that high quality riparian and aquatic habitat does not currently occur in areas that burned at moderate/high fire intensity in 2014; aquatic habitat in streams downstream of these areas is likely also experiencing negative effects such as increases in sedimentation, water temperature and peak flow events. These areas will recover over a range of time frames, dependent upon local site conditions and weather. Along stream reaches on NFS lands that were not impacted by the 2014 fires, riparian and aquatic habitats within project area streams are generally of high quality as management actions are restricted as described in the Forest Plan and Aquatic Conservation Strategy.

Marsh/Lake/Pond Species Association

The project area contains about 802 miles of this perennial stream habitat and 362 acres of lentic habitat that defines this species association. The quality or condition of this habitat association was not heavily impacted by the 2014 wildfires as relatively few miles of low gradient perennial streamsides on the Klamath, Scott, and North Fork Salmon River burned at moderate or high severity. Riparian habitat near lakes (lentic habitat) was also mostly unaffected by the 2014 fires, and is not in or adjacent to project actions and therefore would not be affected. The following effects analysis for the marsh/lake/pond MIS habitat is focused on impacts to perennial stream habitat and therefore potential effects are discussed together with the river/stream association.

Water quality in the Klamath River, Scott River, and North Fork Salmon River is listed as impaired and is on the 303(d) Clean Water Act list as discussed in project hydrology and aquatic resources reports. Following is a summary of existing conditions in the analysis area as it relates to the key habitat indicators used for this analysis (sediment, temperature, and large wood).

Sediment

Habitat for special status aquatic species is dependent upon watershed processes like natural sediment supply and sorting. Access to tributary rearing habitat and refugia for salmonids during parts of the summer is blocked by alluvial barriers. Soils in these areas are highly erodible, and in combination with the steep terrain, recent intense fires, and a legacy of past timber harvest and road-building, fine sediment loading has contributed to impaired conditions throughout the Middle Klamath (see project hydrology and aquatic resources reports, for more detailed information).

Stream Temperature

Use of mainstem habitat by aquatic species is the most limited by water quality during the summer months (June through September) when water temperatures are high throughout the day. Juvenile fish must use tributaries and other off-channel areas where cooler water can be found. In general, mainstem habitat in these rivers is not suitable for productive summer or winter rearing, making tributary habitats highly valuable for growth and survival of Coho Salmon (NMFS and USFWS 2013).

The percent of stream channels burned is an indication of how stream shade was directly affected by 2014 wildfires.

Table X: Summary of stream channel burn severity data from BAER Reports for the 2014 fires.

Fire Area	Stream Type	Moderate miles (%)	High miles (%)	Total (miles)
Beaver Fire	Intermittent	37 (28%)	10 (8%)	47
	Perennial	5 (14%)	<1 (0%)	5
Happy Camp Complex	Intermittent	50 (18%)	2 (1%)	52
	Perennial	27 (11%)	<1 (0%)	27
Whites Complex	Intermittent	21 (24%)	4 (5%)	25
	Perennial	9 (14%)	2 (3%)	11
TOTAL (miles)	Intermittent	108	16	124
	Perennial	41	2	43

Large Wood

Current levels of large woody debris across streams in the analysis area are generally considered "at risk." Large wood was removed from many streams on the Forest in the 1960's and 1970's with the intent of preventing damage to downstream infrastructure. Floods (1964 and 1997) removed shallow-rooted vegetation such as alders, and debris flows delivered large wood to mainstem channels in some areas (particularly Elk and Walker creeks). Many riparian areas along the Middle Klamath and North Fork Salmon River remain partially barren as a result of historic placer and hydraulic mining activities, and lower hillslope road construction that disconnected the river from its floodplain.

Aerial photos show that while there are areas of disturbance, the majority of riparian areas surrounding tributaries and high quality refugia for salmonids contain abundant riparian vegetation and have adequate structure and diversity. Due to 2014 fires, large wood recruitment in many project area drainages will be increased in the short to moderate term as near stream dead trees fall and mass wasting events transport wood and coarse sediment down to fish bearing reaches. The percent of stream channels burned in 2014 (table 3-21) provides an indication of current and future instream large wood conditions.

Environmental Consequences

Alternative 1

Direct Effects and Indirect Effects

Snag Species Association

In this alternative, there would be no removal of trees, road construction, or any other activities associated with the Westside Fire Recovery Project. Potential negative effects of no action would be high fuel loads and risk of future high severity fire adjacent to remaining habitat or within regenerating habitat. Positive effects would include the total retention of snags, which are important habitat features, within remaining late seral closed canopy coniferous habitat.

Snag associated species would have abundant source and variety of snags. Black-backed woodpeckers, if present, would have the maximum available habitat produced by the high intensity fire. Other snag associated species like the Vaux's swift and downy woodpecker would have a possible increase in more open stands of snags or creation of new snag habitat. Secondary

cavity nesters, however, may have a reduction in older snags as those tend to burn up in the fires, but in the long-term, these species will likely have an abundant source of previously excavated snags.

Hardwood Species Association

Hardwood associated species are expected to have a difficult time using moderate and high severity fire affected hardwood stands to meet their needs. Hardwood associated species are completely or partly dependent on hardwood mast as a food source. Without a food source, gray squirrels and acorn woodpecker will likely leave these highly fire affected habitat to occupy areas with live trees, but gray squirrels are likely to have a greater tolerance of this disturbance. In the long-term, some of the hardwood species will re-sprout and these trees will provide future hardwood habitat, if fire doesn't return in the near future. Without fuels treatments and anticipated high fuels loads within or adjacent to the hardwood stands, many of the hardwood stands are likely to have another fire that will prevent these stands from developing into a hardwood forest.

River/Stream Species Association and Marsh/Lake/Pond Species Association

Because no action would be taken, there would be no direct effects with alternative 1. An important indirect effect of alternative 1, relative to riparian and aquatic resources, is the missed opportunity for the legacy sediment site treatments included in all of the action alternatives.

Failing to salvage and reforest moderate to high severity stands that were burned in 2014 would have no effect on stream temperature, sediment, or large wood over the next one to five years as postfire conditions include reduced surface fuel loading across the landscape. From five to10 years out, failing to salvage and reforest moderate to high severity stands, and conduct fuels treatments, increases the potential for a wildfire that spreads and is likely to cause adverse impacts to Riparian Reserves and aquatic habitat. As large trees fall and brush accumulates, it becomes more unsafe to fight fires directly and, therefore, fires are likely to burn across more drainages causing more negative effects to aquatic habitat.

Cumulative Effects

Snag Species Association

In the short-term, the lack of treatment will likely have no direct or indirect effects. The fuels level will be low in the short-term thus reducing the risk of re-occurring fire. Any live trees or snags are likely to remain in a similar condition and any habitat will not be affected by this project. Other projects in the analysis area are expected to affect habitat to the point that the habitat may not function as habitat after treatment. Overall, about 1,692 acres of the 105,410 acres of snag habitat in the analysis area will be affected by actions considered within the cumulative effects. These acres represent the footprint of habitat because some of the woodpecker species habitat overlaps. These affected acres represent about 2% of the habitat within the analysis area. For hardwood associated species, the cumulative effects will result in affecting about 6% (590 acres) of the habitat in the project area.

Hardwood Species Association

In the long-term, the lack of treatment will allow the large amount of fuels to continue to build up and possibly create a high severity fire with the next fire. This process will likely continue to

repeat and the habitat will remain at an early-seral stage. Therefore, the Forest will continue not to provide hardwood forests and future snags. Possibly more importantly, fuels treatments will not occur on strategic ridgelines and roadways that will impede the ability of fire fighters to manage the fire and reduce the amount of high fire severity, thus threatening future high severity fire that may remove more habitat. Therefore, the direct, indirect, and cumulative effects of no action will be at least 1,692 acres of snag habitat and 590 acres of hardwood habitat will be removed, but far more could be affected if high severity fire returns as a consequence of no treatment.

River/Stream Species Association and Marsh/Lake/Pond Species Association

Alternative 1 will not add project-related direct effects to the effects of past, present/ongoing or future projects because no management activities are proposed.

There will be minimal impacts on aquatic species from reasonable foreseeable future actions in other projects (except for private timber harvest in Doggett and Beaver creeks). Where there is spatial or temporal overlap of projects currently undergoing implementation, they have already been accounted for in the existing environment. Where future actions do overlap with the project, cumulative effects will be zero, adding no effects to the effects of other projects does not lead to cumulative effects.

Alternative 2

Direct and Indirect Effects

Snag Species Association

The percent of snag associated species habitat affected by alternative 2 varies between species, but about 12% of snag associated species habitat will be affected by roadside hazard and salvage treatments. The removal of dead and dying trees will result in less trees or snags for these species to create cavities. According to the Forest Plan and associated EIS, about 5 snags/acres averaged over 100 acres with varying decay and size class should be retained for “good” habitat to support snag associated species. The other alternative 2 treatments will likely have minor effects on snag associated species habitat. Given the project design features (PDF), snags will be retained within the salvage units of varying sizes and decay class (where possible). Soft decay class snags are trees that have been dead for several years and have been decomposing since death thus these pose a safety hazards during implementation and will likely need to be felled. However, a PDF was designed to retain all larger (>14 inches in diameter) soft snags where possible.

In roadside hazard treatment units, snag retention would be contradictory to the purpose and need of the project. The project will reduce human safety hazards along roadways and any retention of trees that are dead, likely to die, or are likely to fall on the road will be felled. Any trees within the roadside hazard treatment unit that don’t pose a human hazard will be retained thus providing potential future snags.

Despite the PDFs, the salvage treatment units will not provide 5 snags on every acre, but the project will meet the 5 snags per acre on average over 100 acres. Therefore, alternative 2 is likely to provide a sufficient number of snags of varying decay classes thus providing a habitat level of “good” snag associated habitat.

Hardwood Species Association

The hardwood associated species will be affected by alternative 2. About 728 acres of hardwood habitat exists in the roadside and salvage treatment units. The roadside hazard treatment unit is a standard buffer distance from the road based on possible tree height and topography, but it isn't likely that all trees within the treatment unit will be removed, especially for hardwoods. However, it is difficult to estimate to true amount of hardwoods that might be retained in the hazard tree treatment unit so we are assuming that all the hardwood trees will be removed for this analysis.

About 50 acres of hardwood habitat occurs in the salvage units and these acres are arranged in small pockets. The salvage treatment is focused on removing conifer trees and there is no indentation to remove any hardwoods, but for various reasons during implantation, the hardwoods may be damaged. Even though it is likely that most of these 50 acres of hardwood habitat will not be changed by the project activities, we are assuming that all 50 acres will be removed in alternative 2. Therefore, about 7% of the oak habitat will be removed by alternative 2.

River/Stream Species Association and Marsh/Lake/Pond Species Association

Direct Effects

Project actions that occur in streams could directly impact aquatic habitat. These actions are: water drafting; legacy site culvert upgrades, including 3 crossings that will be upgraded to bottomless arch structures to improve aquatic organism passage; and temporary road crossings. This analysis is focused on effects to perennial stream habitat, but considers project impacts to perennial and intermittent channels in light of the spatial and temporal connectivity between project impacts and MIS habitat and species.

Water drafting will be implemented according to NOAA specifications (when within Coho Salmon critical habitat), Forest Best Management Practices that minimize potential impacts to flows and eliminate the likelihood that sites could be dewatered. Project design features 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. Also, temporary modification of the streams at drafting sites is prohibited in Coho Salmon critical habitat and restricted in all fish-bearing waters. Therefore, water drafting actions are not likely to meaningfully reduce the quantity or quality of river/stream habitat.

Legacy site culvert upgrades and aquatic organism passage improvement projects include protective measures to eliminate, or minimize to discountable levels, the potential short-term negative effects to aquatic habitat which may only occur during and immediately after construction. The amount of habitat affected is limited to the immediate area of stream channel where work is occurring. These actions are directed to occur during the driest part of the season. If there is any flow present, the work site is dewatered then re-watered at the completion of work, according to Best Management Practices and protection measures agreed upon during interagency ESA consultation to sufficiently minimize negative effects to salmonids (Facilities Maintenance and Watershed Restoration programmatic Biological Assessment 2004).

Temporary roads used by the project include stream crossings. Direct effects to aquatic habitat may occur while crossings on temporary roads are being constructed, or reconstructed, used, and hydrologically restored after use. Due to these actions river/stream habitat for management

indicator species may be affected at 14 sites; four perennial stream crossings and ten intermittent stream crossings, none of which are fish-bearing. Reaches of Doggett Creek, Beaver Creek, Grider Creek, O'Neil Creek, Kuntz Creek, Whites Gulch, China Creek, Gard Creek, and Caroline Creek would be affected.

The quality of MIS habitat is expected to be temporarily reduced along stream reaches associated with the 14 sites where temporary road crossings and landings are constructed, for a total of 10.5 miles of MIS stream habitat potentially impacted. Short term effects to aquatic habitat would be due to disturbance-related sediment delivery to stream channels at the time of implementation and during storms within the first 1-2 winters post project, dependent on the site. Short term effects to near stream riparian habitat would be due to disturbance and trampling of near stream vegetation and soils; recovery to pre-project conditions would be expected within 2 years post-project.

The amount of habitat affected, in relation to the amount of habitat available in the project area is as follows: 4.1 miles or 1.2% of habitat for resident trout, 3.1 miles or 1.4% for steelhead trout, 10.5 miles or 1.3% for tailed frog, 7 miles or 2.2% for Cascade frog, 1.25 miles or 0.2% for western pond turtle, and 10.5 miles or 1.3% for American dipper, Northern water shrew, and long-tailed vole.

Indirect Effects

Salvage is not proposed within Riparian Reserves so there would be no effects of this treatment on Riparian Reserves. Vegetation treatments proposed only include Riparian Reserve treatment within site preparation and planting units and within fuels treatment units. These treatments will provide ground cover, reduce fuel accumulations, and encourage natural regeneration in Riparian Reserves. Equipment and activities such as handline construction are restricted within Riparan Reserves so that additional ground disturbance from these activities is not likely to result in any effect to aquatic habitat. Hand treatments in Riparian Reserves within units are designed to help protect aquatic habitat by providing near-term ground cover to help slow overland flow and filter sediment before it reaches stream channels; these actions are proposed on a total of 1158 acres and are likely to provide short term protection of aquatic habitat and encourage natural revegetation in Riparian Reserves.

There will be beneficial effects to aquatic species, and to the connectivity of aquatic habitat, at the three 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 Creek (see project maps). 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 most or all flows. Resident trout are likely to have unimpeded access to a total of about one 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 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 in the Elk Creek watershed. These actions will provide additional benefit to aquatic habitat on a total of approximately 17.4 miles in Doolittle, Cougar, East Fork Elk, and mainstem Elk creeks by reducing diversion potential and chronic sediment inputs from roads.

Similar beneficial long term effects to MIS river/stream habitat are expected as a result of addressing legacy sediment site sources as part of project temporary roads actions in Grider, Beaver, Doggett, O'Neil, and Kuntz drainages. A total of approximately 4.2 miles of river/stream habitat in these streams will benefit from this long term reduction in sediment inputs from roads. A project-wide total of 21.6 miles (includes 17.4 miles in the Elk Creek watershed) of MIS river/stream habitat would benefit from this long term positive effect (approximately 2.7% of perennial stream habitat within the project area) due to treating legacy sediment sites on roads.

Cumulative Effects

Snag Species Association

The direct and indirect effects (about 11,652 acres) of alternative 2 plus cumulative effects resulting from other projects within the analysis area resulted is about 1,726 additional acres of snag habitat being affected. These effects total about 13,378 acres or about 13% of the estimated snag associated species habitat within the project area. However, most of the cumulative effects occur on non-Forest Service lands (1,692 acres) and any snag retention will likely be incidental. Since the Forest Service project that accounts for 34 acres of the cumulative effects must meet the same Forest Plan standards and guidelines as this project, these 34 acres will be meet the "good" level of snag habitat. Therefore, the direct, indirect and cumulative effects will result in 11,693 acres of snag habitat being degraded and 1,692 acres will be removed and will not provide snag habitat after treatment.

Hardwood Species Association

The direct and indirect effects (728 acres) of alternative 2 plus cumulative effects resulting from other projects within the analysis area resulted in about 590 acres of additional acres of hardwood habitat being affected. These effects total about 1,318 acres or about 13% of the estimated hardwood habitat within the project area. The hardwood habitat on non-Forest Service land is assumed to be removed. Therefore, the direct, indirect and cumulative effects will result in 1,318 acres of hardwood habitat being removed and will not function as habitat in the near future.

River/Stream Species Association and Marsh/Lake/Pond Species Association

Project effects to river/stream MIS habitat will not reduce the quantity of habitat available. The site level analysis found that short term negative effects to MIS river/stream habitat may occur in several stream reaches due to the project. Reaches of Doggett Creek, Beaver Creek, Grider Creek, O'Neil Creek, Kuntz Creek, Whites Gulch, China Creek, Gard Creek, and Caroline Creek would be affected. Ongoing and future actions in these drainages where site level effects are expected include grazing, private timber harvest (green and salvage timber harvest plans), and two Forest Service vegetation projects (Thom Seider and Eddy LSR projects). Additive effects related to sediment delivery to streams are likely only as a result of private timber harvest, particularly in Doggett and Beaver creeks. This project would potentially add sediment related impacts to just over a mile of non-fish bearing habitat in each stream; effects would be negative in the short term and positive in the long term as legacy sediment sources on these project temporary roads would be addressed.

Alternatives – 3

Direct and Indirect Effects

Snag Species Association

Alternatives 3 and 4 have similar level of effects on habitat as alternative 2, but these alternatives are proposing a reduced level of salvage treatment. Alternative 3 (about 11,468 acres or about 11% of the total snag habitat) and alternative 4 (about 11,352 acres or about 11% of the total snag habitat) have similar number of acres of snag habitat affected in the project area by proposed salvage and roadside hazard treatments. Given that these alternatives are using the same minimum snag retention (alternative 3 will have additional snag retention beyond alternative 2) as alternative 2, the effects are going to be similar, but alternative 3 and 4 will have less acres degraded. Therefore, alternatives 3 and 4 are likely to provide a sufficient number of snags of varying decay classes thus providing a habitat level of "good" snag associated habitat.

Hardwood Species Association

Alternatives 3 and 4 will result in removing 717 acres and 679 acres of hardwood habitat respectively. Like alternative 2, alternative 3 and 4 estimates of effects are likely overestimated. The roadside hazard treatment is likely to retain most of the hardwoods and the hardwoods in the salvage units may be damaged but are likely to remain in the treatment unit.

River/Stream Species Association and Marsh/Lake/Pond Species Association

All sites where short term negative effects, and long term positive effects, to MIS river/stream habitat are expected remain in alternative 3 therefore direct and indirect effects would be the same as with alternative 2.

Cumulative Effects

Snag Species Association

The direct and indirect effects of alternative 3 (about 11,468 acres) and alternative 4 **(**about 11,352 acres) plus the cumulative effects resulting from other projects within the analysis area resulted is about 1,692 additional acres of snag habitat being affected for alternative 3 and alternative 4. Therefore, the direct, indirect and cumulative effects will result in 11,468 acres (alternative 3) and 11,352 (alternative 4) of snag habitat being degraded and 1,692 acres will be removed and not provide snag habitat after treatment.

Hardwood Species Association

The direct and indirect effects (717 acres) for alternative 3 and alternative 4 (679 acres) plus cumulative effects resulting from other projects within the analysis area resulted in about 590 acres of additional acres of hardwood habitat being affected. These effects total about 1,307 for alternative 3 and about 1,279 acres for alternative 4. Alternative 3 and 4 account for about 13% of the estimated hardwood habitat within the project area. The hardwood habitat on non-Forest Service land is assumed to be removed. Therefore, the direct, indirect and cumulative effects will result in 1,307 acres for alternative 3 and 1,279 acres for alternative 4 of hardwood habitat being removed and will not function as habitat in the near future.

River/Stream Species Association and Marsh/Lake/Pond Species Association

All sites where short term negative effects, and long term positive effects, to MIS river/stream habitat are expected remain in alternative 3 therefore cumulative effects would be the same as with alternative 2.

Alternatives – 4

Direct and Indirect Effects

Snag Species Association

The effects for snag species association are the same as for alternative 3.

Hardwood Species Association

The effects for hardwood species association are the same as for alternative 3.

River/Stream Species Association and Marsh/Lake/Pond Species Association

Short term negative effects to MIS river/stream habitat are mostly avoided with alternative 4 because temporary road crossings, and new landings in Riparian Reserves, are eliminated. Temporary road actions in Kuntz Creek drainage remain in alternative 4 and may have short term negative sediment-related effects to 0.5 miles of MIS river/stream habitat; because erosion concerns related to this temporary road would be addressed by the project, long term beneficial effects to 0.5 miles of MIS river/stream habitat are expected. Long term beneficial effects to MIS river/stream habitat are lost where project temporary road actions would have addressed legacy sediment sites; therefore long term benefit to approximately 3.7 miles of habitat within Grider, Beaver, Doggett, and O'Neil creeks are foregone. Long term beneficial effects will still occur in Elk Creek as legacy sediment site treatments in this watershed remain in all alternatives (17.4 miles).

Cumulative Effects

Snag Species Association

The cumulative effects for snag species association are the same as for alternative 3.

Hardwood Species Association

The cumulative effects for hardwood species association are the same as for alternative 3.

River/Stream Species Association and Marsh/Lake/Pond Species Association

With alternative 4, additive project-related impacts in Doggett and Beaver creeks expected with alternative 2 are avoided because temporary road crossings (and then legacy sediment site fixes) are eliminated. Cumulative effects to MIS river/stream habitat in the rest of project area streams are unlikely with alternative 4, as they were with alternative 2.

Alternatives – 5

Direct and Indirect Effects

Snag Species Association

Alternative 5 has the least amount of proposed salvage treatment among the action alternatives. Alternative 5 will affect about 8,225 acres or about 8% of the total snag habitat in the project

area by proposed salvage and roadside hazard treatments. Given that these alternatives are using the same minimum snag retention as alternative 2, the effects are going to be similar, but alternative 5 will have less acres degraded. Therefore, alternatives 5 is likely to provide a sufficient number of snags of varying decay classes thus providing a habitat level of "good" snag associated habitat.

Hardwood Species Association

Alternatives 5 will result in removing 679 acres of hardwood habitat respectively. Like alternative 2, alternative 3 and 4 estimates of effects are likely overestimated. The roadside hazard treatment is likely to retain most of the hardwoods and the hardwoods in the salvage units may be damaged but are likely to remain in the treatment unit.

River/Stream Species Association and Marsh/Lake/Pond Species Association

Alternative 5 does not include temporary road crossing sites on reaches of Grider, O'Neil, and China creeks, therefore negative short term effects to MIS river/stream habitat are avoided on approximately 1.85 miles of stream. Because sites in Grider and O'Neil creek watersheds included legacy sediment site treatment on temporary roads used by the project, long term beneficial effects would be foregone in these areas for a total of approximately 1.1 miles of MIS river/stream habitat. For other streams potentially affected, impacts would be the same as with alternative 2.

Cumulative Effects

Snag Species Association

The direct and indirect effects of alternative 5 (8,225 acres) plus the cumulative effects resulting from other projects within the analysis area resulted is about 1,692 additional acres of snag habitat being affected. Therefore, the direct, indirect and cumulative effects will result in 8,225 acres of snag habitat being degraded and 1,692 acres will be removed and not provide snag habitat after treatment.

Hardwood Species Association

The direct and indirect effects for alternative 5 (66 acres) plus cumulative effects resulting from other projects within the analysis area resulted in about 590 acres of additional acres of hardwood habitat being affected. These effects total about 656 acres or about 7% of the estimated hardwood habitat within the project area. The hardwood habitat on non-Forest Service land is assumed to be removed. Therefore, the direct, indirect and cumulative effects will result in 656 acres of hardwood habitat being removed and will not function as habitat in the near future.

River/Stream Species Association and Marsh/Lake/Pond Species Association

Because site level impacts that may be additive to effects of other actions (private timber harvest) remain in alternative 5, cumulative effects to MIS river/stream habitat would be roughly the same as with alternative 2.

Comparison of Effects

Table 1. Summary of effects resulting from each alternative for each species

Snag Species Association	Current Amount of Habitat (ac)	Acres of Habitat Affected by Each Alternative[1]			
		Alternative 2*	Alternative 3*	Alternative 4*	Alternative 5*
White-headed, Vaux's, and Pileated woodpecker	65,751	7,552 (8,283)	7,230 (7,961)	7,106 (7,837)	5,767 (6,498)
Hairy and Downy woodpecker	48,039	6,428 (7,080)	6,121 (6,773)	6,010 (6,661)	4,851 (5,502)
Red-breasted woodpecker	87,698	11,001 (12,735)	10,544 (12,278)	10,264 (11,999)	9,066 (10,801)
Black-backed woodpecker	17,711	1,123 (1,203)	1,108 (1,188)	1,096 (1,176)	916 (996)
Hardwood Species Association	Current Amount of Habitat (ac)	Acres of Habitat Affected by Each Alternative[1]			
		Alternative 2*	Alternative 3*	Alternative 4*	Alternative 5*
Western gray squirrel	9,853	728 (1,322)	717 (1,312)	679 (1,273)	713 (1,307)
Acorn woodpecker	9,853	728 (1,322)	717 (1,312)	679 (1,273)	713 (1,307)
River/Streams Species Association	Current Amount of Habitat (miles of stream)	Miles of Stream/River Affected by Each Alternative			
		Alternative 2	Alternative 3	Alternative 4	Alternative 5
Rainbow trout	338 miles	4.1	4.1	0.5	3.5
Steelhead	224 miles	3.1	3.1	0	2.5
Tailed frog	802 miles	10.5	10.5	0.5	8.6
Cascades frog	314 miles	7	7	0.5	5.1
American dipper	802 miles	10.5	10.5	0.5	8.6
Northern water shrew	802 miles	10.5	10.5	0.5	8.6
Long-tailed vole	802 miles	10.5	10.5	0.5	8.6
Marsh/Lake/Pond Species Association	Current Amount of Habitat (miles of stream and acres lake)	Miles of Stream/River Affected by Each Alternative (no effect to lake habitat)			
		Alternative 2	Alternative 3	Alternative 4	Alternative 5
Western pond turtle	802 miles and 362 acres	1.25	1.25	0	1

* The number in the parenthesis represents the direct, indirect, and cumulative effect for each alternative and species.

[1]The acres presented for each species or grouped species overlap substantially thus the actual affected acres are much less than presented.

Compliance with law, regulation, policy, and the Forest Plan

All alternatives are consistent with law, regulation, policy and the Forest Plan standards and guidelines.

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