Headwaters Forest Restoration
Resource Management Plan Amendment and
Environmental Assessment/ Mitigated Negative Declaration

Bureau of Land Management Arcata Field Office
California Department of Fish and Wildlife

June 15, 2017

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Chapter 1. Introduction

A. Purpose and Need for the Amendment

The Headwaters Forest Reserve (Headwaters) consists of 7,472 acres acquired by the Secretary of the Interior and the State of California in 1999 to protect the world's last unprotected, large stand of old-growth redwood forest. However, not all of Headwaters is old-growth forest; in fact, approximately 60% of Headwaters was logged prior to 1999, which left a legacy of overstocked, unnatural, regenerating forest stands. The federal legislation that established Headwaters called for a management plan and established the following management direction: "conserve and study the land, fish, wildlife, and forests occurring on such land, while providing public recreation opportunities and other management needs." The Headwaters Resource Management Plan (RMP) was completed by the Bureau of Land Management (BLM) and California Department of Fish and Wildlife (CDFW) in 2004 with substantial public input and involvement and set the following management goal: to "re-create and protect high quality habitats in Headwaters to the benefit of the threatened marbled murrelet and northern spotted owl, other terrestrial wildlife, nonvascular plants of old-growth forest understory, threatened anadromous fish, and other aquatic organisms."

Since 2004, the BLM and partners have made substantial progress towards achieving this restoration goal. This includes the thinning of over 1,600 acres of formerly logged second-growth forest, the decommissioning of more than 36 miles of former logging roads, replanting of old logging roads and landings, removal of non-native invasive plants, and the stabilization of over one million cubic yards of sediment that otherwise would be at risk of entering the South Fork Elk River and Salmon Creek.

Despite emphasizing this important restoration work, the 2004 RMP also imposed some restrictions that now represent barriers to the goal of re-creating high quality habitats for species dependent on late seral forest conditions, particularly the marbled murrelet and northern spotted owl. These restrictions include a 12 inch diameter limit on thinned trees, limits on the number of entries into each stand, not allowing the removal of material, limited use of fuels reduction in second-growth only, limits on the ability to manage fire for resource benefit, and no use of prescribed fire. In addition, recent advances in forest and watershed science, including an improved understanding of climate change, have provided the BLM with new information regarding restoration that was not available at the time the RMP was completed in 2004.

Research conducted by Humboldt State University and the BLM (Berrill et al 2013) showed that multiple thinning treatments through the pole and early mature stages of stand development are needed to achieve old-growth characteristics. Research conducted by van Mantgem and Das (2014) in Redwood National Park showed that neighborhood crowding is an important limitation on growth in second-growth stands and that relatively uncrowded forest conditions are needed (e.g., 40% basal area reduction) in order to achieve long-term increases in growth. A Master's thesis conducted in Headwaters on fuel loading and availability, showed that restoration work under current management guidelines (e.g., thinning with lop and scatter) may create hazardous fire conditions that could threaten the goals of forest restoration (Glebocki 2015).

In September 2013, a workshop was held with researchers, managers, landowners, and advocacy groups to explore the likely impacts of climate change on redwood forests and develop some initial strategies for

adaptation. Workshop participants from diverse backgrounds identified four primary strategies to increasing the resilience of redwood ecosystems in the face of climate change. These included (1) restoring old-growth characteristics that protect stands from many stressors; (2) improving connectivity among intact redwood forest patches throughout the range of redwoods; (3) reducing stressors that exacerbate the impacts of climate change, such as roads, fragmentation, development, and fire exclusion; and (4) coordinating management across the redwood range, and across land ownership, allowing for conservation and/or restoration of climate change refuges and areas of connectivity (Koopman et al. 2014). Managing and restoring for old-growth is particularly important in the context of climate change because mature redwood forests are more resilient to climatic change, fire, and drought. They also provide refugia for many species that are threatened by climate change. As the climate changes, these pockets of mature forest will be increasingly important as the forests around them continue to change at a faster rate (DellaSala et al. 2015). Because of this new research and information, there is a need to consider whether the land use plan decisions in the 2004 RMP should be adjusted.

The purpose of this RMP amendment is to incorporate recent scientific advances into the Headwaters forest restoration program to allow managers to continue to restore the unique natural ecological functions and processes of Headwaters.

B. Planning Area and Map

Headwaters was established in 1999 to protect the world's last unprotected, intact old-growth redwood forest ecosystem. Co-managed by the BLM and CDFW, Headwaters encompasses approximately 7,500 acres of BLM-managed public land in northern California's Humboldt County near the cities of Eureka and Fortuna (Figures 1 and 2). CDFW holds a Deed of Conservation Easement over Headwaters to ensure consistency of the BLM's management with the area's designating legislation. Headwaters is a component of the BLM's National Conservation Lands and is designated by the State of California as a state ecological reserve.

The federal legislation that established Headwaters called for a management plan and established the following management goal: "conserve and study the land, fish, wildlife, and forests occurring on such land, while providing public recreation opportunities and other management needs." The Headwaters RMP was completed with substantial public input and involvement in 2004.

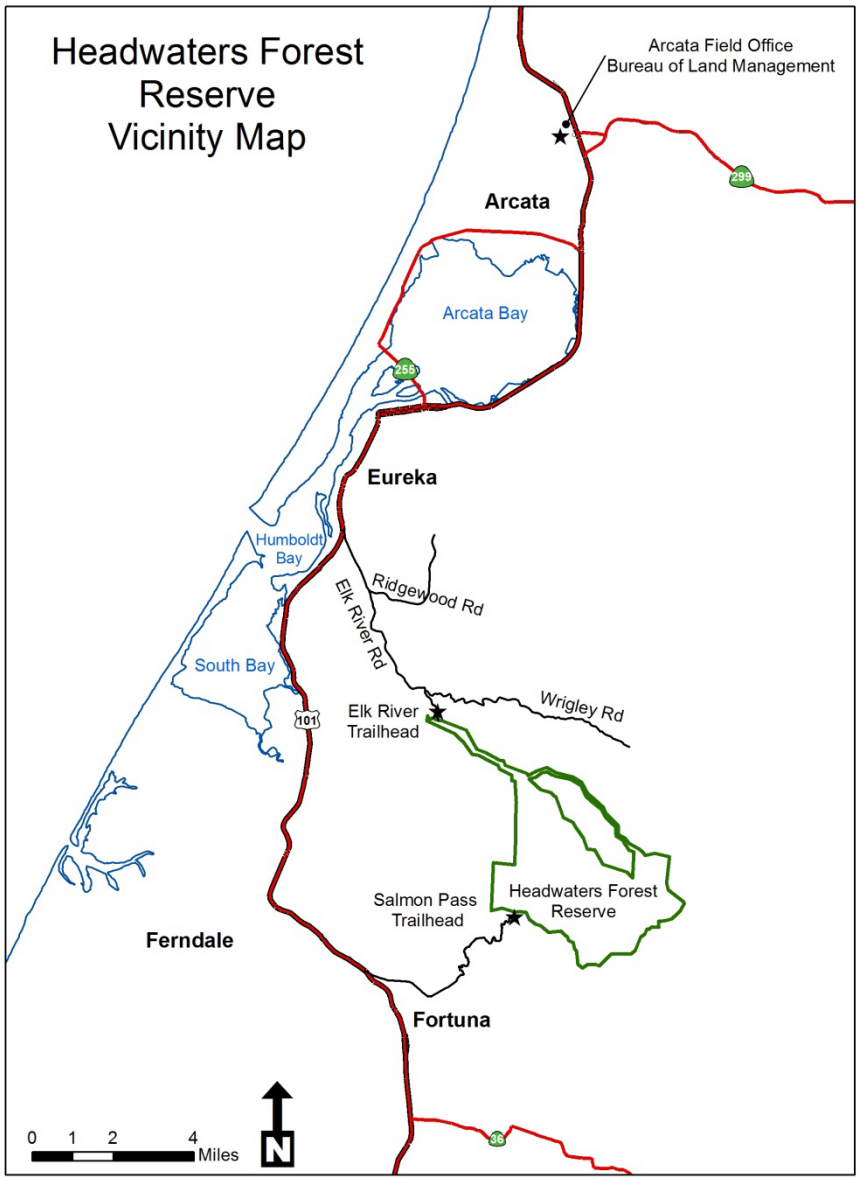

Figure 1: Vicinity map of the Headwaters Forest Reserve

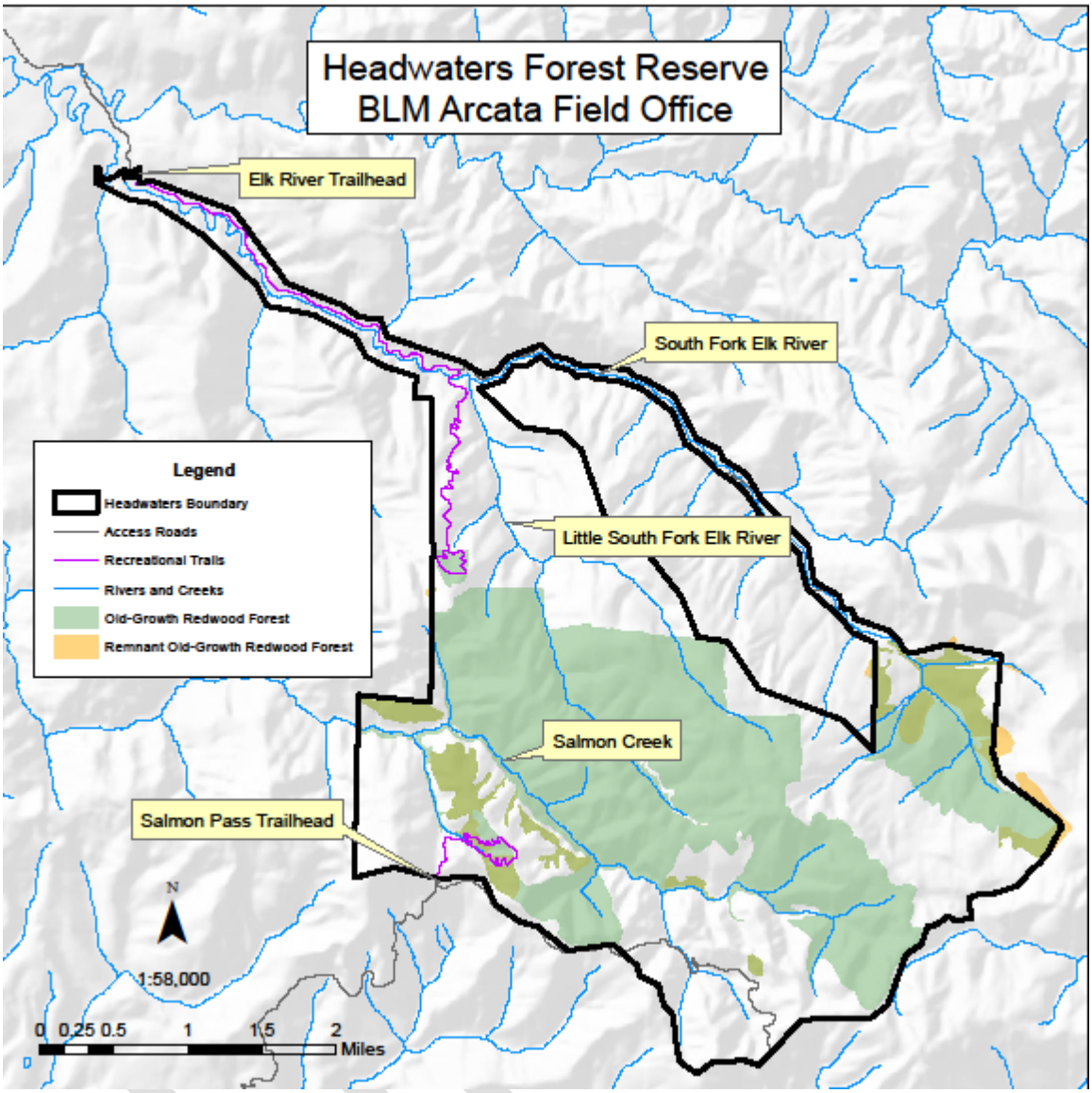

Figure 2: Headwaters Overview Map

C. Scoping/Issues

In 2013, the BLM Arcata Field Office completed an internal evaluation of the 2004 Headwaters RMP. Through this process, the BLM identified issues within the forest restoration and fire management sections of the 2004 RMP. Field Office staff identified the key issue is RMP restrictions that impede achieving ecological goals and objectives for forest restoration, fuels, and species management. Among the most significant restrictions are those that prevent follow-up thinning treatments in many forest stands, cutting trees over 12 inches in diameter, removing any biomass off-site, and using prescribed fire as an ecological tool.

At the time the RMP was completed, it was thought that the BLM could accomplish its objectives with these restrictions in place and the public sought the restrictions to ensure that the BLM would take the

lightest approach possible in restoring these lands. However, through monitoring and the application of new methods these restrictions were found to impede attainment of management objectives.

The BLM initiated a public scoping period with the issuance of a Federal Register Notice on August 24, 2015. A press release was submitted to local media affiliates which resulted in media coverage in the Eureka Times-Standard. The BLM held an open house at the Arcata Field Office (1695 Heindon Road, Arcata, CA) on September 1, 2015, to share information with the public about the amendment and solicit public comments. Eight people attended this open house. On September 14 and 18, 2015, the BLM hosted two field tours to discuss the amendment. A total of four people attended these field tours.

The public scoping period closed on September 23, 2015 and the BLM received three written comments. Two of these comments were received from representatives of non-profit organizations and one was received from a private citizen. Planning issues, specifically those within the scope of this amendment as described in the Federal Register Notice, were identified from these comments. As defined in the BLM Land Use Planning Handbook (USDI BLM 2005), planning issues include concerns or controversies about existing and potential land and resource allocations, levels of resource use, production, and related management practices. Issues include concerns, needs, and resource use, development, and protection opportunities to consider in RMP preparation. A synopsis of planning issues identified through public scoping are described below:

- Neither the BLM's scoping notice, nor the scoping meeting, provided a reasoned basis for proposed changes to the Headwaters Forest Restoration program, other than to provide greater management flexibility. The BLM must provide the public with enough information to adequately evaluate the benefits and drawbacks of any potential restoration activities.
- Support the BLM's removal of thinning product from Headwaters, especially based on studies showing increased fire threat.
- Selling logging/thinning debris is a good idea; however, you will experience pushback from the public if you use the word commercial.
- One entry is not enough to reach the goal of accelerating the development of old-growth forest.
- Lop and scatter will promote the growth of topsoil while commercial removal will deplete soil and have yarding impacts, further setting back the renewal of old-growth conditions.
- Pile burning, while providing nutrients immediately available to the growing forest, can have impacts that slow the project of recruiting old-growth.
- Leaving wood to decay functions to retain more moisture in the body of the woody debris.

D. Planning Criteria/Legislative Constraints

The federal legislation that authorized the creation of the Headwaters Forest Reserve (1998 Interior Appropriations Bill) established the management goal for Headwaters to "conserve and study the land, fish, wildlife, and forests occurring on such land, while providing public recreation opportunities and other management needs."

Additional planning criteria include the following:

- All proposed management actions and alternatives will focus exclusively on forest restoration and related programs in Headwaters;
- All proposed management actions and alternatives will be compatible with the existing plans and policies of local, State, and Federal agencies with an interest in Headwaters;
- All proposed management actions and alternatives will be consistent with the State of California Ecological Reserve Regulations;
- All proposed management actions and alternatives will consider current scientific information, research and technology, and inventory and monitoring information;
- All proposed management actions and alternatives will be consistent with BLM Manual 6220-National Monuments, National Conservation Areas, and Similar Designations (BLM 2012).

E. Planning Process

The purpose and need for this RMP Amendment (RMPA) were developed over several years through collaboration between the BLM and partner organizations and agencies. The BLM formally began this RMPA process through the release of a Notice of Intent in the Federal Register on August 24, 2015. An additional opportunity for public input was provided at a workshop in Arcata on September 1, 2015, to discuss potential alternatives for the RMPA. The BLM initiated government-to-government consultation with the Wiyot Tribe, Bear River Band of Rohnerville Rancheria, and the Blue Lake Rancheria Tribe in April 2016.

The release of this draft RMPA and Environmental Assessment (EA)/Mitigated Negative Declaration (MND) initiates a 30-day public comment period. Following this comment period, the BLM and CDFW may draft a proposed RMPA/EA/finding of no significant impact (FONSI)/MND. The release of the proposed RMPA/EA/FONSI/MND would initiate a 30-day protest period and concurrent Governor's Consistency Review. Subsequently, the BLM and CDFW would prepare a decision record for this RMPA.

As Headwaters is co-managed by the BLM and CDFW, this document is written to conform to regulations of both the Federal National Environmental Policy Act (NEPA) and the State California Environmental Quality Act (CEQA). The BLM drafted this document in collaboration with CDFW to meet requirements under both NEPA and CEQA. A CEQA environmental checklist was completed during project scoping to determine that this project would be considered a mitigated negative declaration (Appendix E). Article 14 of the CEQA handbook (Association of Environmental Professionals 2014) provides guidance regarding development of joint NEPA/CEQA documents.

Relationship to BLM Policies, Plans, and Programs

Headwaters is part of the BLM's system of National Conservation Lands. These lands are managed to "conserve, protect, and restore nationally significant landscapes that have outstanding cultural, ecological, and scientific values for the benefit of current and future generations" (Omnibus Public Land Management Act of 2009, 16 U.S.C. 7202, Section 2002 (b)(2)(E)). Management of Headwaters must be consistent with BLM Manual 6220-National Monuments, National Conservation Areas, and Similar Designations (USDI BLM 2012).

The Headwaters RMP, which guides management of Headwaters, was completed in 2004. This RMPA is limited to amending management actions in the forest restoration and related sections of the 2004 RMP. Other actions described in the 2004 RMP, including actions pertaining to species management, research, recreation, and cultural resources will remain unaffected by this document.

Collaboration

Headwaters is co-managed by the BLM and CDFW, which retains a conservation easement on the property. The BLM and CDFW collaborated on this document in order to meet both federal NEPA requirements and State CEQA requirements. The document was prepared by the BLM, with CDFW support. Additional agency partners in developing this document included Redwood National Park, California State Parks and research partners at the U.S. Geological Survey (USGS) and Humboldt State University (HSU).

F. Related Plans

Headwaters is located in Humboldt County in the heart of California's redwood region. Other land managers in this region, particularly Redwood National and State Parks, have initiated forest restoration programs on their lands with strong similarities to the program at Headwaters. The 2001 Redwood National and State Parks General Management Plan/General Plan called for the use of silvicultural methods such as thinning, replanting, and burning in second-growth forests to accelerate development of old-growth characteristics (National Park Service and California Department of Parks and Recreation 2001). Since the completion of this General Plan, Redwood National and State Parks has implemented a series of environmental assessments to conduct site-specific NEPA/CEQA analysis of forest restoration treatments. The most recent of these EAs was the Middle Fork Lost Man Creek Second-Growth Forest Restoration EA (USDI NPS 2014).

Additional BLM plans in the vicinity of Headwaters include the 1992 Arcata Resources Area RMP, the 2005 California Coastal National Monument RMP, and the 2005 King Range National Conservation Area RMP. The BLM Arcata Field Office is currently in the process of revising the 1992 Arcata Resource Area RMP as part of a larger planning effort with the BLM Redding Field Office.

G. Policy

Headwaters was acquired by the Secretary of the Interior and the State of California on March 1, 1999, to preserve the last unprotected large stand of old-growth redwood forest. The federal legislation authorizing acquisition of Headwaters provided guidance to "conserve and study the land, fish, wildlife, and forests occurring on such land, while providing public recreation opportunities and other management needs" (1998 Interior Appropriations Bill, H.R. 2107).

H. Overall Vision

The overall vision for the Headwaters restoration program is to "restore natural ecological functions and processes of old-growth forests, riparian forest corridors, and aquatic habitats" (USDI BLM 2004). This vision remains unchanged from the 2004 Headwaters RMP.

Chapter 2. Alternatives

Alternative A (No Action)

Under Alternative A, the BLM and its partners would continue to implement the Headwaters forest restoration program as described in the 2004 Headwaters RMP. No changes would be made to the existing RMP. The timing and locations of forest restoration actions would continue in accordance with the existing set of guidelines as outlined in the 2004 Headwaters RMP. Restrictions under this alternative include those limiting thinning of trees less than 12 inches in diameter, limiting the number of entries to one in stands identified as pole stands in the RMP, and prohibitions on biomass removal and prescribed fire.

Alternative B (Proposed Action)

Under Alternative B, the BLM and its partners would implement a wider array of forest restoration treatments. Where appropriate, these treatments could include prescribed fire, biomass removal, multiple thinning entries, and the cutting of trees up to 24 inches in diameter.

Alternatives Matrix

Table 1: Alternatives matrix displaying the two alternatives. Page numbers refer to direct citations from the 2004 Headwaters RMP.

Alternative A (No Action)	**Alternative B (Proposed Action)**
Forest Restoration	
Desired Outcome: Re-create and protect high quality habitats in Headwaters to the benefit of the threatened marbled murrelet and northern spotted owl, other terrestrial wildlife, nonvascular plants of old-growth forest understory, threatened anadromous fish, and other aquatic organisms.	
Goal 1: *Maintain old-growth forest habitat by keeping those systems intact and ensuring that natural processes operating with those systems are left undisturbed. These intact areas would serve as core areas of optimal habitat (Page 4-19).*	
No similar objective in the 2004 Headwaters Forest Reserve Resource Management Plan.	**Objectives 1.1:** Restore the natural effects of wildfire within Headwaters without compromising resource values and restoration objectives of the Headwaters or those of adjacent properties.
Broadcast burning is not proposed in Headwaters and will not be employed (Page 4-29).	Introduce prescribed fire into Headwaters, where feasible and appropriate, in order to restore the natural effects of wildfire. Individual burn units will be no more than 20 acres in size and disconnected in any year. Prescribed fire will be managed for low intensity within old-growth stands; no more than 50% duff consumption, no more than 3 foot sustained flame lengths, no more than 10% canopy scorch or consumption in second-

Alternative A (No Action)	Alternative B (Proposed Action)
	growth trees, and no canopy scorch or consumption in old-growth trees. Low to moderate intensity fire behavior will be allowed in second growth stands; no more than 75% duff consumption, no more than 8 foot sustained flame lengths, no more than 30% torching or scorching of canopy. Higher intensity fire behavior will not be produced. Fuels removal around individual trees may be necessary to mitigate potential damaging fire effects, such as to keep fire out of previous fire scars or reduce the heat retention time around the base, particularly of old-growth trees. Burning will be conducted outside fire season under cooler conditions, and it is expected that some individual 20-acre burn units may only have fire impact 50% of the area. Total number of acres burned would not exceed 100 acres/year. Prescribed fire may only be used between September 15 and February 1 to avoid adverse impacts to special status species. Managers would design burn units to exclude riparian areas: within 100 feet of non-fish bearing streams and 150 feet of fish bearing streams. Each prescribed burn unit will be inspected by a wildlife biologist prior to implementation for special habitat features that could be used by special status wildlife species (e.g. snags, trees with complex structure, cavities, roosting or nesting platforms). These habitat features will be marked for retention and protected from fire by excluding them from the burn unit or by removing fuels from around the habitat structure prior to burning. Appendices A and B contain species-specific mitigation measures for all special status species with range overlap with Headwaters.
	Rationale: Disturbance dynamics and forest structure and composition in Headwaters show a complex pattern of moderately frequent disturbance that helped shape forest structure and composition in both the overstory and understory. For example, Douglas-fir readily establish after fire, and long-term fire exclusion may eventually reduce the importance of this species, both as a sub-dominant within redwood-dominated stands and as a colonizer of small patches caused by localized high severity fire. From 1693 to 1936, there were at least 8 large wild

Alternative A (No Action)	Alternative B (Proposed Action)
	fires in Headwaters with an average return interval of 30 years and a range of 10-48 years (Norman and Jennings 2011). There has not been a large-scale wildfire in Headwaters since 1936, a span of 80 years.
Goal 2: *Restore second-growth forest to achieve old-growth characteristics* (Page 4-19).	
Objective 2.1: Accelerate the rate of succession among forest seral stages (Page 4-19).	
Reduce stem densities by thinning to accelerate growth rates and succession into early and mid-mature stages (Page 4-20). Two to three entries in shrub-sapling stands and in revegetated watershed-restoration sites would be made as needed, and a single entry would be made in pole stands considered appropriate for such action (Page 4-21). Stem diameters of material removed in pole stands will be up to 12 inches, and stem diameters in the other stands will be up to 6 inches (Page 4-22). See Figure 3.	Promote crown vigor by continuing the thinning of second-growth stands in Headwaters. Allow the thinning of trees up to 24 inches diameter-at-breast height (DBH) and allow multiple entries in second-growth stands identified in Figure 4. Thinning projects may only be done between September 15 and February 1 to avoid impacts to special status species. Thinning would only occur in stands identified in Figure 4 and where the average DBH of canopy trees is 24 inches or less. Treatments would be designed to retain the largest, most vigorous individual trees in order to accelerate development of late seral characteristics. Thinning would be completed once a stand reaches the average DBH described above or has received a maximum of four thinning treatments (includes all thinning treatments undertaken since transfer to Federal ownership in 1999). Each thinning unit will be inspected by a wildlife biologist prior to implementation for special habitat features that could be used by special status wildlife species (e.g. snags, trees with complex structure, cavities, roosting or nesting platforms). These habitat features will be marked for retention or excluded from the thinning unit. Appendices A and B contain species-specific mitigation measures for all special status species with range overlap with Headwaters. Appendix D describes best management practices to be used during thinning operations.
	Rationale: Forest modelling research conducted by Humboldt State University and the BLM in Headwaters (Berrill et al. 2013) suggests that multiple thinning treatments through the pole and

Alternative A (No Action)	Alternative B (Proposed Action)
	early mature stages of stand development can achieve old-growth characteristics sooner than would be achieved without treatment. This change would help the BLM accelerate the restoration of second-growth stands in Headwaters to old-growth conditions. An upper limit on the removal of trees greater than 24 inches was introduced to establish a point at which the BLM would cease thinning and allow natural processes to occur. At this point in stand development, these stands become more likely to provide roosting/ nesting habitat for northern spotted owls and the need to protect this habitat would be assumed to outweigh the benefit of additional thinning treatments.
Operational buffers of 100-ft will be established for non-fish bearing and 150-ft for fish bearing streams (Page 4-22). No tree thinning will be conducted in stream management zones as specified in the "Aquatic Conservation Strategy" of the Northwest Forest Plan. However, where competition for sunlight is evident, poles bordering these zones will be removed with the intent of increasing sunlight to riparian vegetation communities or of improving long-term LWD recruitment (Page 4-23).	Retain 100-ft buffers on non-fish bearing streams and 150-ft buffers on fish bearing streams. Within these buffers, thinning would be allowed to promote recruitment of pool-forming wood in areas identified in Figure 4. Within these zones, all work would be accomplished by hand crews, no ground based equipment would be used, and no tree yarding would occur. All cut trees would be left on site. Cut material would be primarily lopped and scattered to get them in contact with the ground, except where limited opportunities exist to fall trees (up to 24 inches DBH) directly into fish-bearing streams to increase large woody debris recruitment. In these buffer zones, thinning would retain at least a 70% post-treatment tree canopy.
	Rationale: Modeling by Beechie et al. (2000) suggests riparian thinning will increase recruitment of pool-forming wood when the average diameter of trees in the stand is smaller than the average minimum diameter of pool-forming wood. In addition, felling whole trees into the stream may offset potential short-term losses in instream wood recruitment following thinning (Benda et al. 2015). Allowing thinning of young trees in dense riparian forests would help the BLM accelerate the restoration of riparian forests and aquatic habitat in Headwaters.
Objective 2.2: Create continuity between old-growth and other seral stages as they advance successionally (Page 4-19).	

Alternative A (No Action)	Alternative B (Proposed Action)
Reduce stem densities to accelerate growth rates and succession into early- and mid-mature stages, and to create more diverse and healthy stand structures; Create tree spacing in young stands to maximize early growth and crown development; Develop stand structure to soften the spatial transition from old-growth to second-growth stands; Reestablish continuous forest canopy in harvested stands with old-growth remnants; Nurture connectivity between old-growth stands (Page 4-20).	Promote continuity between old-growth stands and other seral stages by utilizing variable-density thinning (VDT) of second-growth forests in Headwaters with cutting of trees up to 24 inches DBH, reducing basal area by no greater than 40%, and by allowing multiple entries in second-growth stands(see Figure 4). Thinning would be completed once a stand reaches an average DBH of 24 inches for canopy trees or has received a maximum of four thinning treatments (includes all thinning treatments undertaken since transfer to Federal ownership in 1999).
	Rationale: Variable-density thinning enhances stand structural heterogeneity, increases the proportion of redwood to other conifers, and accelerates development toward old growth structures (O'Hara et al. 2012). VDT is the primary restoration approach for young stands in state and national parks in Humboldt and Del Norte Counties of northern coastal California (O'Hara et al. 2012). These treatments have been used in Redwood National Park (USDI NPS S2014) and have been shown to lead to substantial growth releases, particularly for coast redwood (van Mantgem and Das 2014).
Objective 2.3: Restore structural diversity of second-growth stands (Page 4-19).	
Broadcast burning is not proposed at the Reserve and will not be employed (Page 4-29). Variable-density approaches can be used to thin trees (Page 4-22).	Utilize variable-density thinning and prescribed fire to recruit multiple age classes (uneven-aged stands), to accelerate the restoration of old-growth forest, to promote wildlife features such as snags, large woody debris, cavities and complex structure and to create spatial heterogeneity across second-growth stands (also meets Objective 1.1).
Objective 2.4a: Enrich species composition of second-growth stands (Page 4-19).	**Objective 2.4b:** Conserve and restore species composition and diversity.
Focus of density management will be on Douglas-fir. Redwoods, including stump sprouts, usually will not require treatment to restore a natural mix of Douglas-fir and redwood species. Some planting of redwoods will be required on watershed restoration sites (Page 4-21).	Use thinning treatments to approximate the species composition of adjacent old-growth stands. Planting of redwoods and other native species may occur on watershed restoration sites and as needed elsewhere. Appendices A and B contain species-specific mitigation measures for all special status species with range overlap with Headwaters.
	Rationale: Young regenerating stands in Headwaters are dominated by Douglas-fir (60 – 80%) and redwood stump sprouts (20 – 40%) and

Alternative A (No Action)	Alternative B (Proposed Action)
	can be extremely dense (500 – 3000 trees per acre). On decommissioned roads for example, 73% of all seedlings and 60% of all saplings were Douglas-fir compared with only 11% and 14% for redwood seedlings and saplings, respectively (Sherriff et al. 2010). In some cases, natural regeneration of native vegetation is limited due to soil condition (highly compacted soils for example) and may need to be replanted in order to recover. In contrast, old-growth stands in Headwaters are dominated by redwood (65%) compared with Douglas-fir (19%) and other species (16%) and typically have 65-80 trees per acre. Thinning and replanting is needed to approximate the species composition and density of old-growth forests.
Goal 3: *Eliminate invasive non-native plants from the Reserve* (Page 4-19).	
Invasive, nonnative species will be controlled using manual or natural means. Herbicides will not be used (Page 4-22).	
Fire Management	
Desired Outcome: Replicate the natural fire regime prior to the era of fire suppression and timber entry, to the degree that it is consistent with the need to protect resources of adjoining properties and the need to protect the Reserve from unnatural catastrophic fire originating on surrounding lands (Page 4-29).	
Goal 1: *Restore shrub-dominated sites and earlier-successional forest to old-growth forest* (Page 4-29).	
See Objectives 1.1, 2.1, 2.2, 2.3 and 2.4 above and Pages 4-19 – 4-20 of the 2004 Headwaters Forest Reserve Resource Management Plan.	
Goal 2: *Protect old-growth forests from catastrophic fires originating in second-growth forests either outside or inside the Reserve* (Page 4-29).	
Objective 2.1: Manage fuels in second-growth stands to reduce the risk to all stands, and manage all fires to minimize the loss of unharvested forest stands and minimize impacts of fire suppression activities in old-growth (Page 4-29).	
Goal 3: Reduce effects of catastrophic fire on all forest and soils of the Reserve.	
Objective 3.1a: Fuel loading in second-growth stands will be managed in a manner that reduces fuel loading and continuity throughout and therefore reduces fire risk (Page 4-29)	**Objective 3.1b:** Disrupt the vertical and horizontal continuity of fuels in second-growth stands in order to reduce the likelihood and detrimental effects of crown and/or stand replacing fires.
Fuels in second-growth forest will be reduced through tree-density reduction (thinning) and brush removal in sapling and pole stands. Foliage and smaller stems from removed trees and brush will be lopped and scattered, piled and burned or chipped (p. 4-29).	Utilize variable-density thinning to interrupt the vertical and horizontal continuity of fuels (also meets Objective 2.1).

Alternative A (No Action)	Alternative B (Proposed Action)
	Rationale: Thinning interrupts the horizontal continuity of fuels by creating space between trees; however, when the cut material is left onsite there is an increase in fuel loading (Glebocki 2015), which necessitates one or more of the actions listed below.
All biomass will be left onsite (p. 4-22).	Remove biomass from thinning treatments where necessary to minimize fuel loading. Where commercial-grade lumber generated by thinning can be accessed using existing roads and skid trails, allow the sale of timber to offset restoration project costs (also meets Objective 2.4). All operations would be ground-based (no use of aircraft) using existing roads and skid trails. See Figure 5. Appendix D contains best management practices to be used during thinning operations.
	Rationale: Removal of material would help alleviate fuel loading issues associated with thinning treatments.
Slash will be treated by machine chipping, lopping or by hand pilling and burning outside of riparian areas only (p. 4-22, p. 4-29).	Where removal of biomass is not feasible or practical, minimize fuel loading by lopping and scattering, piling and burning, and/or chipping material.
	Rationale: Restoration thinning increases loading and availability of forest fuel (decreases fuel moisture levels), thus requiring subsequent fuels reduction treatments (Glebocki 2015).
Broadcast burning is not proposed at the Reserve and will not be employed (p. 4-29).	Utilize prescribed fire, where feasible and appropriate, to minimize fuel loading (also meets Objective 1.1).
	Rationale: Prescribed fire is successful in meeting fuel-reduction objectives such that treated stands are more resilient to high-intensity wildfire (Stephens et al. 2012).
Goal 4: Prevention of the movement of wildfire into or out of the Reserve (Page 4-29).	
Objective 4-1: Modes of fire suppression are detailed in the Annual Operating Plan, developed with Cal Fire, and tiered to the California Master Cooperative Wildland Fire Management and Stafford Act Response Agreement. In all areas of the Reserve, suppression response would entail a minimum-impact strategy (Page 4-29).	

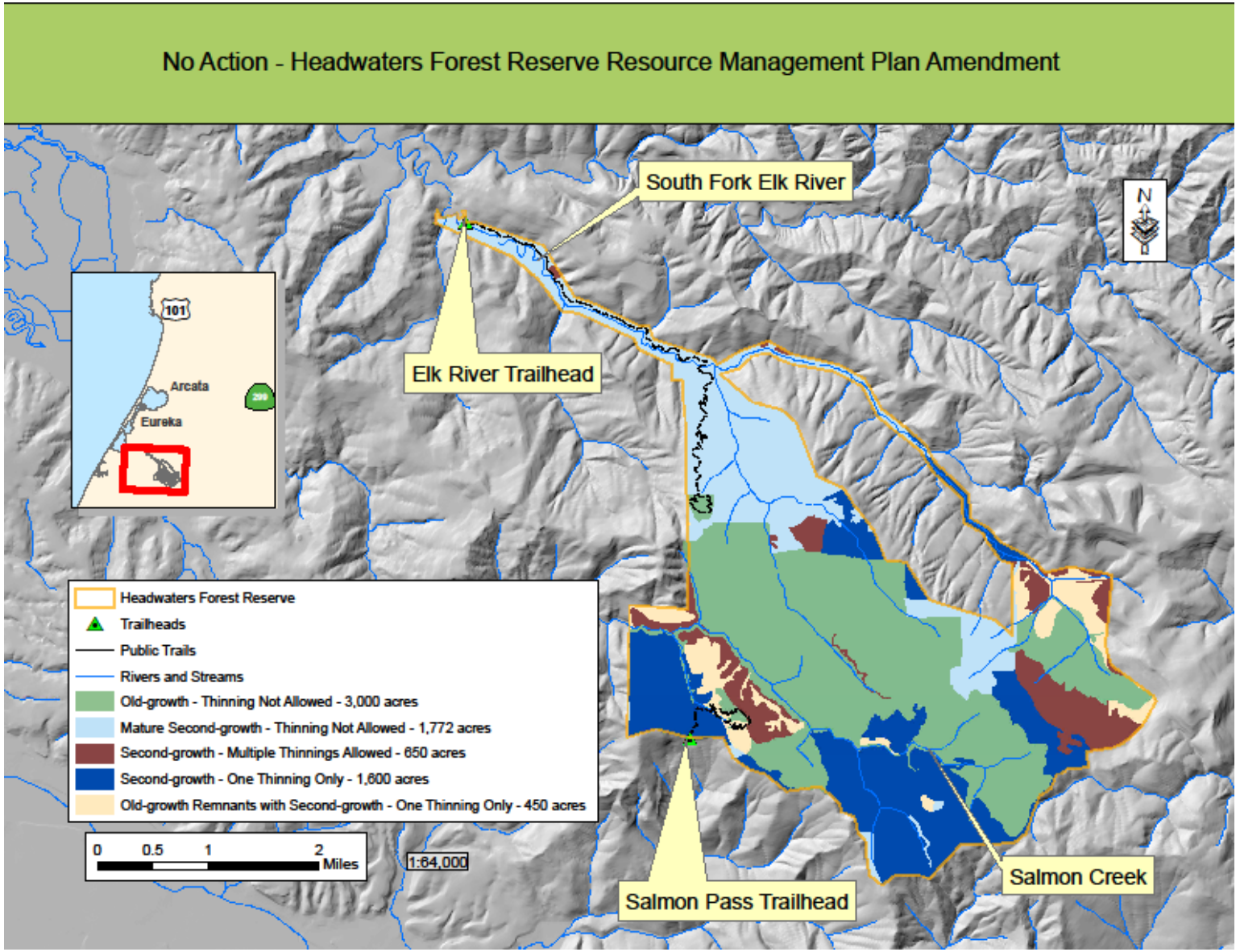

Figure 3: Allowable restoration thinning treatments within the Headwaters Forest Reserve under Alternative A (No Action).

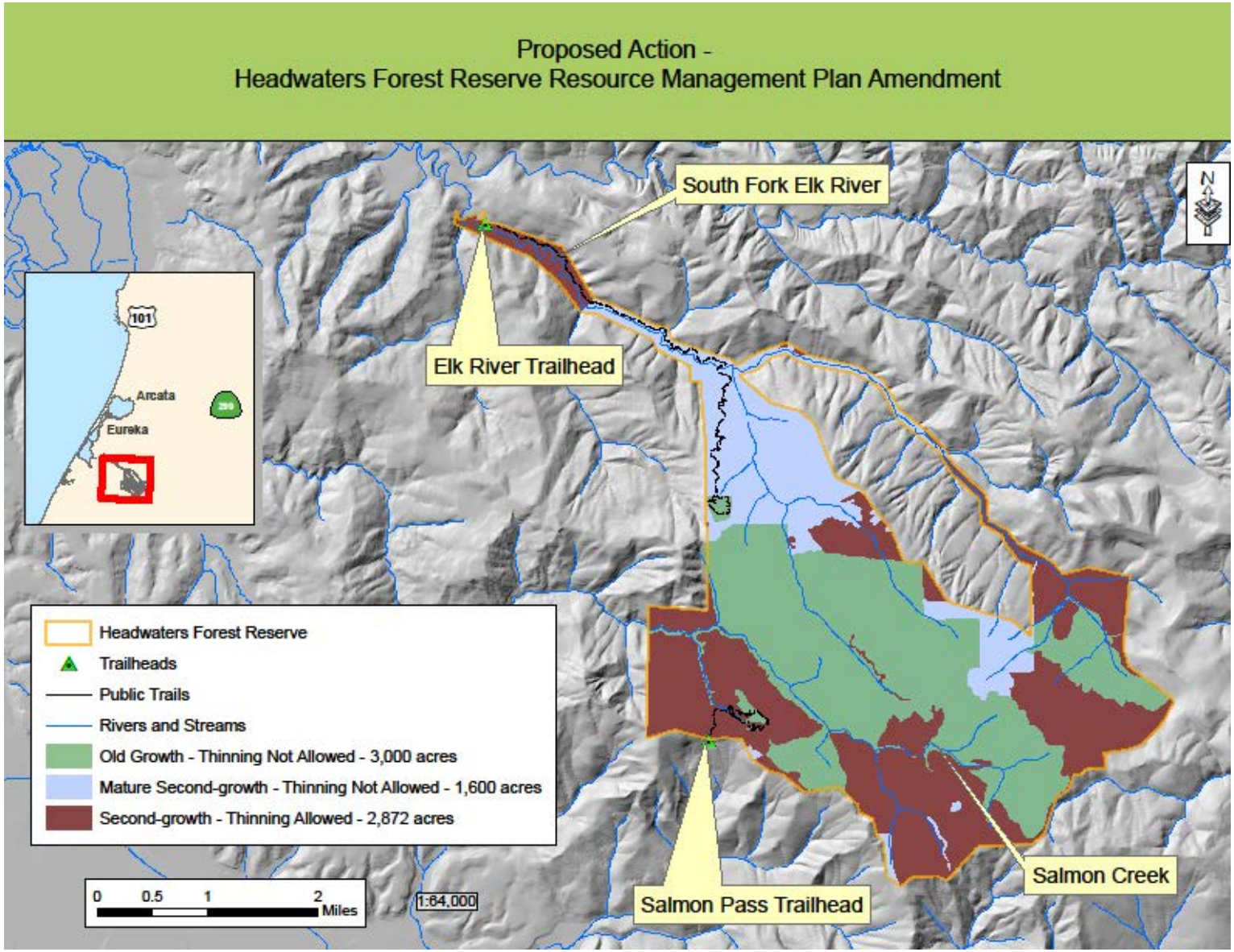

Figure 4: Allowable restoration thinning treatments within the Headwaters Forest Reserve under Alternative B (Proposed Action).

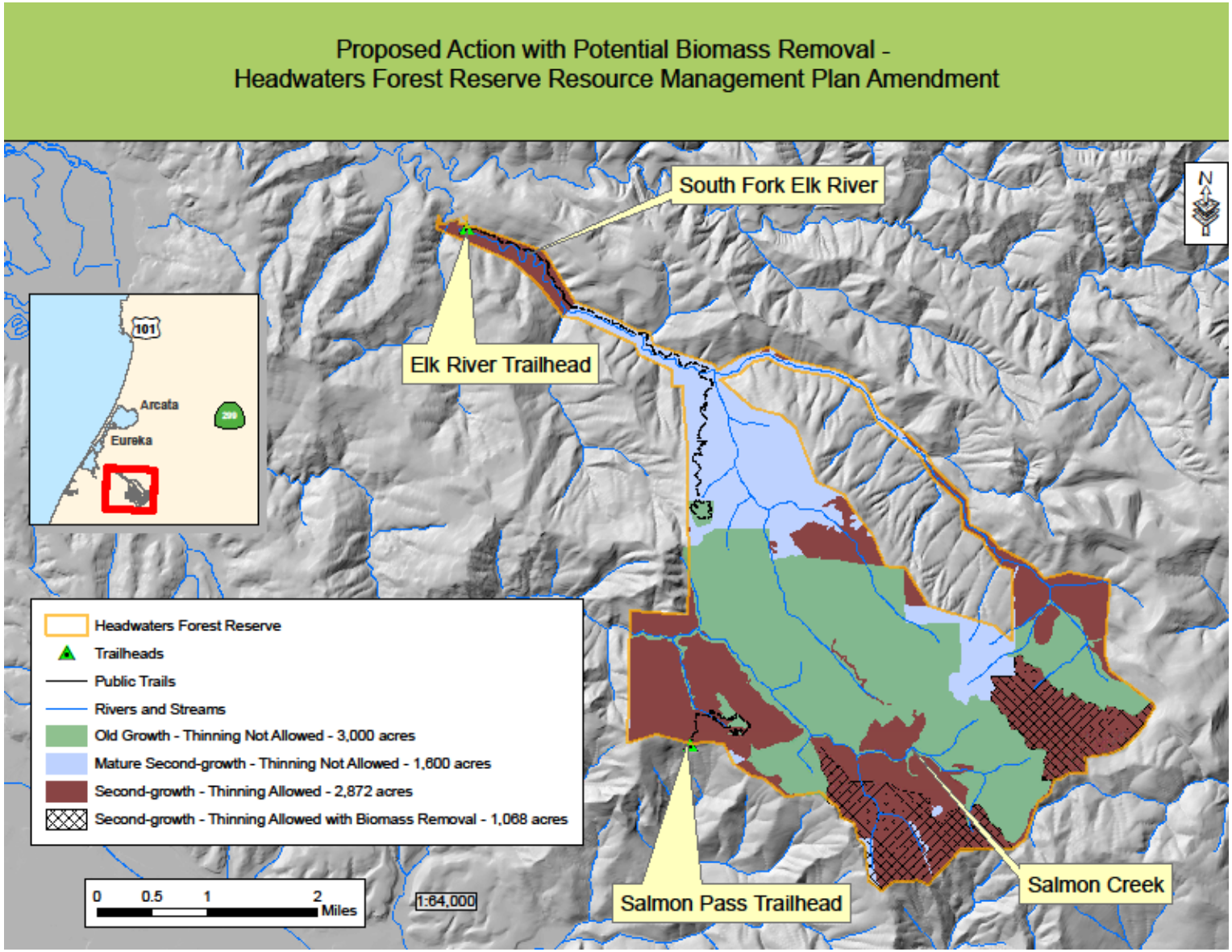

Figure 5: Potential biomass removal areas within the Headwaters Forest Reserve under Alternative B (Proposed Action).

Chapter 3. Affected Environment

Air Quality

The North Coast Air Basin is comprised of three air districts in Del Norte, Humboldt, Trinity, Mendocino, and northern Sonoma counties. The entire North Coast Air Basin is currently designated as nonattainment for the State 24-hour PM_{10} standard. The attainment plans, rules and regulations, and criteria pollutant attainment status are different for each of the three air districts in the North Coast Air Basin.

The North Coast Unified Air Quality Management District (NCUAQMD) is listed as "attainment" or “unclassified" for all the federal and state ambient air quality standards, except for the state 24-hour Particulate Matter (PM_{10}) standard in Humboldt County only. Particulate Matter is fine mineral, metal, soot, smoke and dust particles suspended in the air. The county's sunny climate, pollution-trapping mountains and valleys, along with the growing population, all contribute to the problem. Primary sources of particulate matter in the Eureka area are on-road and off-road vehicles (engine exhaust and dust from paved and unpaved roads), open burning of vegetation (both residential and commercial), residential wood stoves, and stationary industrial sources (factories).

Cultural Resources

Ethnographic Overview

Archaeological research in the region has resulted in a broader understanding of when and how resources in the area have been used by people over time. Prehistoric use of the region is generally presented as a chronological sequence beginning with the Paleoindian period (approximately 10,000 B.C. to 6,550 B.C.), and proceeding through subsequent stages, such as the Lower Archaic (approximately 6,550 B.C. to about 3,050 B.C.), the Middle Archaic (approximately 3,050 B.C. to 550 B.C.), the Upper Archaic (550 B.C. to 850 A.D.), and the Late or Emergent Period (approximately 850 A.D. to 1800 A.D.). Our knowledge of the Emergent Period is mainly derived from studies conducted by Loud (1918) at Tuluwat village on Gunther (Indian) Island in Humboldt Bay. These studies suggest cultural groups engaged in a lifeway generally focused on hunting, fishing, and gathering of acorns.

According to more recent work focused on linguistics (Golla 2007), the cultural groups associated with this time period include the Wiyot (whose arrival to the area would have been about 100 A.D.), the Yurok (whose entry to the area occurred approximately 700 to 800 A.D.), and the Athabaskan-speaking people (who entered the area approximately 800 to 900 A.D.). Most recently, work by Tushingham et al. (2016) identified and quantified dietary and other material remains from a site on Humboldt Bay. This comprehensive study indicates that the deposits predate those examined by Loud at Tuluwat village by several hundred years, and presents evidence of the earliest fish and shellfish harvesting on California’s northern coast (approximately 640 A.D.). It is thought that plank house village life emerged throughout northwestern California about this same time.

After about 1800 A.D., the north-coast tribal groups were disrupted by contact with Russian Traders, Spanish sea vessels, and Euro-American settlement. Within Headwaters, the predominant historic theme

is redwood lumber harvesting. Roscoe et al. (2002) provide an historic overview of Headwaters, suggesting logging activity began in the area sometime in the 1850s or 1860s. Within Headwaters, the remains of the towns of Scribner and Falk have been documented. Scribner was a stage stop for the Elk River Stage Lines based in Eureka and provided a store, telegraph station, post office, and boarding house. Falk was a mill town associated with the Elk River Lumber Company that housed a population of up to 400 persons during the height of lumber production.

Archaeological Research at Headwaters Forest Reserve

An archaeological study of the entire 7,500 acre Headwaters Forest Reserve was completed in 2000 (Roscoe et al. 2002). The survey method was designed to take into account the area's variable topographic and biotic zones, and incorporated information from models that predicted the occurrence of prehistoric and historic cultural resources. Additional site-scale cultural resource studies have been conducted within Headwaters on a project by project basis.

Eight archaeological sites were found and formally documented during the 2000 study, including one prehistoric period site and seven historic period sites. Archaeological studies at the prehistoric "Saddle Ridge Site" indicate that the site was used during the Middle Archaic period. In general, the lifeway during this time was dominated by the use of villages at lower elevations located along streams containing resources such as salmon and near acorn crops. Ethnographic studies suggest that Headwaters may have also been used during the Late or Emergent Period, and that it lies within Wiyot territory.

The historic period sites documented in Headwaters span the period of 1854 to 1940, with a prominent historic theme of redwood logging. Two of the historic sites are complex and contain multiple features. The "Falk Town and Mill Site" served as a mill town for the Elk River Lumber Company (ERM&L) from the 1880s through 1937, and was occupied by up to 400 persons at peak operation. The "Maggie's Camp" site is one of the biggest and most permanent of five ERM&L logging camps.

Other historic sites include the limited remains of the town of Scribner, the collapsed Creek House site, the "End of the Line Site" encompassing the end of the ERM&L railroad line, four segments of the ERM&L railroad system, and an historic military trail that linked Fort Humboldt to historic Yager Creek settlements.

Fire and Fuels

The last landscape-wide fire event in Headwaters was in 1936. During the 300 years prior to 1936, tree-ring evidence reflects regular fires throughout Headwaters from 8-47 years apart, averaging 24 years (Norman et al. 2009). Since 1936, there have been small wildfires due to lightning, heavy equipment, escaped campfires, and unknown causes. In the absence of a landscape-wide fire event, fuels available to a wildfire steadily increase.

Wildfire suppression in Headwaters' old- and second-growth is challenging. Duff layers may be several feet deep, heavy large fuels have accumulated, and crown fire potential and long-range spotting in second growth is high. Furthermore, hazards to firefighter safety in old-growth forests are particularly difficult to manage. A 300 feet tall burning snag can create a life hazard 750 feet away when falling. This requires a 13 acre safety circle around it to mitigate firefighter risk. Single-tree lightning fires have occurred in the

broken tops of live old-growth trees in early summer, and water drops from helicopters were unsuccessful in extinguishing the deep, smoldering heat. This necessitated dropping the trees to extinguish fires, as firefighting resource availability and risk to firefighter safety and adjacent private property values could not be accurately assessed and mitigated before a potentially long and dry fire season.

Forestry and Vegetation

The vegetation of Headwaters falls with the Coast Range EPA Level III ecoregion. Coniferous forest of Headwaters is dominated by coast redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii*), with a mosaic of western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophyllya*) included. Common riparian species include red alder (*Alnus rubra*) and big leaf maple (*Acer macrophyllum*); with common forest understory species including salal (*Gaultheria shallon*), evergreen and red huckleberry (*Vaccinium ovatum* and V. *parvifolium*) and thimbleberry and salmonberry (*Rubus parviflorus* and *R. spectabilis*).

Approximately 60% of Headwaters has been harvested, beginning in the late 1800s and continuing through most of the 1990s. The remaining 40% has not been logged. The timber harvesting significantly altered the natural vegetation, suppressing certain species and favoring others. This created a mosaic of forest stands that are more accurately characterized by postharvest age than by potential vegetation. For purposes of management, therefore, it is important to consider Headwaters' vegetation in terms of seral stage, rather than natural plant associations (see section below and Table 2).

Table 2: Seral stages of the Headwaters Forest Reserve.

Seral Stage	Acreage	Percent of Reserve
Unharvested Forest	**3,138**	**42**
Old-growth	1,947	26
Late-mature	434	6
Midmature with pre-dominant trees	519	7
Midmature	188	3
Early mature with pre-dominant trees	23	<1
Shrub/forb natural	5	<1
Harvested Forest	**4,334**	**58**
Seed-tree harvested	433	6
Late-mature harvested	9	<1
Midmature harvested	838	11
Early-mature harvested with pre-dominant trees	153	2
Early-mature harvested	598	8
Pole harvested	2,324	31

Note: "Pre-dominant trees" indicates that larger individuals are beginning to dominate the stand.
Source: Jimerson and Jones 2000

Unharvested Forest

Unharvested portions of Headwaters consist of old-growth, late-mature, midmature with pre-dominants trees, early mature with pre-dominant trees, and shrub/forb natural stands.

- **Old-growth forest**. Covering 1,947 acres (26% of Headwaters), old-growth forest has approximately 30 – 80 overstory trees per acre, consisting primarily of redwood and Douglas-fir. They usually occur as widely spaced individuals, generally with diameters at breast height (dbh) greater than 60 inches and ages greater than 200–500 years. A variety of age classes of conifer species are represented with a high degree of both vertical and horizontal structural complexity. Understory vegetation is well developed and there is a significant component of large woody debris (LWD) on the forest floor.
- **Mature forest**. Because of natural substrate and topographic conditions, as well as wind and fire history, a substantial portion of the unharvested forest is not strictly considered "old-growth" but comprises somewhat younger forests considered "mature." Occupying 1,164 acres (16% of Headwaters), these stands differ as a matter of degree rather than kind from the old-growth groves tending to grade into one another. In general they have fewer old-growth attributes, but are capable of attaining them. Average tree ages and diameters tend to be less, and stocking densities tend to be higher, with a larger Douglas-fir component. Understory vegetation is also well-developed with a significant LWD component.

Harvested Forest

Harvested portions of Headwaters are considered for active restoration in the 2004 RMP and the proposed Amendment, with the goal of accelerating successional change to natural mature and old-growth conditions. Harvested forest seral stages and riparian zones in Headwaters are described below.

- **Seed-tree harvested**. Approximately 6% of Headwaters (433 acres) was harvested by seed tree silvicultural prescriptions in which scattered single trees or small groups of mature or old-growth trees were retained across the harvest area, usually with random spacing. (This seral stage is referred to as old-growth harvested by Jimerson and Jones 2000.) These stands generally have two distinct strata of conifers and a less-well-developed understory and LWD component. The overstory is composed of the residual trees, and the understory is usually a uniform pole or shrub-sapling stand with characteristics similar to pole or shrub-sapling stands described below.
- **Mature harvested**. These stands, covering 1,598 acres (21% of the Reserve), are generally more than 30 years old, representing regeneration in the earliest harvest units of Headwaters. They are highly variable in species compositions and structures. Average stem diameters are greater than 16 inches, and maximum stand height is greater than 100 feet. In general, redwood dominates the stands (44% to 71%), with Douglas-fir as the other principal species. Minor constituents, but often locally dense, include tanoak, western hemlock, and grand fir. Understory layers are better developed than in the pole/sapling stands because stand densities are less due to thinning processes. Principal understory species are salal, evergreen huckleberry, red huckleberry, salmonberry, and thimbleberry. Variability of stand structure depends on the history of management and/or natural processes. Some stands show characteristics similar to the pole stands (i.e., emerging dominance differentiation and little structural diversity), while older stands show strong variability in individual tree form and have highly variable structures, both vertically and horizontally.

- **Pole harvested**. These stands, covering 2,324 acres (31% of Headwaters), are composed of extremely dense stands of young conifer trees generally 15–35 years of age. Typically, 500–2,500 trees are present per acre. A sample regeneration survey showed Douglas-fir dominance (78%), with redwood and grand fir percentages of 21% and 1%, respectively. Tanoak is present in these stands but is a very minor component once these stands are well established. Structurally, the stands typically have a single overstory layer, with some understory composed of salal and evergreen huckleberry. The trees have diameters ranging from 6–14 inches dbh, and sometimes as large as 20 inches. Stand heights range from 40 to 75 feet. Because of the density of these stands, live crown ratios are low and crown-base height is relatively high. These stands are extremely dense where they have developed on skid trails and layouts (i.e., beds prepared for the purpose of reducing breakage during the felling of large trees). Eventual overstory trees have begun to establish dominance over slower-growing trees that are at less of an advantage because of their location and the availability of resources such as sunlight and water. This overstory selection will accelerate through the pole stage.
- **Riparian zones**. Vegetation along watercourses and seep areas in unharvested forests is dominated by redwoods and huckleberry. In harvested forests, it is dominated by hardwoods such as red alder and big leaf maple and by conifers such as western red cedar, Douglas-fir, Sitka spruce, and grand fir. Crown canopy closures are usually 90–100%, with well-developed vertical structure. The LWD component is also usually well developed.

Forest Restoration

At the time Headwaters was established in 1999, 60% of the area had been previously logged. In some areas, forests were only beginning to recover from clear-cut harvests in the 1980s and 1990s, which left a legacy of overly dense and un-natural forest conditions. From 2004 through 2014, the BLM thinned approximately 1,600 acres (Figure 6) of these forests using standard forestry prescriptions that designated uniform spacing between trees. These treatments were successful in meeting several goals, including accelerating forest development and restoring a more natural species mix to these areas.

In 2014, the BLM began a second round of thinning with an added goal: introduce more spatial complexity to mimic conditions found in old-growth forests within Headwaters, using an approach called variable-density thinning. One hundred and fifteen acres were thinned in 2014 using this novel approach, 80 acres thinned in 2015, and 85 acres in 2016. To date, 1,320 acres have been thinned once and 280 acres have been thinned twice (Figure 6). This approach built off recent research completed by Humboldt State University (Berrill et al. 2013), Redwood National and State Parks, and the U.S. Geologic Survey (van Mantgem et al. 2016).

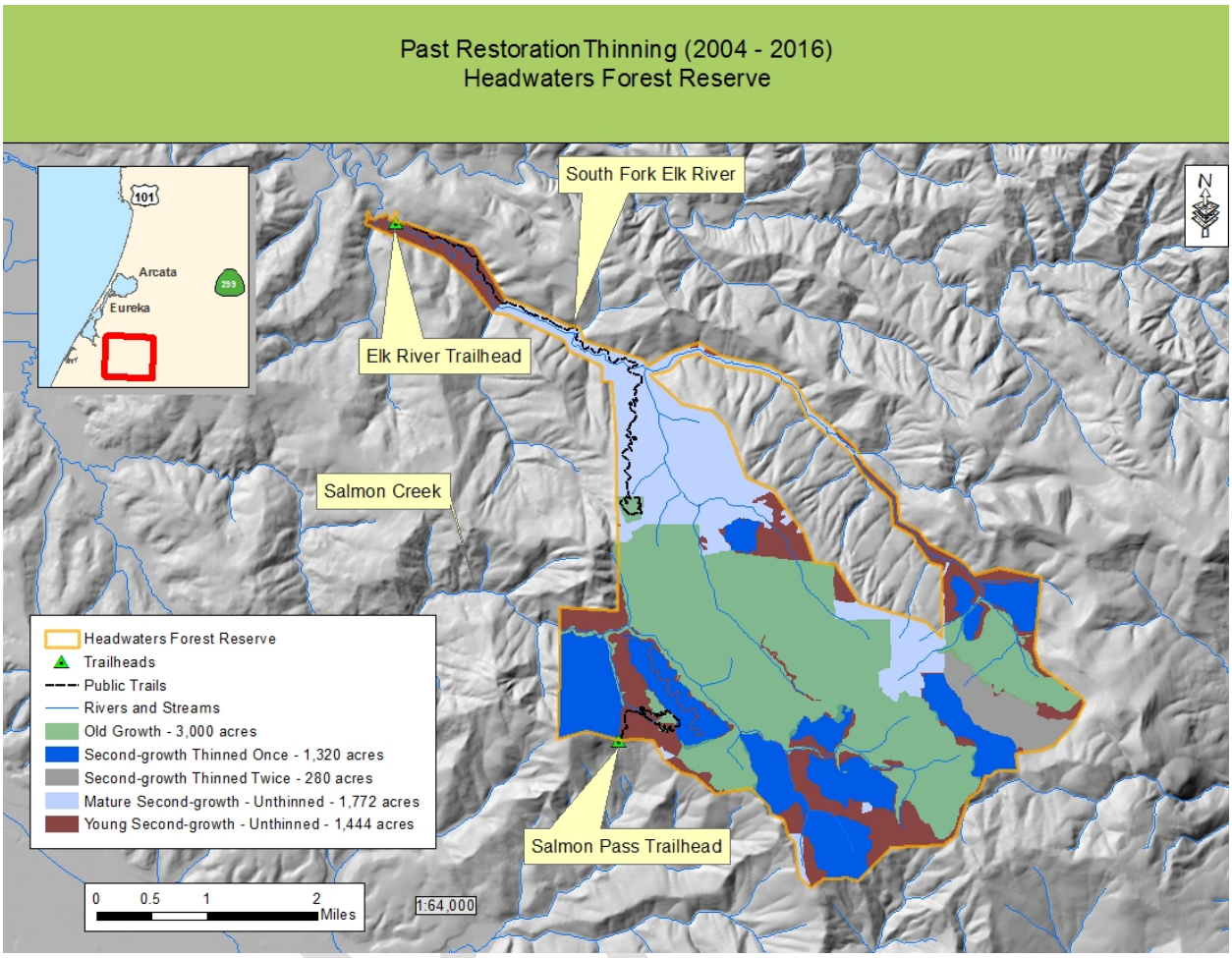

Figure 6. Past restoration thinning in Headwaters.

New Science/Research Results

Old-growth Reference Study (Berrill et al. 2013)

Three old-growth reference stands were inventoried by Humboldt State University from 2010 to 2011, which were used to answer the question: how do we restore characteristics of old-growth forest in Headwaters? Within old-growth stands, Douglas-fir and tanoak were well represented while coast redwood dominated in terms of size. Numbers of understory and overstory trees and average tree sizes were similar among sites, suggesting these were useful goals for restoration. Adjacent to each old-growth stand, recent growth rates of second-growth trees and remnant old-growth trees were measured across a range of tree sizes, stand structures, and densities. The resultant growth models of redwood and Douglas-fir were used to project the development of thinned young stands at Headwaters forward in time under two restoration prescriptions: (i) no further thinning; and (ii) restoration thinning simulated before trees attained 12" dbh. The "no further thinning" scenario did not promote rapid development of overstory trees towards the old-growth reference condition (Figure 7). A second thinning, including thinning of larger diameter trees, was needed to further reduce stand density, and promote and sustain rapid growth among overstory redwood and Douglas-fir trees. This also allowed for snag recruitment and making growing

space available for smaller trees in the understory. This restoration approach reduced stand density and set the young stand on a more rapid trajectory towards the reference condition found at Headwaters (Figure 7). For example, overstory Douglas-fir trees reached the restoration goal at approximately 150 years, while overstory redwood reached the restoration goal at approximately 250 years.

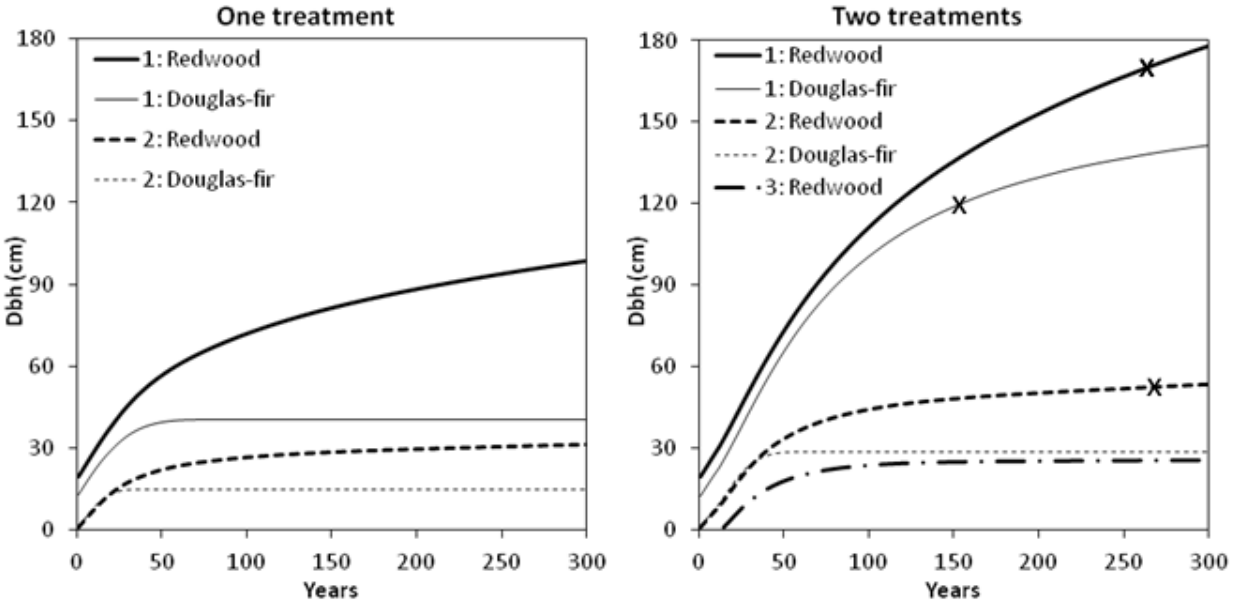

Figure 7: Simulated diameter development of redwood and Douglas-fir in two or three cohorts (overstory cohort, '1'; second cohort, '2'; third cohort, '3') under two different scenarios. Left panel: "One treatment" with 465 overstory stems ha^{-1} remaining after one PCT (before time zero). Right panel: "Two treatments" including one PCT (before time zero) followed by a second stand entry (partial cutting to leave 70 stems ha^{-1} in the overstory) before the average overstory redwood reached 30 cm dbh. Restoration goals for mean dbh denoted by "x". Taken from Berrill et al., 2013.

Post-thinning Tree Growth (van Mantgem et al. 2016)

From sites that had more than 10 years to respond to thinning treatments, van Mantgem et al.(2016) measured growth rates of coast redwood and Douglas-fir at Redwood National Park and Headwaters. Compared to untreated stands, thinned stands had lower stem density (trees ha^{-1}) and basal area (m^2 ha^{-1}), primarily due to removal of Douglas-fir. Individual tree growth (basal area increment, BAI, m^2 yr^{-1}) was related to tree size (basal area, m^2) and treatment history, with the highest growth observed in large trees in thinned stands. The positive growth response to thinning was more pronounced in coast redwood compared to Douglas-fir, indicating a long-term advantage in growth following thinning for coast redwood.

Forest Restoration at Redwood National Park: Exploring Prescribed Fire Alternatives to Second-Growth Management: A Case Study (Eamon Engber, Jason Teraoka, and Phil van Mantgem 2016)

Forest Structure

Low-intensity prescribed fire resulted in small changes to the overstory forest structure, but some tree mortality was concentrated in the smaller tree sizes (less than 12 inch dbh). Moderate- to high-intensity fire may increase mortality in Douglas-fir up to 24 inch dbh and top-kill all understory tanoak, as we saw in the Dolason Trailhead burn. Redwood's main competitor– Douglas-fir in the larger size classes– may not be affected by low-moderate intensity fire and will need follow-up mechanical thinning to remove the larger trees. Growth in tree diameter for living trees was observed during the 7-year study period post burns. Burning initiates vigorous sprouting on pole and overstory redwoods and tanoak which will result in new cohorts of trees.

Fuels and Fire Behavior

Redwood leaf litter is quite flammable. Areas dominated by redwood burned at a higher intensity and with greater fuel consumption (reduction of leaf litter) than areas dominated by Douglas-fir trees. While small redwoods may be susceptible to increased mortality, competitors such as Douglas-fir and tan oak are likely to suffer greater damage, and the ability of redwood to resprout may give it an advantage over other tree species. Further work is needed to analyze the effects of residual stumps and fire behavior in clonal redwood groups. For example, does stump smoldering increase mortality in redwood? Fine fuels (small twigs and branches) fully recover after fires and even exceed pre-burn load after seven years. This suggests re-entry may be necessary to maintain low amounts of fuel to reduce fire hazard from unplanned ignitions. Heavy fuels (logs, limbs) may remain unchanged in low intensity burns or increase or decrease following moderate-high intensity burns seven years post-burn.

Management Implications

Prescribed fire can be used as an alternate tool in second-growth management with some notable differences to standard silvicultural methods such as thinning. The application of prescribed fire returns a key process to fire-adapted landscapes and may have desirable effects that thinning doesn't produce. Fire may promote growth of redwood trees, but provides less control over the results compared to mechanical thinning. These studies show it may be difficult to achieve the goal of killing large Douglas-fir trees while remaining within the burn prescription. Mechanical thinning will be required to remove large trees. The use of prescribed fire in second growth forests warrants further study to assess: patterns in tree mortality; the role of redwood stump smoldering in post-fire redwood mortality; and understory vegetation recovery following fire. The amount of second growth forest needing restoration is a management challenge, but the opportunity to bring back old growth is worth the effort.

Managing for long-term, ecological carbon stocks (Sillet 2010; van Mantgem et al. 2013; and van Mantgem and Das 2014)

Managing for ecological carbon stocks is a relatively new consideration. Terrestrial ecosystems store vast amounts of carbon, much of which is found in the soil, but forests also store a large proportion of ecosystem carbon. Van Mantgem and Das (2014) reports that old growth stands contain a subset of trees with low crowding and the potential for rapid growth. Their model suggests that in second-growth stands, the more aggressive thinning prescriptions (for example, 40% percent basal area removal) will lead to substantial growth increases. Further, Sillet (2010) found that larger trees show accelerating growth rates and higher levels of biomass accumulation due to their greater surface area. A comparison of forest inventory data and standard forest development models between the outcome of no thinning, low-intensity thinning (25% basal area removal), and moderate-intensity thinning (40% basal area removal) projections suggest that over the long term, enhanced tree growth of treated stands may allow thinned and unthinned stands eventually to contain similar forest carbon stocks (van Mantgem and Das 2013).

Invasive Non-native Species

Since acquisition in 1999, most invasive, non-native species have been manually treated and dramatically reduced in their extent within Headwaters. Publicly accessible areas such as the Elk River and Salmon Pass trails have been intensively treated with great success. Treatment areas (Figure 7) are regions that were previously infested with one or more invasive, non-native plants that have been annually and intensively surveyed and retreated with the goal of eradication. In addition, treatment areas include infestation areas that required a treatment in order to accommodate conifer replanting efforts and that would ensure survival and successful growth.

Individuals and small areas of infestation do remain in Headwaters that can provide potential viable seed or materials for spread. Extensive inventory mapping efforts were completed in 2001 and 2010 and annual inspection for invasive, non-native weeds occurs in previously treated areas.

In general, most invasive, non-native plants are restricted to areas of past disturbance, whereas old-growth forests and stands with high-crown closure do not provide suitable habitats for most weed species. The most common invasive, non-native weeds in Headwaters are pampas grass (*Cortaderia jubata*) , English ivy (*Hedera helix*), cotoneaster (*Cotoneaster spps*), foxglove (*Digitalis purpurea*), periwinkle (*Vinca major*), holly (Ilex aquifolium), bull thistle (*Cirsium vulgare*), French broom (*Genista monspessulana*), Himalaya berry (*Rubus discolor*), and St. John's wort (*Hypericum sp.*). The northwest portion of Headwaters near the Elk River Trailhead and the historical town of Falk contains the greatest diversity of non-native species, generally associated with historical landscaping and chronic disturbance.

Pampas grass has been treated systematically since 1999. The remaining areas where it persists such as exposed slides, and healing clear-cuts and landings, have been manually treated and planted with redwood seedlings. The trajectory of pampas grass infestation in Headwaters is one of decline, with remaining plants eventually getting shaded-out to the point of low vigor, death, and a low likelihood of re-invasion with increasing canopy closure.

English ivy has been treated in the Elk River and South Fork Elk River corridor since 1999. Annual inspection and retreatment of any new discoveries is necessary into the future to prevent resurgence of

this shade-tolerant species. English ivy has the potential to spread into intact native forest, and thus, is one of the highest priorities in Headwaters to minimize and/or eradicate.

Himalaya berry is present on the Elk River corridor in the first two miles of the trail but is limited to the trailside edge. Eradication efforts for this plant have not been implemented to date.

Other weeds listed above are annually surveyed for and treated. Their presence is minimal, if not close to eradicated.

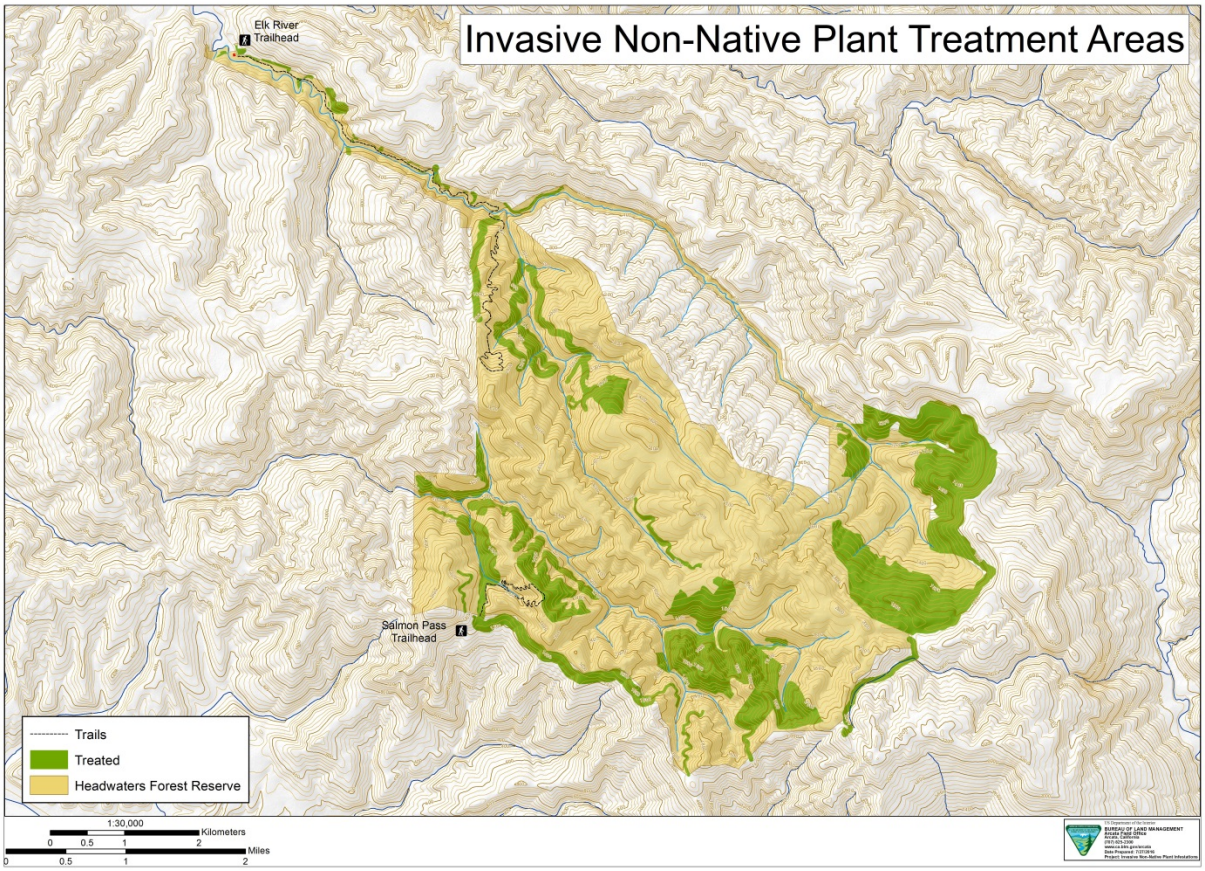

Figure 7: Invasive non-native plant infestation treatment areas in the Headwaters Forest Reserve.

Lands with Wilderness Characteristics

The Headwaters RMP (2004) identified 4,400 acres (60% of Headwaters) of unharvested forest and older harvested stands as lands with wilderness characteristics. These lands are managed to maintain and enhance these characteristics.

Native American Religious Concerns

The BLM consulted with the Wiyot Tribe and Bear River Band of Rohnerville Rancheria tribes prior to the preparation of this amendment document. During the government-to-government consultation meeting the tribes did not express any religious or spiritual concerns with the proposed actions as presented in the RMP Amendment. The BLM will continue to consult with these tribes throughout the planning process. In particular, the tribes would like to share natural and cultural resource data, including Traditional Ecological Knowledge (TEK), and provide input on harvesting and gathering policies, with special emphasis with regard to food and basketry plant materials and redwood logs.

Recreation and Visual Resources

There are two public trails in Headwaters: the Elk River Trail and the Salmon Pass Trail. The Salmon Pass Trail, near the City of Fortuna, is accessible by guided tour only. The Elk River Trail, near the City of Eureka, is accessible year-round for the visiting public. This trail, which receives nearly 40,000 visits per year, is a popular destination for dog-walking, hiking, nature viewing, bicycling, trail running and environmental education/interpretation. The trail winds along the South Fork Elk River for three miles, followed by a two-mile ascent to a short 0.5-mile loop through an old-growth redwood forest. The Headwaters Education Center, a restored train engine house that is now used for environmental education and interpretation, is located a half-mile from the Elk River Trailhead.

The BLM completed a visual resource inventory of Headwaters as part of the 2004 RMP (USDI BLM 2004). Through this process, 3,100 acres were identified as Class A (most outstanding), 1,550 acres were identified as Class B (some outstanding features and some features that are fairly common in the region), and 2,750 acres were identified as Class C (features are fairly common). The Headwaters restoration program has had a positive impact on visual resources by eliminating man-made features (e.g. roads) and restoring a more natural forest state in areas that had previously been clear-cut logged.

Special Status Aquatic Species and Essential Fish Habitat

A complete list of special status fish and wildlife species with potential range overlap with Headwaters can be found in Appendix A. The South Fork Elk River is home to three species of anadromous salmonids listed as threatened under the federal Endangered Species Act: Southern Oregon/Northern California Coasts (SONCC) coho salmon (*Oncorhynchus kisutch*), California Coastal (CC) Chinook salmon (*Oncorhynchus tshawytscha*), and Northern California (NC) steelhead (*Oncorhynchus mykiss*). SONCC coho salmon are the only salmonid in Headwaters listed (threatened) under the California Endangered Species Act. Coastal cutthroat trout (*Oncorhynchus clarkii clarkii)*, a BLM priority species and state species of special concern, also occupy the watershed. A natural barrier prevents anadromous salmonids from accessing the portion of the Salmon Creek watershed within Headwaters; however, resident cutthroat trout and rainbow trout (*Oncorhynchus mykiss*) occupy all accessible reaches of the watershed. Pacific lamprey (*Lampetra tridentata*), a BLM sensitive species, federal species of concern, and state species of special concern also occupy the South Fork Elk River and its tributaries. Based upon recent monitoring efforts in nearby Freshwater Creek, longfin smelt (*Spirinchus thaleichthys*) could be found within the project area.

The project area contains designated critical habitat for all three listed salmonids, and essential fish habitat (EFH) for coho salmon and Chinook salmon. The primary spawning and rearing areas for listed salmonids within Headwaters are the mainstem South Fork Elk River and the lower 0.25 miles of Little South Fork Elk River. Due to past logging activities that introduced high loads of fine sediment to South Fork Elk River and Salmon Creek, spawning and egg incubation habitat for salmonids and lamprey in the project area is low to moderate quality, with abundant shallow to moderately deep pools and large woody debris.

When the BLM acquired Headwaters in 1999, the area contained approximately 60 miles of roads, with an estimated 49 road-induced landslides. The area also contained an extensive skid trail network in previously harvested areas. This road network resulted in highly excessive sedimentation, and negative impacts to aquatic species and downstream residents. Since 2000, the BLM has treated the majority of the existing roads, working up-watershed to first address roads that pose most direct threats of sedimentation and impacts to threatened salmonid species. As a result, remaining roads are largely in the upper reaches of the watersheds of the South Fork Elk River and Salmon Creek and pose a relatively low threat to salmonids. These roads will continue to be accessed and treated (upgraded or decommissioned), as opportunities arise. See Table 3 and Figure 8 for more detail on the current status of the road network in Headwaters.

Table 3: Status of road network in Headwaters.

Road Status	**Miles**
Decommissioned (full recontour)	33
Passively restored / restoration not feasible	10
Potential treatment / further assessment needed	11
Road to trail conversion	3
Maintained / Upgraded	3
TOTAL	**60**

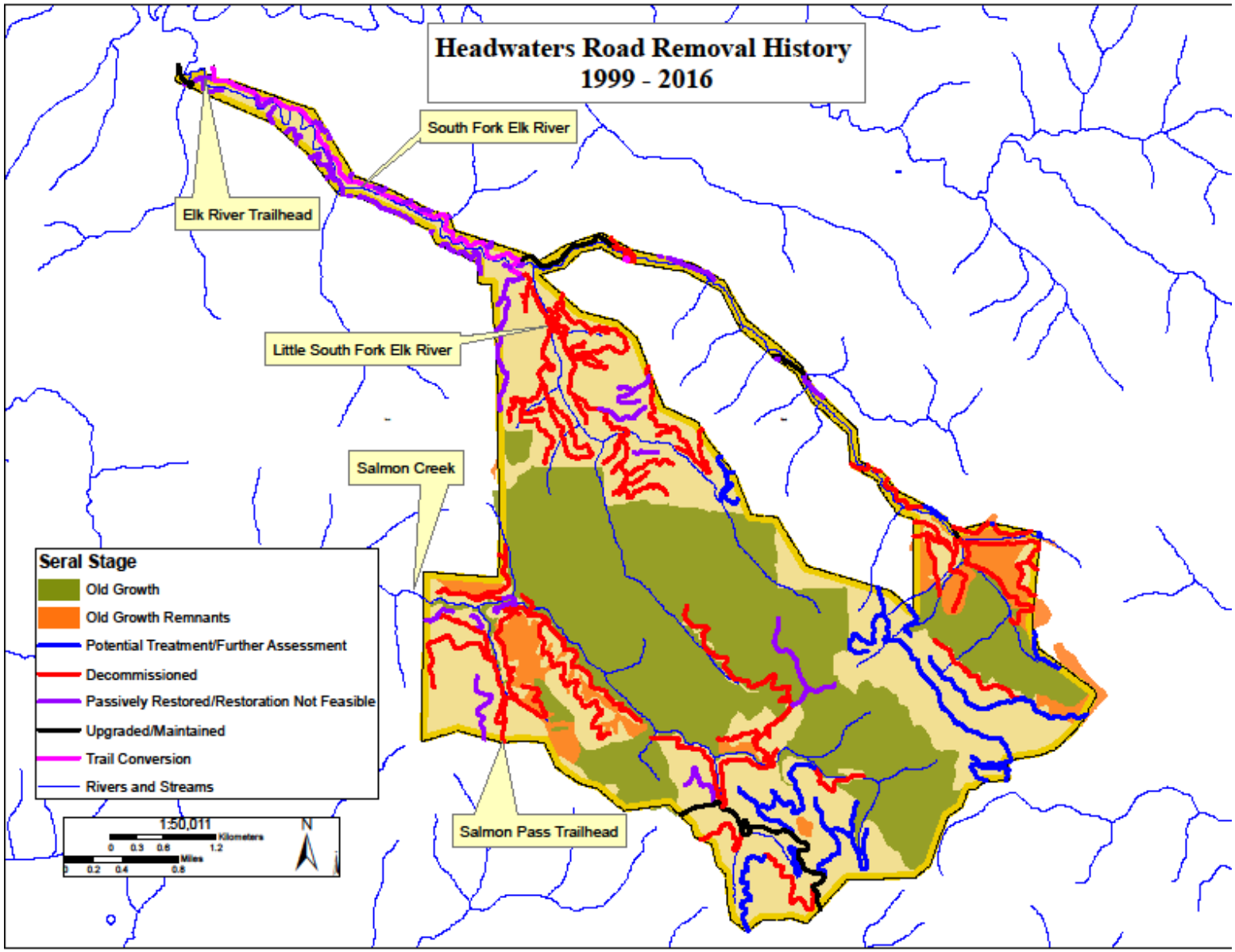

Figure 8: Road treatment history and status in Headwaters.

Special Status Plants

A complete list of known and potential special status plant species that have ranges that overlap with Headwaters, and their proposed conservation measures, can be found in Appendix B.

To date and since completion of the 2004 Headwaters RMP, there are no plants in Headwaters that are listed, or candidates for listing, under the Endangered Species Act (ESA) or California Endangered Species Act (CESA). There are no California Native Plant Society (CNPS) Rank 1 or 2 species present. There are no known BLM Sensitive vascular plants that have been observed in Headwaters.

BLM Sensitive plants are those plant species that are not federally Endangered, Threatened, or Proposed, but are designated by the BLM State Director for special management consideration. In California this includes all plants on BLM lands that are Federal Candidates for listing, all plants that are listed as Endangered, Threatened, or Rare by the State of California, all plants that have a Rare Plant Rank of CNPS List 1B (plants are native California species, subspecies or varieties that are rare, threatened, or endangered in California and elsewhere) (unless the State Director has determined, on a case-by-case basis, that a particular List 1B plant does not require Sensitive status), and any other plants the State Director has determined to warrant Sensitive status. Because of BLM's scattered land pattern in much of California, the Sensitive plant list also includes plants that are suspected to occur due to their proximity or the similarity of their known habitat to habitat known to exist on BLM lands. As more inventory work is completed, these suspected plants will either be redesignated as "known" to occur on BLM lands or dropped from the BLM Sensitive plant list.

There are three California Native Plant Society (CNPS) List 4 (a watch list of plants that are species of limited distribution) plants that are known to occur within Headwaters; heart-leaved twayblade (*Listera cordata*, CNPS List 4.2), Kellogg's lily (*Lilium kelloggii*, CNPS List 4.3), and running clubmoss (*Lycopodium clavatum*, CNPS List 4.1). (CNPS 2016; California Natural Diversity Database - CNDDB 2016).

Kellogg's lily (Figure 9) occurs in Oregon and in California, Del Norte and Humboldt Counties. The habitat of Kellogg's lily is variable and is known to occupy forest openings in the understory of mixed conifer forests or as dense shrub dominated serpentine chaparral within small breaks in vegetation. These perennial plants develop from bulbs and show an affinity for gaps created by roadsides and trails, which historically would likely be created by fine scale disturbance associated with mixed severity fire (Clarno 2014). Observations in Headwaters have included trail sides and road sides along late-successional forest stands.

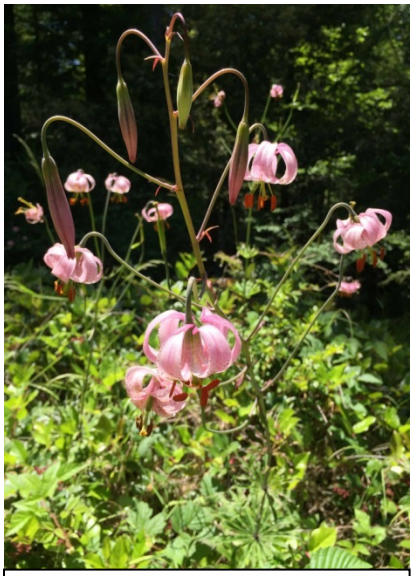

Figure 9. Kellogg's lily.

Heart-leaved twayblade (Figure 10) occurs in the western United States, Alaska and across Canada. In California, it occurs in Del Norte, Humboldt and Mendocino counties. Heart-leaved twayblade is a perennial plant that develops annually from a creeping rhizome.

Figure 10. Heart-leaved twayblade .

Its habitat is often shady and dry or moist coniferous forest. Observations in Headwaters have occurred in un-entered, old-growth stands.

Running clubmoss (Figure 11), regionally known as running pine, occurs globally, and throughout the United States. In California, it occurs in Humboldt, Mendocino and Sonoma counties. Running clubmoss is a creeping, spore-bearing perennial herb found in full to semi-shaded, dry to moist soil sites. There is one known site in Headwaters within a mature redwood-Douglas fir forest stand.

Figure 11. Running pine or club moss.

No fungi, lichens, or bryophytes, collectively known as cryptogams, are currently listed or are candidates for listing under the ESA or CESA. However, the California Lichen Society has developed a list of Lichens of Conservation Concern for which CNPS and CNDDB has adopted and classifies using the CNPS ranking system. Any cryptogams meeting List 1B ranking status would meet criteria for BLM Sensitive. In addition, the Northwest Forest Plan contains a list of Survey and Manage species that includes fungi, lichens, and bryophytes (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001). A subset of these Survey and Manage species that are known or suspected to occur in the Arcata Field Office area are currently designated by the California BLM as BLM Sensitive.

Seven BLM Sensitive forest-dependent, non-vascular plant species are known to occur in Headwaters (five fungi and two lichen species; Table 4).

Table 4: Bureau Sensitive non-vascular plants species known in the Headwaters Forest Reserve.

Species	Common name	Habitat/niche in the region
Clitocybe subditopoda	n/a	In duff under conifers/hardwoods
Dermocybe humboldtensis	n/a	On hard-packed soil
Mycena quinaultensis	n/a	In duff under conifers
Phaeocollybia olivacea	n/a	In duff under conifers/hardwoods
Ramaria largentii	orange coral mushroom	In duff under conifers
Lobaria oregana	Oregon lettuce lung	On mossy branches and trunks of hardwoods and conifers
*Usnea longissima**	Methuselah's beard lichen	On branches of older conifers

**Usnea longissima* is also listed by CNPS (List 4.2) and by the state of California as S4 – Apparently Secure.

Terrestrial Wildlife/ Special Status Wildlife

Table 3-6 in the 2004 Headwaters RMP contains a list of species that, at the time of analysis, were those fish and wildlife species listed by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (FESA), listed by the California Department of Fish and Wildlife (CDFW) under the California Endangered Species Act (CESA), the BLM sensitive species (BLM-S), and CDFW Species of Special Concern (CDFW-SSC), and Fully Protected (CDFW-FP). An updated list of special status fish and wildlife species with range overlap within 0.25 miles of Headwaters can be found in Appendix A. Additional information is provided below for those special status species that have primary management emphasis in Headwaters or have confirmed presence in Headwaters. Common terrestrial wildlife species considered for analysis and potentially found in the project area are listed in Appendix C.

Affected Environment - Prescribed fire treatments

Prescribed fire treatment areas proposed by this amendment have not been identified at this time but could be implemented throughout Headwaters. If implemented, prescribed fire will affect many habitat types and most terrestrial wildlife considered for analysis including all FESA, CESA, BLM-S and CDFW-SSC species found within Headwaters.

Affected Environment - Forest thinning treatments

The terrestrial wildlife species found in the proposed forest thinning treatment areas are generally a smaller group of the species contained in Appendices A and C, as these thinning treatments are only proposed within young, second-growth forest (Figure 4).

Special Status Wildlife Species

The species discussed below are those that have primary management emphasis in Headwaters or have confirmed presence.

Marbled Murrelet (*Brachyramphus marmoratus*) FESA threatened, CESA endangered

Species background: The marbled murrelet is a small seabird in the Alcid family. It occupies the nearshore waters from central California north to south central Alaska. It feeds by diving and catching small fish and invertebrates within the water column. Typically Alcids are ground nesters on cliffs, offshore rocks and islands but throughout most of the murrelets range this species has evolved to nest in the late successional forests near the coast. During the April through mid-September nesting season murrelets select a wide limb with a moss or vegetative covering in an old-growth tree that will support the incubation of their one egg. When the chick fledges it must fly out to the ocean to begin its life on the ocean. These seabirds use the forest environment only for nesting (Ralph et.al. 1995).

Current Federal and State status: The population segment of the marbled murrelet found in Washington, Oregon and California was listed under the Endangered Species Act as threatened in 1992 by the USFWS and is listed as endangered by CDFW. Its population decline is primarily due to the excessive harvesting and fragmentation of mature forests and ocean oil spills (Ralph et.al. 1995). The near shore waters along the coasts of these three states have been surveyed for murrelets by the USFWS since 2001. For the 2001-

2013 period the combined 5-conservation zone survey area revealed a weak downward trend of 1.2% population decline per year (U.S. Fish and Wildlife Service 2014).

Status in the Headwaters Forest Reserve: The old-growth portion of Headwaters contains the only habitat that is suitable for murrelet nesting, and was intensively surveyed shortly after acquisition in 1999 and found to be occupied with murrelets. In the subsequent years a monitoring program has been established, beginning in 2004. Annual surveys have been completed at eleven monitoring sites since 2005 and biannually since 2011. Murrelet occupation (subcanopy flight behavior that assumes nesting) has been observed at several of those sites and murrelet presence at all of the sites. The surveys completed within Headwaters are not intended and cannot determine the population status. They are simply designed to determine occupation, presence or absence of breeding murrelets at these locations. The sea surveys completed by the USFWS are the only way to census the marbled murrelet population.

RMP amendment status: The proposed forest treatment areas for thinning mapped in the RMP amendment do not contain habitat for the marbled murrelet. Areas that may have prescribed burning as a part of the proposed action under this amendment may take place in murrelet suitable habitat.

Northern Spotted Owl (*Strix occidentalis caurina*) FESA threatened, CESA candidate threatened

Species background: The northern spotted owl is a medium-sized owl found in the coniferous forests of Washington, Oregon, and northern California. It prefers forests with a moderate to dense canopy closure, complex structure with tree cavities or broken tops for nesting and a stable population of small rodents and other animals for prey. It forms pair bonds that may last for many years and maintains a territory during the nesting season that it defends from other owls (USDI USFWS 2016).

Current Federal and State status: The northern spotted owl was listed under the Endangered Species Act as threatened in 1990 by the USFWS and is a CESA candidate for listing as threatened by the CDFW. Its population decline was initially from loss of habitat due to the excessive harvesting and fragmentation of mature forests. Over the last 20-30 years it has suffered from competition from the barred owl, which has expanded its range from the eastern U.S. As the barred owl population within the range of the northern spotted owl has increased the competition between the two owls for territory, habitat and prey is an increasing reason for the lack of recovery of the northern spotted owl (USDI USFWS 2008).

Status in the Headwaters Forest Reserve: When Headwaters was acquired it had a population of six northern spotted owl territories established at that time. Surveys for northern spotted owls have occurred annually since acquisition over the majority of Headwaters. In 2004 the first barred owl was detected and since then have displaced many of the spotted owls and taken over much of the desirable habitat and spotted owl territories. In 2016 the number of spotted owl pairs was down to two, the lowest since acquisition of Headwaters in 1999.

RMP amendment status: The proposed forest thinning treatment areas mapped in the RMP amendment do not contain preferred habitat for the northern spotted owl. Although these treatment areas may contain residual mature trees that may have spotted owl habitat components they do not offer high quality habitat and owls are only expected to occasionally forage and have temporary presence there . Areas that may have prescribed burning as a part of this amendment may take place in spotted owl preferred habitat.

Fisher (*Pekania pennanti*) formally Pacific fisher (*Martes pennanti pacifica*) BLM-S, CDFW-SSC

Species background: The fisher is a medium-sized forest carnivore and member of the mustelid family. It takes advantage of a variety of habitats but prefers a closed canopy forest habitat with large wood debris and trees for foraging and resting and also cavities in trees used for denning. It forages extensively both on the ground and in trees for small to mid-sized animals and prefers large areas to maintain as a territory that it defends against other fishers (USDI USFWS 2014).

Current Federal and State status: The West Coast Distinct Population Segment (DPS) of the fisher found in Washington, Oregon and Northern California was proposed but withdrawn for listing under the Endangered Species Act by the USFWS in 2016 (Federal Register 2016) and was a candidate for listing under the CESA. The fisher is currently a BLM sensitive species and a CDFW species of special concern. The fisher population suffered in the northwest U.S. initially from overharvesting by fur trappers in the early 1900's but more recently from loss of habitat due to the excessive harvesting and fragmentation of mature forests (USDI USFWS 2014).

Status in the Headwaters Forest Reserve: An inventory for fishers conducted in Headwaters in 2013-14 found a relatively high density of fishers concentrated within the old-growth area. Nine individuals were identified by DNA analysis of their hair samples in an approximately 5,000 acre sample area. It is assumed that Headwaters supports this high density because of high quality old-growth habitat and an abundance of prey.

RMP amendment status: The proposed forest treatment areas for thinning mapped in the RMP amendment generally do not contain preferred habitat for the fisher. Although these treatment areas may contain residual mature trees that may have fisher habitat components they do not offer high quality habitat and fishers are only expected to occasionally forage and have temporary presence there . Areas that may have prescribed burning as a part of this amendment may take place in fisher preferred habitat.

Other Special Status Species with confirmed presence in Headwaters

There are several amphibian species found in the project area. The foothill yellow-legged frog (*Rana boylii;* BLM-S; CDFW-SSC), Pacific tailed frog (*Ascaphus truei;* CDFW-SSC), northern red-legged frog (*Rana aurora;* CDFW-SSC), and the southern torrent salamander (*Rhyacotriton variegatus;* CDFW-SSC) spend most of their life in or adjacent to the waters of ponds, streams and rivers (Ashton et al. 2002).

The bat species Yuma myotis (*Myotis yumanensis*; BLM-S) has been confirmed in the project area. The fringed myotis (*Myotis thysanodes*; BLM-S) and the Townsend's big-eared bat (*Corynorhinus townsendii*; BLM-S, CESA- threatened candidate), as well as other common bat species, may also be present. These bats may be found foraging or roosting throughout Headwaters. Roosting in the forest would occur under sloughing tree bark, deformities or cavities (Western Bat Working Group 2016). Townsend's big-eared bat has been documented to breed in large tree cavities. Other than a short distance of South Fork Elk River near the Elk River Trailhead, the bat population within Headwaters has not been surveyed or inventoried.

The olive-sided flycatcher (*Contopus cooperi*; CDFW-SSC), and the Vaux's swift (*Chaetura vauxi;* CDFW-SSC) are two more special status bird species with confirmed presence in Headwaters. The olive-sided flycatcher may be found throughout Headwaters both nesting and foraging. The swift prefers nesting in hollows of large trees. Both species' habitat may be in the proposed prescribed fire treatment

areas and the swift may be found in potential thinning areas where remnant old-growth trees can be found.

The Sonoma tree vole (*Arborimus pomo*; CDFW-SSC) is the other special status mammal with confirmed presence in Headwaters. Its preferred habitat is Douglas-fir trees, primarily in the old-growth portion of Headwaters and may spend most of its life in the canopy of the trees (Chinnici et al. 2012). It may also be found in proposed thinning treatment areas, including areas along the Elk River Trail. Under the 2004 RMP, this species was referred to as the California red tree vole.

Northwest Forest Plan Survey and Manage species

The Arcata Field Office is covered under the Northwest Forest Plan and the Survey-and-Manage Species program identified under that Plan. The Survey-and-Manage program has undergone several changes since it was initiated, resulting in many species being eliminated from the list. Headwaters is not within the range or does not contain habitat for any of the vertebrate or invertebrate animal species currently on the Survey-and-Manage list (USDI BLM 2011). The Oregon shoulderband snail (*Helminthoglypta hertleini*) was eliminated from the Survey-and-Manage Program but is a BLM sensitive species and is included in Appendix A.

Other updates

An osprey nest was observed within Headwater at the time of analysis for the 2004 RMP; however this nest has not been active since 2004. Although Headwaters contains nesting habitat for ospreys it is not preferred nesting habitat due to the distance from water bodies. Ospreys typically nest adjacent to or extremely close to bodies of water that they use to forage for fish (Zeiner et al. 1988-1990).

Water Quality

The Elk River watershed is listed as an impaired water body under the Clean Water Act. The North Coast Regional Water Quality Control Board has drafted, but not finalized, a total maximum daily load (TMDL) for the Elk River. The primary pollutant is excessive sediment. Elevated sediment loads in the Elk River have impacted aquatic habitat and increased flooding frequency in downstream reaches. During winter flows, turbidity is often high as a result of sediment transport. Flood flows typically leave a veneer of fine sediment on floodplains. Summer water temperature in Salmon Creek and South Fork Elk River (13-16 °C) (BLM unpublished data) is considered ‘very good’ for salmonids based on NMFS (2014) criteria.

Wetlands and Riparian Resources

A few wetland features exist in Headwaters, most notably two large ponds in the headwaters of South Fork Elk River. Forested wetlands provide novel wildlife habitat and provide ecosystem services such as water storage, nutrient cycling, and sediment trapping. Small, forested wetlands have not been mapped in Headwaters, but based on findings from Washington State (Janisch et al. 2011), they are most common on north-facing aspects, along streams with spatially continuous, perennial flow and large woody debris. Wetlands in the project area will receive the same buffer protections as streams.

Several treatment areas will occur within riparian habitat associated with Salmon Creek, South Fork Elk River, and their tributaries. Riparian areas are characterized by a mixed overstory canopy of coast

redwood, Douglas-fir, and red alder. The understory is composed of a diverse array of shrub and herbaceous plants.

Riparian areas along the South Fork Elk River provide food resources for the aquatic and terrestrial ecosystems, contribute woody vegetation for instream habitat functions, buffer sediment delivery to streams, provide shade and thermal buffering to the channel, and provide bank and channel stability. Canopy cover in riparian areas is generally very high (90 to 100%).

Chapter 4. Environmental Effects – Direct, Indirect and Cumulative

Alternative A (No Action)

Under Alternative A, the BLM and its partners would continue to implement the Headwaters forest restoration program as described in the 2004 Headwaters RMP.

Direct and Indirect Effects

Air Quality

Under the No Action alternative, air quality is unlikely to see much change from current conditions during day-to-day circumstances. Uncommon wildfire events, however, are likely to be more intense and have greater resistance to control due to the gradual build-up of dead-and-down fuels. These uncommon events are likely to adversely impact air quality from a few days to several weeks.

Cultural Resources

There would be no effect to known cultural resources as a result of implementation of the No Action Alternative. As stated in the 2004 Headwaters RMP, all of Headwaters has been surveyed for cultural resources. Before any land-disturbing forest restoration activity takes place, a file search ensues to be certain known cultural resources are identified and avoided. If warranted, a supplementary examination of the area for cultural resources may take place, and if any are encountered, the project will be modified based on an evaluation by a qualified archaeologist. If any cultural materials or sites are encountered during forest-thinning activities, all work will be stopped until a qualified archaeologist has evaluated the find. BLM will continue to consult with the appropriate tribal groups to gather information about Traditional Ecological Knowledge and use an ethnoscientific approach whenever possible to sustain local resources.

Fire and Fuels

Under the No Action Alternative, hazardous fuels will continue to accumulate. Dead and down and fine materials on the forest floor will increase, as will the ladder fuels. Consequently, the potential for high intensity damaging effects from wildfire also increase. Potential for complete consumption of living trees – even the tallest living trees – gradually becomes greater. Duff layer depth will gradually increase as well, increasing the potential for a low-intensity, smoldering fire to kill even the largest trees through girdling (damaging the plants vascular system around the trunk's periphery at the ground level).

Forestry and Vegetation

Under Alternative A (No Action), the BLM and its partners would continue to implement the Headwaters forest restoration program as described in the 2004 Headwaters RMP. Berrill et al. (2013) simulated forest growth in Headwaters under multiple restoration scenarios and found that under our current management we would not meet our old-growth restoration objectives in the next 300 years. In addition they found that a single round of thinning, as allowed for in the 2004 RMP, will not promote rapid development of overstory trees towards the old-growth reference condition (Berrill et al. 2013). In general, forest restoration would become increasingly limited (due to inherent limitations with the 2004 RMP) and therefore No Action would result in:

- The growth rate for the second-growth trees would continue to be less than for trees in thinned stands of second-growth trees growing in areas with similar site potential.
- The second-growth forests would continue to have significantly smaller trees at a significantly higher density than the original forest. Understory vegetation would remain suppressed, as sunlight is prevented from reaching the forest floor.
- Recruitment of seedlings would remain suppressed, which would maintain uniform stand characteristics and even-aged conifer tree demographics.
- Without a large-scale disturbance, unmanaged growth would continue to promote uniform tree heights and simple crown architecture.
- Tree crowns would recede as the stand ages, reducing the live crown ratio and slowing the diameter growth rates of trees as competition for light, water, and soil nutrients increases.
- The high densities would increase the potential for disease and insect infestation. High densities would also result in large height-to-diameter ratios, which would increase the potential for large-scale wind throws in severe storms.
- Natural competitive thinning would occur in untreated, second growth stands leading to some carbon loss, while over time the associated growth of residual trees would result in carbon gain.

Invasive Non-native Species

Under the No Action Alternative, additional thinning entries into recovering forest stands would be reduced over time. Because there would be fewer managed forest actions moving forward in time, there could be a reduced risk of new invasive, non-native plant introductions or inadvertent spread related to forest health disturbance activities. However, as on-the-ground BLM staff associated with forest health projects are cross-trained to also contribute to invasive, non-native species survey and response, there could be a reduction in regular inspections and small-scale, manual eradication efforts. These types of proactive, early detection and rapid response visits help prevent individual weeds from expanding into larger infestations in many remote and seldom visited areas.

Lands with Wilderness Characteristics

Under the No Action Alternative, lands with wilderness characteristics fall outside the areas proposed for thinning and are largely unimpacted by the forest restoration program. However, the inability of the BLM to better utilize fire and other tools to improve the naturalness of these areas could have a long-term negative impact on wilderness character.

Native American Religious Concerns

The BLM has been consulting with the Wiyot Tribe and the Bear River Band of Rohnerville Rancheria tribes. There are no known Native American religious concerns.

Recreation and Visual Resources

Under the No Action Alternative, the Headwaters forest restoration program would largely wind down as available restoration opportunities decrease. Recreation within Headwaters is concentrated along the Elk River and Salmon Pass Trails. Therefore, the No Action Alternative is likely to have a negligible impact on recreation resources, as visitors are largely unaware of restoration activities that occur outside of the viewshed of the trail.

Special Status Aquatic Species and Essential Fish Habitat

Under the No Action Alternative, special status aquatic species and their habitats are anticipated to improve at a slow rate. Aquatic habitat within Headwaters is in a largely natural, slow state of recovery following instream wood removal and excess sediment input from legacy logging operations and roads. Current management is directed towards improving riparian and aquatic habitat conditions.

Special Status Plants

Under the No Action Alternative, BLM Sensitive non-vascular plants, and CNPS List 4 plants, are expected to continue to receive little to no disturbance from ongoing or completed forest management. Kellogg's lily should persist on maintained trail and road edges, but may be affected long-term if natural disturbances such as wildfire are not able to create occasional forest gaps required for presence within the forest understory. BLM Sensitive non-vascular plants occur in late-successional and old-growth forests that are not subject to disturbance associated with the No Action alternative.

Under the No Action alternative, sensitive plants with potential to occur in Headwaters Forest Reserve (described in Appendix B) would likely not receive additional, targeted surveys in potential habitat areas as the trigger for such surveys would be proposed project work in forest management units connected to the proposed action alternative.

Terrestrial Wildlife/ Special Status Wildlife

Prescribed fire treatment

Prescribed fire is intended to reduce fuel loading and the impacts of a wildfire when it occurs. Current management does not allow prescribed fire in Headwaters. Because future wildfire occurrence and its impacts to wildlife and their habitat in Headwaters are unknown, current management does not necessarily increase the negative direct or indirect effects of wildfire. Although, as years and decades pass the continual accumulation of the fuels in the forest will increase the chance of a catastrophic fire that will cause significant impacts to many wildlife species and their habitats.

Forest thinning treatment

The thinning treatment areas have all largely had the full extent of thinning permitted under the current plan and therefore will not have any negative effects from disturbance or habitat modification associated with additional thinning.

Water Quality

Under the No Action Alternative, continued forest restoration and the subsequent transition to old-growth forest characteristics would slowly restore sediment transport and the hydrology of watersheds to a more natural state. Interception and storage of precipitation would continue to improve, resulting in slowed runoff, improved water clarity, and cooler water delivered to streams during the warm summer months. All of these changes would increase the quality of aquatic habitat.

Wetlands and Riparian Resources

Under the No Action alternative, wetlands would be unaffected due to existing protective measures. Riparian resources would benefit from continued forest restoration efforts, but benefits would be limited by the existing restrictions and number of remaining opportunities (as described in 'Forestry and Vegetation' above).

Cumulative Effects

Air Quality

Wildfire events are likely to become more intense and have greater resistance to control due to the gradual build-up of dead-and-down fuels over time. These uncommon events are likely to adversely impact air quality from a few days to a few months, adding significant amounts of smoke and particulate matter to the airsheds across northern and central California. These additions could exacerbate the air quality issues associated with other wildfires.

Cultural Resources

There are no anticipated cumulative effects since known cultural resources are identified and avoided by forest restoration activity. If any cultural materials or sites are encountered during forest restoration work, all work will be stopped until a qualified archaeologist has evaluated the find. BLM will continue to consult with the appropriate tribal groups to gather and incorporate Traditional Ecological Knowledge to avoid cumulative effects to these local resources.

Fire and Fuels

Wildfires over time could produce some localized changes in forest upper-level canopy structure. Every year there exist the potential for loss of second-growth redwood trees, younger firs, and large snags from consumption, and loss of old-growth trees from girdling, and this potential is greater in the absence of fuel reduction on the forest floor.

Gradually increasing fuel loading increases potential fire behavior, thus limiting the strategic and tactical options available to firefighting teams. For example, lightning fires in the broken tops of live trees often requires falling of old-growth trees that may have survived the fire for potentially hundreds of years into

the future, because options such as confining and monitoring or containing the potential fire spread through burning out adjacent fuels may not be safely or effectively completed in areas with high fuel loading. Extended, long-term commitment of firefighting resources (aircraft, crews, equipment) to wildfire suppression in the Headwaters could have a negative effect on local, state, and even national firefighting capabilities.

Forestry and Vegetation

Since the mid-1800s, approximately 95% of old-growth redwood forest across its entire range has been harvested one or more times. This has resulted in a patchwork of old-growth stands within a matrix of second-growth forest. Within the northern region of redwood forests, the majority of old-growth forest exists within National and State Parks. Headwaters is surrounded by industrial timberlands managed by Green Diamond Resource Company and Humboldt Redwood Company, and is situated between Humboldt Redwoods State Park to the south and Redwood National and State Parks to the north. Because adjacent lands are managed for industrial timber, the restoration of Headwaters to an old-growth state is critically important. The No Action alternative would limit achieving restoration objectives and would have an overall negative effect on regional forest restoration.

Invasive Non-native Species

The invasive, non-native species of Headwaters are widespread in the Humboldt County assessment area, and Pacific Northwest coast range, in general. Pampas grass, broom species, and English ivy form monocultures in timber harvest areas, disturbed coastal forests near urban centers, and along riparian areas, roadsides and freeways. Interagency, private and non-profit organizations have an ongoing memorandum of understanding to control invasive, non-native plants in Humboldt County. Ongoing weed abatement and eradication efforts in Headwaters contribute to the cumulative Humboldt Weed Management Area efforts to control the spread of these weeds in natural areas, which temper the unchecked pace of spread in unmanaged areas.

Lands with Wilderness Characteristics

No cumulative impacts are expected to wilderness characteristics.

Native American Religious Concerns

The BLM has been consulting with the Wiyot Tribe and the Bear River Band of Rohnerville Rancheria tribes. There are no known Native American religious concerns.

Recreation and Visual Resources

Under the No Action alternative, the Headwaters forest restoration program would largely wind down as available restoration opportunities decrease. The Headwaters restoration program has had a positive impact on visual resources by improving the “naturalness” of second-growth forests in Headwaters. As a result, the decision to wind down the restoration program could have a long-term negative impact on visual resources as young, dense, re-growing forests take longer to develop into mature and visually-appealing forest.

Special Status Aquatic Species and Essential Fish Habitat

Industrial timber harvest outside and upslope of Headwaters has occurred in the past and is expected to continue in the South Fork Elk River watershed. Therefore, aquatic species and their habitat in South Fork Elk River will be subject to higher than natural fine sediment levels resulting from roads and other logging-related activities. Under the No Action alternative, a negligible amount of sediment is expected to be delivered to streams as a result of management actions, and riparian buffer areas within Headwaters would continue to be protected.

Special Status Plants

BLM Sensitive vascular plants

Kellogg's lily benefits from forest disturbances that create gaps of light in the forest understory. For the Humboldt County assessment area, cumulative effects of the No Action alternative that withholds the application of prescribed fire that could create forest gaps, may or may not contribute to fewer observations of this plant in the future. However, maintenance of trails and road should contribute to long-term retention of Kellogg's lily in those areas. Overall, late successional forest conservation activities and natural disturbances within Headwaters should contribute to conservation of Kellogg's lily in Humboldt County, which is the southernmost county in its Oregon/California distribution.

The No Action alternative contributes to long-term conservation of forest habitat in the Humboldt County assessment area that is necessary for heart-leaved twayblade and running clubmoss.

The No Action alternative would likely contribute to the overall conservation of sensitive plants with potential to occur in Headwaters Forest Reserve and the Humboldt County assessment area as a whole (see Appendix B). Appendix B errs on the side of conservative, in that it leans favorably on the potential for habitat to be present, and therefore a potential for a given population to be present. With the level of survey that has occurred throughout this relatively small area in the past 17 years, it is unlikely that any new affirmative potential sensitive species findings would occur. However, if existing conditions are left to persist on a natural successional trajectory, most mesic-site related potential species should persist; however, disturbance dependent species that require canopy gaps for additional light for reproductive population health may decline, if they were present in the first place.

BLM Sensitive non-vascular plants

In the Pacific Northwest forest assessment area, the No Action alternative contributes to the cumulative effect of increased conserved late-successional habitat. The No Action alternative, which has accelerated development of complex, late successional forest habitat structure, contributes to objectives outlined in the Northwest Forest Plan to conserve late successional habitat for Survey and Manage species.

Terrestrial Wildlife/ Special Status Wildlife

The Headwaters Forest Reserve was acquired to provide late successional forest as wildlife habitat for those species that depend upon or prefer that habitat type. Currently Headwaters provides critical habitat for the marbled murrelet. The nearest similar habitat is found approximately 40 miles to the north in Redwood National and State Parks, 12 miles to the southeast in Grizzly Creek State Park and 19 miles to

the south in Humboldt Redwood State Park. Headwaters is surrounded by commercially-owned forest that is managed for mid-mature successional harvest. Under that management strategy, those commercial forests will not be permitted to develop into a late successional forest. The current management of Headwaters meets key objectives in the recovery plans for both the marbled murrelet and the northern spotted owl in providing the late successional forest that these species depend upon or prefer (USDI USFWS 1997, USDI USFWS 2008).

Prescribed fire treatment

As discussed in direct effects, future wildfire occurrence and its impacts in Headwaters are unknown. Generally, repeated low intensity wildfires over a long time frame are beneficial to the forest environment, including wildlife, because it reduces the ground fuel loading that, if not reduced, may increase the chance of a catastrophic high intensity wildfire. Prescribed fire treatments are intended to mimic those low intensity wildfires. The continued lack of prescribed fire in Headwaters will increase the chance of wildfires that causes significant impacts to wildlife and their habitat as well as impacts to adjacent land owners.

Forest thinning treatment

The current management in Headwaters is to accelerate old-growth forest qualities. The lack of additional thinning treatments in these young forest stands will slow that progress and may have a negative cumulative effect on species that depend upon or prefer old-growth forest such as the marbled murrelet, northern spotted owl, and fisher. Eventually, a late successional forest will occur in these treatment areas but potentially at a slower rate of time or with structural characteristics that differ from conditions expected under Alternative B. The management of the commercial timber land that surrounds Headwaters is for a rotation of mid-mature harvesting. By attempting to accelerate the development of old-growth qualities in Headwaters under Alternative B, the BLM will provide a refuge of wildlife habitat that is vastly different than the immediate surrounding area.

Water Quality

Industrial timber harvest outside and upslope of Headwaters has occurred in the past and is expected to continue in the South Fork Elk River watershed. Therefore, the South Fork Elk River will be subject to higher than natural fine sediment levels resulting from roads and other logging-related activities.

Under the No Action alternative, a negligible amount of sediment is expected to be delivered to streams as a result of management actions. Riparian areas within Headwaters would be protected and would continue to serve as sediment traps that buffer fine sediment delivery to streams.

Wetlands and Riparian Resources

Prior to conversion to agriculture and impacts from upslope land use, the valley floors of the Humboldt Bay watershed were rich with freshwater and brackish wetland habitat. There is very little wetland habitat remaining in the Humboldt Bay watershed, most of which is degraded in quality. Past logging activities within the project area likely degraded and filled wetlands, and riparian areas were commonly cleared for timber harvest or road building. However, current management in Headwaters provides special protections for wetlands and riparian corridors. Under the No Action alternative, wetlands would

continue to function in their current state. Riparian resources would benefit from the continued forest restoration efforts, but benefits would be limited by the existing restrictions and number of remaining opportunities.

Alternative B (Proposed Action)

Under Alternative B, the BLM and its partners would implement a wider array of forest restoration treatments than allowed under the existing 2004 Headwaters RMP.

Direct and Indirect Effects

Air Quality

Under the Proposed Action, air quality is unlikely to see much change from current conditions during day-to-day circumstances. Prescribed burning will only be conducted on days approved and permitted by the North Coast Unified Air Quality Management District, when atmospheric conditions are conducive to minimal impacts through prescribed fire activities. Internal combustion engines from equipment operations (thinning, chipping) are not expected to have any measurable effect.

Uncommon wildfire events, however, are likely to be less intense and easier to control due to the decrease of dead-and-down fuels, therefore decreasing the potential for air quality issues from summertime wildfire smoke.

Cultural Resources

There would be no effect to known cultural resources as a result of implementation of the Proposed Action Alternative. All of Headwaters has been surveyed for cultural resources. Before any land-disturbing forest restoration activity takes place, a file search will ensue to be certain known cultural resources are avoided. If warranted, a supplementary examination of the area for cultural resources may take place, and if any are encountered, the project will be modified based on an evaluation by a qualified archaeologist. If any cultural materials or sites are encountered during forest-thinning activities, all work will be stopped until a qualified archaeologist has evaluated the find. The BLM will continue to consult with the appropriate tribal groups to gather information about Traditional Ecological Knowledge and use an ethnoscientific approach whenever possible to sustain local resources.

Fire and Fuels

Under the Proposed Action, the accumulation of hazardous fuels will be mitigated in treatment areas and break up the continuity of high fuel loading across Headwaters. Dead and down and fine materials on the forest floor will decrease, as will the ladder fuels. The risk of high intensity, damaging effects from wildfire will decrease. Potential complete consumption of living trees will lessen. Duff layer depth will be reduced in treatment areas, decreasing the potential for a low-intensity, smoldering fire to kill the largest trees through girdling (damaging the plants vascular system around the trunk's periphery at the ground level).

Forestry and Vegetation

Restoration actions would reduce overall stand densities, stimulate stand growth and development, release dominant trees, improve conditions for development of understory vegetation and canopy, improve stand resilience to stressors such as pathogens and climatic events, and increase the numbers of redwood relative to Douglas-fir. Thinning would also contribute to health of the forest community over the long-term as the retained trees will grow at a faster rate. In addition, restoration actions would enhance the development of understory vegetation because there would be more light reaching the forest floor via creation of canopy openings. This benefit would occur over several decades.

Riparian vegetation would be protected by establishing streamside protection zones, with thinning allowed only in areas where thinning will increase recruitment of pool-forming wood (using Beechie et al. 2000 as a guide). Where feasible, trees identified for thinning would be felled directly into the stream to offset any short-term loss in wood recruitment following thinning. Allowing thinning of young trees in dense riparian forests would accelerate the restoration of aquatic habitat in Headwaters. This would be a long-term benefit to the riparian vegetation that has regrown following clearcutting and loss of riparian zones from past logging practices.

There would be no short-term adverse effects on old-growth forest or residual old-growth trees under the proposed action. Over the long-term, there would be a moderate benefit to old-growth forest community function from thinning adjacent forests through greater buffering of these old-growth stands. The benefit would not be realized for centuries until the thinned forest attains the structure of old-growth forest.

The addition of prescribed fire as a tool under this alternative would reintroduce a natural process to Headwaters that is currently lacking. This would have positive impacts to the forest community by mimicking natural disturbance and reducing the fuels that could lead to a high-intensity wildfire. Scanlon (2007) concluded from the 2003 Canoe Fire in Humboldt Redwoods State Park “prescribed burning should be applied to decrease the fire-free interval, reducing fuel accumulation and potential damage to habitat.”

Variable-density thinning and biomass removal in second growth stands would result in a short-term, carbon storage loss. However, the ensuing acceleration of growth rates and biomass accumulation of larger trees would lead to long-term gain. Further, there would be both a near-term and long-term, decreased risk of wildfire that could threaten long-term, ecological carbon stocks.

Invasive Non-native Species

Under the Proposed Action alternative, additional thinning entries into recovering forest stands would occur. With additional entries, there could be a continued risk of new invasive, non-native plant introductions or inadvertent spread related to forest health disturbance activities. However, all BLM ground-disturbing contracts include equipment inspection and cleaning clauses; for example, any contracted equipment is to be inspected prior to ingress to and egress from public lands and cleaned to remove any invasive plant parts capable of reproduction to reduce the possibility of introduction or spread of existing infestation(s) of invasive weeds). Other relevant clauses may be included such as maintaining shade along road rights-of-way for road maintenance projects to prevent suitable conditions for opportunistic invasive, non-native plants; or using fill from known or inspected, weed-free sources.

Further, on-the-ground BLM staff associated with forest health projects is cross-trained to contribute to invasive, non-native species survey and rapid response. Because Headwaters is regularly visited by staff, there is a very low risk of new invasive, non-native plant introduction and proliferation. The Proposed Action provides for additional staff survey and would contribute to early detection and rapid response in many remote and seldom visited areas.

Lands with Wilderness Characteristics

Under the Proposed Action, lands with wilderness characteristics generally fall outside the areas proposed for thinning. Therefore, lands with wilderness characteristics would be largely unimpacted by the forest restoration program. However, the reintroduction of fire on the landscape through limited prescribed fire could increase the naturalness of these lands, resulting in improvements to wilderness character.

Native American Religious Concerns

The BLM has been consulting with the Table Bluff Wiyot and the Bear River Band of Rohnerville Rancheria tribes. There are no known Native American religious concerns.

Recreation and Visual Resources

The proposed action would allow for additional restoration activities within Headwaters. These proposed thinning treatments fall largely outside of the view shed of existing recreation trails. Where the amendment does allow thinning within the vicinity of these two trails, impacts to visitors and visual resources should be negligible and short in duration because the proposed treatments would be designed to mimic natural processes and natural forest conditions. Trail closures as a result of these treatments are not expected.

Special Status Aquatic Species and Essential Fish Habitat

Ground disturbance during thinning-related felling of trees within riparian zones (within 100 feet of non-fish bearing streams and 150 feet of fish bearing streams) has the potential to negatively affect special status aquatic species and essential fish habitat. Ground disturbance may result in a small and temporary increase in turbidity following the first rain event. However, due to the small footprint of ground disturbance and restrictions that limit operations within these zones, the likelihood of sediment entering the stream network is low and the amount of sediment would be negligible.

Continued thinning within young, dense riparian forests would result in long-term beneficial effects to aquatic species and their habitats by promoting the development of large streamside trees which will ultimately be recruited into the stream channel. Riparian thinning treatments would take into account site-specific conditions (e.g., tree diameter, stream width), and sufficient riparian canopy would be retained so that any increase in stream temperatures would be minor and localized. Where feasible, trees identified for thinning would be felled directly into the stream to offset any short-term loss in wood recruitment following thinning, and would result in improved aquatic habitat conditions.

Ground disturbance resulting from upland thinning and prescribed fire treatments has the potential to negatively affect water quality, and therefore aquatic species and their habitats, particularly where heavy equipment would be used in the removal of biomass or timber. However, these operations will occur

outside of streamside protection zones (within 100 feet of non-fish bearing streams and 150 feet of fish bearing streams), will be limited to existing roads and skid trails, and proposed best management practices (Appendix D) will significantly reduce the magnitude and likelihood of ground disturbance and subsequent sediment runoff. The likelihood of sediment entering the stream network due to these activities is low and the amount of sediment would be negligible.

The proposed streamside protection zones exclude riparian areas from prescribed fire, thereby providing a significant (100-150 foot) buffer between burned areas and streams. Arkle and Pilliod (2010) found that for the three years after a prescribed fire treatment there were no detectable changes in periphyton, macroinvertebrates, amphibians, fish, and riparian and stream habitats compared to data collected over the same time period in four unburned reference streams. This information suggests prescribed fire, as opposed to high severity wildfire, has little to no negative effects on aquatic species and their habitats.

Special Status Plants

BLM Sensitive vascular plants

Under the Proposed Action alternative, known BLM Sensitive vascular plants are expected to continue to receive little to no disturbance. Both Kellogg's lily and heart-leaved twayblade bloom throughout spring and summer. Seed development is complete before a late summer or fall natural or prescribed fire would burn in the shady, mature forests of Headwaters. A low intensity fall fire would not likely negatively impact these bulbing (Kellogg's lily) and rhizomatous (heart-leaved twayblade), fire-adapted, perennial plants. According to Vogel et al. (2011) clubmosses, in general, are fire resistant plants. Lycopodium contains gymnospermous (conifer)-type lignin and lignin pre-cursor compounds that may offer resistance to fire. Lycopodium also has adaptive mechanisms such as increased germination rate of spores following a low intensity fire, and also in dark conditions, such as might occur under a layer of ash, for example. Plants that release spores generally do so in damp weather, such that a seasonally-timed, low intensity fire (if the site fell within a proposed prescribed burn area) might serve to benefit reproduction of running pine.

Under the proposed action, and with conservation measures described in Appendix B, either no effects, or short-term minor or beneficial effects are anticipated to occur to special status plants with potential to occur in Headwaters. Potential plants that would receive no effects either do not have suitable habitat in second or old-growth forest areas within Headwaters, or they would be protected from disturbance activities entirely with site conditions maintained. Many of these plants are known to benefit from disturbance to their habitat, and/or whose habitat would experience the disturbance while the perennial plant was in dormancy, or after the plant had completed its annual life cycle. See Appendix B for species-specific information.

BLM Sensitive non-vascular plants

Under the Proposed Action alternative, BLM Sensitive non-vascular plants are expected to continue to receive little to no disturbance. Most known sites for these species occur in unharvested, mature forest not subject to additional thinning entries under the proposed action. The purpose of the inclusion of prescribed fire in the proposed action is to mimic natural fire during a season, frequency and intensity to which these ecosystems are adapted. BLM Sensitive non-vascular species persist underground (fungi) and

high on large branches of trees (lichens); and are not expected to be impacted by the incorporation of a natural disturbance.

Terrestrial Wildlife/ Special Status Wildlife

A table of special status fish and wildlife whose ranges overlap with the project area is provided in Appendix A. The species include all range-overlapping fish and wildlife species listed by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (FESA), listed by the California Department of Fish and Wildlife (CDFW) under the California Endangered Species Act (CESA), the BLM sensitive species (BLM-S), and CDFW Species of Special Concern (CDFW-SSC), and Fully Protected (CDFW-FP). This table also provides a summary of mitigation measures proposed to avoid significant impacts to these species. Information regarding potential impacts and proposed mitigation measures is more extensively described below.

Prescribed fire treatment

Direct effects

If prescribed fire is used in Headwaters, it will have a negative, but not significant, direct effect on some wildlife from both flames and smoke. The fire intensity is intended to be low and remain in ground fuel.

Generally the greatest negative effects will be on slow moving, small bodied wildlife such as invertebrates, reptiles, amphibians and small or some medium sized mammals in the form of disturbance, temporary or permanent displacement, or death. Generally flying, fast moving, and/or large bodied wildlife such as birds and medium to large bodied mammals will be able to escape the flames or smoke and suffer fewer of the same negative effects.

Amphibians and reptiles, including those species identified within Appendix A, may be unable to avoid fire or smoke. However, impacts are expected to be minimal due to the limited acreages to be burned (not to exceed 100 acres/year), proposed mitigation measures that exclude prescribed fire from riparian zones (100 feet for non-fish bearing streams and 150 feet for fish-bearing streams), and due to the fact that these species have relatively high reproductive rates and, therefore, populations that will quickly recover.

Arboreal mammals, including the Sonoma tree vole from Appendix A, may also be unable to avoid impacts from prescribed fire, particularly smoke as it dissipates through the forest. However, impacts are expected to be less than significant because fire intensity is intended to be low, of a short duration, and to remain in ground fuel. In addition, prior to treatment each burn unit will be inspected for signs of the Sonoma tree vole. Any identified nest sites will be protected from fire by a minimum buffer of 30 feet on all sides by excluding these features from the burn unit or by establishing a protective fire line around the nest site.

The white-footed vole, which is highly associated with riparian forests, would be protected by proposed mitigation measures that exclude prescribed fire from riparian zones (100 feet for non-fish bearing streams and 150 feet for fish-bearing streams).

Birds and medium sized to large mammals, including fisher, Humboldt marten, and ringtail, would largely be able to avoid direct impacts of a prescribed fire treatment by temporarily departing from the

area. In addition, burning would be implemented in the autumn and winter months when birds are not nesting and young terrestrial wildlife have gained enough mobility to avoid negative impacts. Migratory birds will be preparing to leave or will have departed the area during potential treatment times. Marbled murrelets will not be present in the forest environment when prescribed fire would be used (September 15 to February 1).

Bats, including those identified in Appendix A, if roosting in the area, will be affected by smoke but the smoke is expected to dissipate quickly due to the low intensity and short duration of fire treatments.

The BLM will continue with annual monitoring of the northern spotted owl. The BLM will not burn within 100 feet of any known spotted owl nest tree.

As a protective measure for all special status species each burn unit will be inspected by a wildlife biologist prior to implementation for special habitat features (e.g. snags, trees with complex structure, cavities, roosting or nesting platforms, nests) that could be used by these species. Special habitat features will be excluded from the burn unit or fuels will be removed from around the feature prior to burning. As a result, impacts are expected to be less than significant for these species.

Indirect effects

There will be some negative indirect effects such as the burning of unoccupied nesting, denning or cover structure which may lead to temporary displacement of some animals. Burning will also have beneficial indirect effects such as releasing of nutrients in the combustion process, which will stimulate new vegetative growth that may be utilized for forage by many herbivores. If prescribed fire is implemented and successful the reduction in the constant accumulation of fuel loading on the forest floor will benefit many wildlife species, especially late-seral dependent species, by reducing the chances of catastrophic wildfire or the spread of catastrophic wildfire. Prescribed fire will help protect the long-term investment and work that has been done to preserve the old-growth wildlife habitat and accelerate the development of young forest towards late successional habitat.

Forest thinning treatment

The 2004 Headwaters RMP addresses the effects of thinning on wildlife in Headwaters. Generally those effects apply for this assessment although with additional and larger trees being removed. Please refer to the Headwaters RMP and Appendix A to complement any effects on specific species.

The additional thinning treatments proposed by this amendment will negatively, but not significantly, affect some of the wildlife occupying or utilizing these areas. The additional thinning will disturb, temporarily or permanently displace, and possibly kill some of the current occupants. The greatest negative effects will be upon small wildlife that can't escape the disturbance, but generally those species have relatively high reproductive rates and their populations are expected to quickly recover. Other species that are temporarily displaced will return, while those species that find the habitat changes unsuitable will be permanently displaced. The wildlife species composition will change with these additional thinning treatments as some wildlife species will be attracted to the treatment areas and others not, as would happen if natural succession were to occur. Populations of common terrestrial wildlife species, found in Appendix C, that occupy these thinning areas will not suffer significant impacts.

Amphibians and reptiles, including those species identified within Appendix A, may be unable to avoid thinning treatments. However, impacts are expected to be minimal due to proposed mitigation measures that minimize thinning impacts within riparian zones (100 feet for non-fish bearing streams and 150 feet for fish-bearing streams) and due to the fact that these species have relatively high reproductive rates and, therefore, populations that will quickly recover.

Arboreal mammals, including the Sonoma tree vole from Appendix A, may also be unable to avoid impacts from thinning. Any potential nest trees with signs of recent occupation by arboreal mammals identified during a pre-project inspection will be protected with a minimum no-cut buffer of 30 feet on all sides.

The white-footed vole, which is highly associated with riparian forests, would be protected by proposed mitigation measures that minimize thinning impacts within riparian zones (100 feet for non-fish bearing streams and 150 feet for fish-bearing streams).

Birds (including all bird species identified in Appendix A) and medium sized to large mammals, including fisher, Humboldt marten, and ringtail, would largely be able to avoid direct impacts of thinning by temporarily departing from the area. In addition, thinning would be implemented in the autumn and winter months when birds are not nesting and young terrestrial wildlife have gained enough mobility to avoid negative impacts. Migratory birds will be preparing to leave or will have departed the area during potential treatment times and marbled murrelets will not be present in the forest environment. The second-growth forest areas identified for thinning do not include suitable nesting or roosting habitat for the northern goshawk, golden eagle, bald eagle, marbled murrelet, and purple martin. The northern spotted owl and Vaux's swift could utilize remnant old-growth trees within thinning units, however, these trees will be retained (see Appendix D for more detail on thinning operations).

Impacts to bats, including those bat species identified in Appendix A, will be less than significant as the thinning treatment areas are generally not suitable roosting habitat and because thinning may only occur outside the breeding season of these species.

The BLM will continue with annual monitoring of the northern spotted owl. Any residual mature trees within the thinning units will be retained to ensure that spotted owl habitat is neither removed nor degraded. See Appendix D for more detail on thinning operations

As a protective measure for all special status species, each thinning unit will be inspected by a wildlife biologist prior to implementation for special habitat features (e.g. snags, trees with complex structure, cavities, roosting or nesting platforms, nests) that could be used by these species. Special habitat features will be excluded from the thinning unit or marked for retention. As a result, impacts are expected to be less than significant for these species.

Water Quality

The proposed action would promote old-growth forest characteristics that would slowly restore sediment transport and the hydrology of watersheds to a near natural state. Interception and storage of precipitation would continue to improve, resulting in slowed runoff, improved water clarity, and cooler water delivered to streams during the warm summer months. All of these changes would increase the quality of aquatic habitat.

Ground disturbance resulting from upland thinning and prescribed fire treatments has the potential to negatively affect water quality, particularly where heavy equipment would be used in the removal of biomass or timber. However, these operations will occur outside of streamside protection zones (within 100 feet of non-fish bearing streams and 150 feet of fish bearing streams), will be limited to existing roads and skid trails, and proposed best management practices (Appendix D) will significantly reduce the magnitude and likelihood of ground disturbance and subsequent sediment runoff. The likelihood of sediment entering the stream network due to these activities is low and the amount of sediment would be negligible.

The proposed streamside protection zones exclude riparian areas from prescribed fire, thereby providing a significant (minimum 100-150 ft) buffer between burned areas and streams. Arkle and Pilliod (2010) found that for the three years after a prescribed fire treatment there were no detectable changes in water quality compared to data collected over the same time period in four unburned reference streams. This information suggests prescribed fire, as opposed to high severity wildfire, has little to no negative effects on water quality.

Wetlands and Riparian Resources

The proposed action would continue to provide the same protective measures for wetlands (i.e., no disturbance within buffer area). Riparian resources would benefit from thinning in selected riparian areas, as thinning would promote development of large trees that would ultimately provide instream shade and recruit to the stream as large woody debris.

Cumulative Effects

Air Quality

The fuel reduction treatments in the proposed action will likely increase the capability to control wildfires, lessening the potential smoke and particulate matter impacts on air quality locally and across northern California airsheds during busy fire seasons. Internal combustion engines from equipment operations (thinning, chipping) are not expected to have any measurable effect over time.

Cultural Resources

There will be no cumulative effects to cultural resources since Headwaters has been subjected to a 100% cultural resource survey. This survey resulted in the documentation of eight sites and the site information will be used to ensure avoidance of cultural resources during the implementation of forest restoration treatments. Additional cultural resource work has been conducted prior to some development work in the past in Headwaters, and will continue to be conducted when a development project warrants such work. BLM will continue to consult with the appropriate tribal groups and seek information about Traditional Ecological Knowledge to avoid cumulative effects to these local resources.

Fire and Fuels

Although single wildfire events are difficult to predict temporally, the potential for wildfires in the Headwaters is present every year. Reduction in ground fuel and duff depth, ladder fuel height and continuity, and promoting larger canopy growth will make most wildfires easier to control in Headwaters.

Fuel reduction will likely decrease potential fire behavior and allow for more strategic, tactical, and firefighter safety mitigation options. This will likely shorten the commitment time of limited firefighting resources, such as aircraft, crews, or equipment, and produce a beneficial effect on local, state, and national fire suppression capabilities, particularly during busy fire seasons.

Forestry and Vegetation

The Proposed Action would increase the amount of old-growth and mature forest in the region and would accelerate the rate of restoration of old-growth and mature forest in the region. This would have a positive cumulative effect on forestry and vegetation resources (i.e., old-growth forest).

Since the mid-1800s, approximately 95% of old-growth redwood forest across its entire range has been harvested one or more times. This has resulted in a patchwork of old-growth stands within a matrix of second-growth forest. Within the northern region of redwood forests, the majority of old-growth forest exists within National and State Parks. Headwaters is surrounded by industrial timberlands managed by Green Diamond Resource Company and Humboldt Redwood Company, and is situated between Humboldt Redwoods State Park to the south and Redwood National and State Parks to the north. The importance of Headwaters in this regional context highlights the need to increase the amount of old-growth forest within Headwaters as rapidly as possible given how little old-growth forest remains.

The proposed action would set the second-growth in Headwaters on a rapid trajectory towards the kind of old-growth forest that we see within Headwaters itself (Berrill et al. 2013). This would increase the amount of high quality old-growth habitat in the region, making Headwaters an even more important refuge within a sea of logged lands.

Invasive Non-native Species

Same as cumulative effects of the No Action alternative.

Lands with Wilderness Characteristics

No cumulative impacts are expected to wilderness characteristics.

Native American Religious Concerns

The BLM has been consulting with the Table Bluff Wiyot and the Bear River Band of Rohnerville Rancheria tribes. There are no known Native American religious concerns.

Recreation and Visual Resources

The Headwaters restoration program has had a positive impact on visual resources by improving the "naturalness" of second-growth forests in Headwaters. Efforts to expand this program should have a positive long-term impact to visual resources.

Special Status Aquatic Species and Essential Fish Habitat

Industrial timber harvest outside and upslope of Headwaters has occurred in the past and is expected to continue in the South Fork Elk River watershed. Therefore, aquatic species and their habitat in South

Fork Elk River will be subject to higher than natural fine sediment levels resulting from roads and other logging-related activities. Under the proposed action, a negligible amount of sediment is expected to be delivered to streams as a result of management actions, and riparian buffer areas within Headwaters would continue to be protected. The proposed action would contribute to the long-term recovery of special status aquatic species and EFH.

Special Status Plants

BLM Sensitive vascular plants

Kellogg's lily benefits from forest disturbances that create gaps of light in the forest understory. Cumulative effects of the Proposed Action alternative in the Humboldt County assessment area may or may not contribute to additional observations of this plant in the future. The application of prescribed fire may create forest gaps in locations adjacent to existing populations that could lead to increases in plant numbers and locations. Overall, late successional forest conservation activities in Headwaters should contribute to conservation of Kellogg's lily in Humboldt County, which is the southernmost county in its Oregon/California distribution.

The Proposed Action alternative contributes to long-term conservation of forest habitat in the Humboldt County assessment area that is necessary for heart-leaved twayblade and running clubmoss.

The Proposed Action alternative would likely contribute to the overall conservation of sensitive plants with potential to occur in Headwaters Forest Reserve, and the Humboldt County assessment area as a whole (see Appendix B). Appendix B errs on the side of conservative, in that it leans favorably on the potential for habitat to be present, and therefore a potential for a given population to be present. With the level of survey that has occurred throughout this relatively small area in the past 17 years, it is unlikely that any new affirmative potential sensitive species findings would occur. However, with additional pre-project related, focused surveys, coupled with any potential affirmative finds and custom conservation measures incorporated into the project implementation approach, there would be an increased likelihood of successful short-term persistence and long-term conservation whether lack of disturbance and retention of shady, mesic conditions is the preferred conservation measure, or increased light exposure is the preferred conservation measure.

BLM Sensitive non-vascular plants

In the Pacific Northwest forest assessment area, the Proposed Action alternative contributes to the cumulative effect of increased conserved late successional habitat. The Proposed Action alternative, which would accelerate development of complex, late successional forest habitat structure, contributes to objectives outlined in the Northwest Forest Plan to conserve late successional habitat for Survey and Manage species.

Terrestrial Wildlife/ Special Status Wildlife

The proposed prescribed fire and increased thinning treatments will have beneficial cumulative effects for those wildlife species that prefer or depend upon old-growth habitat.

Prescribed fire treatment

Prescribed fire treatments are intended to mimic low intensity wildfires that reduce accumulated ground fuel loading in the forest. These treatments, if implemented and successful, will reduce the chance of a catastrophic wildfire that would destroy both threatened wildlife that inhabit Headwaters and their habitat on which they depend. Any destruction of old-growth habitat by a catastrophic wildfire would slow the recovery of both the marbled murrelet and northern spotted owl populations.

Forest thinning treatment

The purpose of additional thinning treatments is to accelerate the development of old-growth forest habitat primarily for marbled murrelet nesting. Accelerating the development of old-growth forest in Headwaters, in an area that is dominated by younger commercial forest, will provide critical habitat for those species that depend upon or prefer that habitat and advance the recovery goals for the marbled murrelet and northern spotted owl.

Water Quality

Industrial timber harvest outside and upslope of Headwaters has occurred in the past and is expected to continue in the South Fork Elk River watershed. Therefore, the South Fork Elk River will be subject to higher than natural fine sediment levels resulting from roads and other logging-related activities.

Under the proposed action, a negligible amount of sediment is expected to be delivered to streams as a result of management actions. Riparian areas within Headwaters would be protected and would continue to serve as sediment traps that buffer fine sediment delivery to streams. The proposed action would contribute to long-term improvement of water quality.

Wetlands and Riparian Resources

Past timber harvest activities likely degraded and filled wetlands and certainly negatively affected riparian areas. Under the proposed action, wetlands would continue to function in their current state and would benefit from ongoing protective measures. Riparian resources would benefit from continued forest restoration efforts, with healthier forest stands being the primary objective. The proposed action would contribute to long-term improvement of wetlands and riparian resources.

Chapter 5. Consultation and Coordination

The BLM is currently engaged in informal consultation with the U.S. Fish and Wildlife Service (USFWS) to update the Biological Assessment from the original RMP. A revised Biological Opinion will be provided by the USFWS.

The BLM initiated government-to-government consultation with the Wiyot Tribe, Bear River Band of Rohnerville Rancheria, and the Blue Lake Rancheria Tribe in April, 2016. The BLM continues to consult with these Tribal governments on this project.

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Appendix A. Special-Status Fish and Wildlife Species with Range Overlap within 0.25 miles of Headwaters

Table A1. Special-status fish and wildlife species with range overlap within 0.25 miles of Headwaters. Confirmed species occurring in Headwaters are highlighted in green.

Element Type	Scientific Name	Common Name	Federal Status	State Status	BLM Status	CDFW Status	Occurrence in Project Area	Summary of Measures to Avoid Significant Impacts (Proposed Action)
Invertebrate	*Helminthoglypta hertlieni*	Oregon shoulderband snail	None	None	BLMS	None	Outside of known range, minimal suitable habitat, presence not detected	Presence unlikely
Amphibians	*Ascaphus truei*	Pacific tailed frog	None	None	None	SSC	Confirmed present	100ft streamside protection zones for non-fish bearing streams for prescribed fire and thinning treatments; 150ft streamside protection zones for fish bearing streams for prescribed fire and thinning treatments*
Amphibians	*Rana aurora*	Northern red-legged frog	None	None	None	SSC	Confirmed present	Same measures described above for Pacific tailed frog to protect larvae, juvenile and some adults
Amphibians	*Rana boylii*	Foothill yellow-legged frog	None	None	BLMS	SSC	Confirmed present	Same measures described above for Pacific tailed frog
Amphibians	*Rhyacotriton variegatus*	Southern torrent salamander	None	None	None	SSC	Confirmed present	Same measures described above for Pacific tailed frog

Element Type	Scientific Name	Common Name	Federal Status	State Status	BLM Status	CDFW Status	Occurrence in Project Area	Summary of Measures to Avoid Significant Impacts (Proposed Action)
Reptiles	*Emys marmorata*	Western pond turtle	None	None	None	SSC	Suitable habitat, presence not detected	Same measures described above for Pacific tailed frog
Birds	*Accipiter gentilis*	Northern goshawk	None	None	BLMS	SSC	Suitable habitat, presence not detected	Preferred habitat will not have thinning treatments; Prescribed fire and thinning treatments may only occur from September 15 to February 1; Pre-treatment inspections for special habitat features prior to treatment**
Birds	*Aquila chrysaetos*	Golden eagle	None	None	BLMS	FP	Suitable habitat, presence not detected	Preferred habitat will not have thinning treatments; Prescribed fire and thinning treatments may only occur from September 15 to February 1; Pre-treatment inspections for special habitat features prior to treatment**
Birds	*Circus cyaneus*	Northern harrier	None	None	None	SSC	Habitat not preferred, presence not detected	Prescribed fire and thinning treatments may only occur from September 15 to February 1;
Birds	*Elanus leucurus*	White-tailed kite	None	None	BLMS	FP	Habitat not preferred, presence not detected	Prescribed fire and thinning treatments may only occur from September 15 to February 1; Pre-treatment inspections for special habitat features prior to treatment**

Element Type	Scientific Name	Common Name	Federal Status	State Status	BLM Status	CDFW Status	Occurrence in Project Area	Summary of Measures to Avoid Significant Impacts (Proposed Action)
Birds	*Haliaeetus leucocephalus*	Bald eagle	Delisted	Endangered	BLMS	FP	Suitable habitat, presence not detected	Preferred habitat will not have thinning treatments; Prescribed fire and thinning treatments may only occur from September 15 to February 1; Pre-treatment inspections for special habitat features prior to treatment**
Birds	*Falco peregrinus anatum*	American peregrine falcon	Delisted	Delisted	None	FP	Habitat not preferred, presence not detected	Prescribed fire and thinning treatments may only occur from September 15 to February 1
Birds	*Brachyramphus marmoratus*	Marbled murrelet	Threatened	Endangered	None	None	Suitable nesting habitat, Confirmed presence	Nesting habitat will not have thinning treatments; Prescribed fire and thinning treatments may only occur from September 15 to February 1; Continue biennial monitoring
Birds	*Coccyzus americanus occidentalis*	Western yellow-billed cuckoo	Threatened	Endangered	BLMS	None	Suitable habitat, presence not detected	Prescribed fire and thinning treatments may only occur from September 15 to February 1;
Birds	*Asio otus*	Long-eared owl	None	None	None	SSC	Suitable habitat, presence not detected	Prescribed fire and thinning treatments may only occur from September 15 to February 1;

Element Type	Scientific Name	Common Name	Federal Status	State Status	BLM Status	CDFW Status	Occurrence in Project Area	Summary of Measures to Avoid Significant Impacts (Proposed Action)
Birds	*Strix occidentalis caurina*	Northern spotted owl	Threatened	Candidate threatened	None	SSC	Suitable habitat, Confirmed presence	Thinning will occur outside of preferred nesting and roosting habitat; Prescribed fire and thinning treatments may only occur from September 15 to February 1; Continue annual monitoring; Prescribed fire may not occur within 100 feet of any known nest; Pre-treatment inspections for special habitat features prior to treatment**;
Birds	*Chaetura vauxi*	Vaux's swift	None	None	None	SSC	Suitable habitat, Confirmed presence	Prescribed fire and thinning treatments may only occur from September 15 to February 1; Pre-treatment inspections for special habitat features prior to treatment**
Birds	*Contopus cooperi*	Olive-sided flycatcher	None	None	None	SSC	Suitable habitat, Confirmed presence	Prescribed fire and thinning treatments may only occur from September 15 to February 1;
Birds	*Empidonax traillii*	Willow flycatcher	None	Endangered	None	None	Habitat not preferred, presence not detected	Prescribed fire and thinning treatments may only occur from September 15 to February 1;
Birds	*Progne subis*	Purple martin	None	None	None	SSC	Suitable habitat, presence not detected	Nesting habitat will not have thinning treatments; Prescribed fire and thinning treatments may only occur from September 15 to February 1; Pre-treatment inspections for special habitat features prior to treatment**

Element Type	Scientific Name	Common Name	Federal Status	State Status	BLM Status	CDFW Status	Occurrence in Project Area	Summary of Measures to Avoid Significant Impacts (Proposed Action)
Birds	*Riparia riparia*	Bank swallow	None	Threatened	BLMS	None	Habitat not preferred, presence not detected	Prescribed fire and thinning treatments may only occur from September 15 to February 1
Birds	*Icteria virens*	Yellow-breasted chat	None	None	None	SSC	Suitable habitat, presence not detected	Prescribed fire and thinning treatments may only occur from September 15 to February 1
Birds	*Setophaga petechia*	Yellow warbler	None	None	None	SSC	Suitable habitat, presence not detected	Prescribed fire and thinning treatments may only occur from September 15 to February 1
Birds	*Ammodramus savannarum*	Grasshopper sparrow	None	None	None	SSC	Habitat not preferred, presence not detected	Prescribed fire and thinning treatments may only occur from September 15 to February 1
Birds	*Agelaius tricolor*	Tricolored blackbird	None	None	BLMS	SSC	Habitat not preferred, presence not detected	Prescribed fire and thinning treatments may only occur from September 15 to February 1
Fish	*Entosphenus tridentatus*	Pacific lamprey	None	None	BLMS	SSC	Confirmed present	100ft streamside protection zones for non-fish bearing streams for prescribed fire and thinning treatments; 150ft streamside protection zones for fish bearing streams for prescribed fire and thinning treatments*; Appendix D describes additional mitigation measures applicable to special status fish species

Element Type	Scientific Name	Common Name	Federal Status	State Status	BLM Status	CDFW Status	Occurrence in Project Area	Summary of Measures to Avoid Significant Impacts (Proposed Action)
Fish	*Oncorhynchus clarkia clarkii*	Coast cutthroat trout	None	None	None	SSC	Confirmed present	Same measures described above for Pacific lamprey
Fish	*Omcorhynchus kisutch*	Coho salmon – southern Oregon / northern California ESU	Threatened	Threatened	None	None	Confirmed present	Same measures described above for Pacific lamprey
Fish	*Oncorhynchus mykiss irideus*	Steelhead – northern California DPS	Threatened	None	None	None	Confirmed present	Same measures described above for Pacific lamprey
Fish	*Oncorhynchus tshawytscha*	Chinook salmon – California coastal ESU	Threatened	None	None	None	Confirmed present	Same measures described above for Pacific lamprey
Fish	*Spirinchus thaleichthys*	Longfin smelt	Candidate	Threatened	None	SSC	Presence unknown – may occur	Same measures described above for Pacific lamprey
Mammals	*Arborimus albipes*	White-footed vole	None	None	None	SSC	Suitable habitat, presence not detected	100ft streamside protection zones for non-fish bearing streams for prescribed fire and thinning treatments; 150ft streamside protection zones for fish bearing streams for prescribed fire and thinning treatments*
Mammals	*Arborimus pomo*	Sonoma tree vole	None	None	None	SSC	Suitable habitat, Confirmed presence	Prescribed fire and thinning treatments may only occur from September 15 to February 1; Pre-treatment inspections for nests prior to treatment; Any potential nest sites with signs of recent occupation will be

Element Type	Scientific Name	Common Name	Federal Status	State Status	BLM Status	CDFW Status	Occurrence in Project Area	Summary of Measures to Avoid Significant Impacts (Proposed Action)
								protected with a minimum no-cut buffer of 30 feet on all sides
Mammals	*Antrozous pallidus*	Pallid bat	None	None	BLMS	SSC	Suitable habitat, presence not detected	Roosting habitat will not have thinning treatments; Prescribed fire and thinning treatments may only occur from September 15 to February 1; Pre-treatment inspections for special habitat features prior to treatment**
Mammals	*Corynorhinus townsendii*	Townsend's big-eared bat	None	Candidate Threatened	BLMS	SSC	Suitable habitat, presence not detected	Same measures described above for Pallid bat
Mammals	*Myotis thysanodes*	Fringed myotis	None	None	BLMS	None	Suitable habitat, presence not detected	Same measures described above for Pallid bat
Mammals	*Myotis yumanensis*	Yuma myotis	None	None	BLMS	None	Suitable habitat, Confirmed presence	Same measures described above for Pallid bat
Mammals	*Pekania pennanti*	Fisher – West Coast DPS	None	None	BLMS	SSC	Suitable habitat, Confirmed presence	Prescribed fire and thinning treatments may only occur from September 15 to February 1; Pre-treatment inspections for special habitat features prior to treatment**

Element Type	Scientific Name	Common Name	Federal Status	State Status	BLM Status	CDFW Status	Occurrence in Project Area	Summary of Measures to Avoid Significant Impacts (Proposed Action)
Mammals	*Martes caurina humboldtensis*	Humboldt marten	None	Candidate Endangered	None	SSC	Suitable habitat, presence not detected	Same measures described above for fisher
Mammals	*Brassariscus astutus*	Ringtail	None	None	None	FP	Suitable habitat, presence not detected	Same measures described above for fisher

* Within streamside protection zones, all work would be accomplished by hand crews, no ground based equipment would be used, and no tree yarding would occur. All cut trees would be lopped and scattered on site or felled into the stream. Prescribed fire would not be allowed.

** Each thinning or prescribed fire unit will be inspected by a wildlife biologist prior to implementation for special habitat features that could be used by any special status wildlife species (e.g. snags, trees with complex structure, cavities, roosting or nesting platforms, nests). For thinning treatments, these habitat features will be marked for retention or excluded from the thinning unit. For prescribed fire treatments, these habitat features will be excluded from the burn unit or fuels will be removed from around the habitat structure prior to burning.

Appendix B. List of Special-Status Plants That Have Potential to Occur in Headwaters Forest Reserve

This section describes special-status vascular plants that occur or may occur in Headwaters Forest Reserve.

Vascular Plants

Special-status plants are plants that are legally protected under ESA, CESA, or other regulations and species that are considered sufficiently rare by the scientific community to qualify for such listing. Special-status plants are species in any of the following categories:

- Plants listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.12 [listed plants] and various notices in the Federal Register [proposed species]);
- Candidates for possible future listing as threatened or endangered under ESA (61 FR 40: 7596-7613, February 28, 1996);
- Listed or proposed for listing by the state as threatened or endangered under CESA (14 CCR 670.5);
- Rare or endangered under the California Native Plant Protection Act (California Fish and Game Code, Section 1900 et seq.);
- Those that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines, Section 15380);
- Considered by the California Native Plant Society (CNPS) to be "rare, threatened, or endangered in California" (lists 1B and 2 described in Skinner and Pavlik 1994);
- Listed by CNPS as species about which more information is needed to determine their status; plants of limited distribution (lists 3 and 4 described in Skinner and Pavlik 1994), which may be included as special-status species on the basis of local significance or recent biological information;
- Designated as Bureau sensitive by BLM. Bureau Sensitive plants are those plant species that are not federally Endangered, Threatened, or Proposed, but are designated by the BLM State Director for special management consideration. In California this includes all plants on BLM lands that are Federal Candidates for listing, all plants that are listed as Endangered, Threatened, or Rare by the State of California, all plants that have a Rare Plant Rank of 1B (plants are native California species, subspecies or varieties that are rare, threatened, or endangered in California and elsewhere) in the most current online version of the California Department of Fish and Wildlife list of Special Vascular Plants, Bryophytes, and Lichens (unless the State Director has determined, on a case-by-case basis, that a particular List 1B plant does not require Sensitive status), and any other plants the State Director has determined to warrant Sensitive status.

A list of special-status plants with potential to occur in Headwaters was developed through a search of the latest versions of the California Natural Diversity Data Base, Rarefind 5 (CNDDB 2016 and 2016a) (using quads: Fields Landing, McWhinney Creek and Hydesville), the CNPS Electronic Inventory (8th edition, 2016), and descriptions of the vegetation types of the project area (Jimerson and Jones, 2000).

Any new locations of potential or known federal, California, CNPS, or BLM Sensitive special status species would be submitted to the CNDDB database in accordance with the special status plant policies described in the BLM California Special Status Plants Handbook, H-6840-1.

These lists were aggregated and species with no possible suitable habitat in Headwaters were removed. Special-status plants that may occur in Headwaters, their listing status, known geographic distribution, ecological information, potential or confirmed occurrence in Headwaters, and measures included to avoid significant impacts are summarized below in Table B1.

Table B1. A list of special-status plants with potential to occur in Headwaters Forest Reserve. Confirmed species occurring in Headwaters are highlighted in green.

Scientific Name	Common Name	CNPS Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation Range (m)	Geographic Distribution	Ecological Information	Occurrence in Headwaters	Summary of Measures Proposed to Avoid Significant Impacts (Proposed Action)
Bensoniella oregona	bensoniella	1B.1	S2	G3	CR	--	915-1400	CA (HUM Co.), OR	Perennial herb, inhabits mesic sites. Blooms May-July	No confirmed observations, suitable habitat present.	Presence unlikely. Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.
Cardamine angulata	seaside bittercress	2B.1	S1	G5	--	--	915-65	CA (DNT, HUM, MRN, SIS Co.), AK, OR, WA	Perennial herb, wet areas or stream sides. Blooms Jan - July.	No confirmed observations, suitable habitat present.	Presence unlikely. Survey shaded, mesic areas in proposed treatment units. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.
Carex arcta	northern clustered sedge	2B.2	S1	G5	--	--	60-1400	CA (DNT, HUM, MEN, MPA, TUL), northern USA.	Perennial herb, generally bogs, fens and mesic forest. Blooms June - Sept.	No confirmed observations, suitable habitat present.	Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.

Scientific Name	Common Name	CNPS Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation Range (m)	Geographic Distribution	Ecological Information	Occurrence in Headwaters	Summary of Measures Proposed to Avoid Significant Impacts (Proposed Action)
Carex leptalea	bristle-stalked sedge	2B.2	S1	G5	--	--	0-700	CA (HUM, DNT, MRN, TRI Co.), many other states.	Perennial rhizomatous herb living in seeps, springs, bogs, fens, marshes.	No confirmed observations, suitable habitat present.	Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.
Carex lyngbyei	Lyngbye's sedge	2B.2	S3	G5	--	--	0-10	CA (North Coast counties), OR, WA,	Perennial rhizomatous herb, brackish or freshwater marshes. Blooms Apr - Aug.	No confirmed observations, suitable habitat present. Confirmed observations in nearby quads.	Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.
Carex praticola	northern meadow sedge	2B.2	S2	G5	--	--	0-3200	CA (Sierra and NW counties), western USA.	Perennial rhizomatous herb, meadows and seeps, blooms May - July.	No confirmed observations, suitable habitat present.	Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.

Scientific Name	Common Name	CNPS Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation Range (m)	Geographic Distribution	Ecological Information	Occurrence in Headwaters	Summary of Measures Proposed to Avoid Significant Impacts (Proposed Action)
Chrysosplenium glechomifolium	Pacific golden saxifrage	4.3	S3	G5	--	--	10-220	CA (HUM, DNT, MEN Co.), OR, WA.	Perennial herb, inhabits streambanks, also seeps and roadsides. Always shaded areas. Blooms Feb - June.	No confirmed observations, suitable habitat present.	Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.
Coptis laciniata	Oregon goldthread	4.2	S3	G4	--	--	0-1000	CA (DNT, HUM, MEN), OR, WA.	Perennial rhizomatous herb, wet sites in conifer forest, also seeps and streambanks. Blooms Feb - Nov.	No confirmed observations, abundant suitable habitat.	Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.
Cypripedium californicum	California lady's-slipper	4.2	S4	G4	--	--	30-2750	Northern CA, OR.	Perennial rhizomatous herb, seeps and streambanks in lower elevation conifer forest, often serpentine sites. Blooms Apr - July.	No confirmed observations, possibly suitable habitat.	Presence unlikely. Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.

Scientific Name	Common Name	CNPS Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation Range (m)	Geographic Distribution	Ecological Information	Occurrence in Headwaters	Summary of Measures Proposed to Avoid Significant Impacts (Proposed Action)
Cypripedium fasciculatum	clustered lady's-slipper	4.2	S4	G4	--	--	100-2435	North coast and northern Sierra Nevada counties (CA), western states.	Perennial rhizomatous herb, mesic and shady coniferous forest, generally serpentine. Notably small population sizes. Blooms Mar - Aug.	No confirmed observations, possibly suitable habitat.	Presence unlikely. Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.
Cypripedium montanum	mountain lady's-slipper	4.2	S4	G4	--	--	185-2225	North coast and Northern Sierra Nevada counties (CA), MT, WY.	Perennial rhizomatous herb, upland conifer and broadleaf forests, dry or moist sites. Blooms Mar - Aug.	No confirmed observations, possibly suitable habitat.	Presence unlikely. Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.
Epilobium oreganum	Oregon fireweed	1B.2	S2	G2	--	--	500-2240	Klamath and North Coast CA to Southern OR.	Perennial herb, inhabits bogs and small streams, Blooms July - Aug.	No confirmed observations, likely very little suitable habitat in Headwaters.	Presence unlikely. Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.

Scientific Name	Common Name	CNPS Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation Range (m)	Geographic Distribution	Ecological Information	Occurrence in Headwaters	Summary of Measures Proposed to Avoid Significant Impacts (Proposed Action)
Erythronium revolutum	coast fawn lily	2B.2	S3	G4G5	--	--	0-1600	NW CA to So BC	Bulbiferous perennial herb, inhabits wet places in woodlands. Blooms Mar - July.	No confirmed observations, possibly suitable habitat.	Survey proposed treatment units. Allow low intensity burning over site during dormancy. Avoid direct ground disturbance from thinning activities.
Gilia capitata ssp. pacifica	Pacific gilia	1B.2	S2	G5T3	--	--	5-1330	CA (DNT, HUM, MEN, SON), OR.	Annual herb, generally coastal bluff or scrub. Flowers May - Aug.	No confirmed observations, low potential for suitable habitat.	No suitable habitat in second and old-growth forest in Headwaters.
Hosackia gracilis	harlequin lotus	4.2	S3	G4	--	--	0-700	Northern and Central coast of CA, also OR, WA.	Annual herb, inhabits a variety of habitats from coastal bluffs to meadows and roadside ditches. Prefers wet areas. Blooms Mar - July.	No confirmed observations, possibly suitable habitat.	No suitable habitat in second and old-growth forest in Headwaters.
Kopsiopsis hookeri	small groundcone	2B.3	S1S2	G4?	--	--	90-885	Northern CA coast, OR, WA, into Southern Canada.	Parasitic rhizomatous herb, generally found in coniferous forests on Ericaceous host plants.	No confirmed observations, possibly suitable habitat.	Survey proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) and maintain existing site conditions.

Scientific Name	Common Name	CNPS Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation Range (m)	Geographic Distribution	Ecological Information	Occurrence in Headwaters	Summary of Measures Proposed to Avoid Significant Impacts (Proposed Action)
									Blooms in April.		
Lilium kelloggii	Kellogg's lily	4.3	S3	G3	--	--	3-1300	CA (DNT, HUM Co.), OR.	Bulbiferous perennial herb, inhabits gaps and roadsides in coniferous forest. Blooms Jun - Aug.	Multiple confirmed observations in Headwaters, abundant suitable habitat.	Survey proposed treatment units. Allow low intensity burning over site during dormancy. Avoid direct ground disturbance from thinning activities.
Lilium occidentale	western lily	1B.1	S1	G1	CE	FE	2-185	CA (DNT, HUM Co.), OR.	Bulbiferous perennial herb, inhabits gaps in coniferous forest and coastal bluffs, populations highly disjunct. Blooms Jun - Aug.	No confirmed observations. Low potential for suitable habitat.	Presence unlikely. Survey any appropriate freshwater wetland, marsh soil, or spruce forest areas prior to thinning or burning. If found, consult with USFWS prior to proposed action implementation.
Lilium rubescens	redwood lily	4.2	S3	G3	--	--	30-1910	CA (DNT, GLE, HUM, LAK, MEN, NAP, SHA, SIS, SON, TRI Co.)	Bulbiferous perennial herb, inhabits chaparral but also gaps in coniferous forest including road cuts.	No confirmed observations, but suitable habitat exists	Survey proposed treatment units. Allow low intensity burning over site during dormancy. Avoid direct ground disturbance from thinning activities.

Scientific Name	Common Name	CNPS Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation Range (m)	Geographic Distribution	Ecological Information	Occurrence in Headwaters	Summary of Measures Proposed to Avoid Significant Impacts (Proposed Action)
									Blooms May - Aug.		
Listera cordata	heart-leaved twayblade	4.2	S4	G5	--	--	5-1370	Throughout Western USA, also Eurasia, AK, Eastern USA.	Perennial herb, inhabits moist shady coniferous forests. Blooms Mar - June.	Confirmed in 1 location in old-growth, unharvested part of Headwaters.	Survey areas prior to thinning or burning. Allow low intensity burning over site during dormancy. Avoid direct ground disturbance from thinning activities. Survey proposed treatment units. Maintain existing site conditions, and allow low intensity prescribed fire. Monitor population.
Lycopodium clavatum	running-clubmoss	4.1	S3	G5	--	--	40-1225	Northern CA, across USA, global distribution.	Perennial creeping herb, prefers moist to inundated areas.	Confirmed in 2 locations in old growth habitat.	
Mitellastra caulescens	leafy-stemmed mitrewort	4.2	S4	G5	--	--	5-1700	Northern CA, ID, OR, WA, MT.	Perennial rhizomatous herb, wet shaded areas, sometimes road cuts.	No confirmed observations, but suitable habitat exists.	Survey shaded, mesic areas in proposed treatment units. Avoid direct disturbance to any confirmed populations, but allow thinning to maintain existing site conditions.

Scientific Name	Common Name	CNPS Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation Range (m)	Geographic Distribution	Ecological Information	Occurrence in Headwaters	Summary of Measures Proposed to Avoid Significant Impacts (Proposed Action)
Monotropa uniflora	ghost-pipe	2B.2	S2	G5	--	--	10-550	CA (HUM, DNT Co.), considerable populations outside CA.	Mycotropic perennial herb lacking chlorophyll, mixed evergreen forests, blooms June - Sept.	No confirmed observations, but suitable habitat exists.	Survey proposed treatment units. Avoid direct ground disturbance from thinning activities. Avoid prescribed fire.
Montia howellii	Howell's montia	2B.2	S2	G3G4	--	--	0-835	CA (HUM, TRI Co.), OR, WA.	Annual herb, inhabits spring-wet sites such as seeps, springs and road ditches. Blooms Feb - May.	No confirmed observations within Headwaters, but suitable habitat exists.	Survey mesic areas prior to thinning or burning. Allow thinning and burning around confirmed population(s) to maintain existing site conditions. Monitor population.
Packera bolanderi var. bolanderi	seacoast ragwort	2B.2	S2S3	G4T4	--	--	30-650	CA (DNT, HUM, MEN), OR, WA.	Perennial rhizomatous herb, inhabits coastal forest/scrub, sometimes roadsides. Blooms Jan - Aug.	No confirmed observations, but suitable habitat exists.	Survey areas prior to thinning or burning. Avoid thinning or burning on any confirmed population(s) to maintain existing site conditions.
Piperia candida	white-flowered rein orchid	1B.2	S3	G3	--	--	30-1310	CA, OR, WA.	Bulbiferous perennial herb, open or shady mixed evergreen forests. Blooms May - Sept.	No confirmed observations, but suitable habitat exists.	Survey areas prior to thinning or burning. Allow low intensity burning over site during dormancy. Avoid direct ground disturbance from thinning activities.

Scientific Name	Common Name	CNPS Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation Range (m)	Geographic Distribution	Ecological Information	Occurrence in Headwaters	Summary of Measures Proposed to Avoid Significant Impacts (Proposed Action)
Pityopus californicus	California pinefoot	4.2	S4	G4G5	--	--	15-225	CA, OR, WA.	Mycotropic perennial herb lacking chlorophyll, mixed evergreen forests, blooms March - Aug.	No confirmed observations, but suitable habitat exists.	Survey proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) to maintain existing site conditions.
Pleuropogon refractus	nodding semaphore grass	4.2	S4	G4	--	--	0-1600	CA (DNT, HUM, MEN, MRN Co.), OR, WA.	Perennial rhizomatous herb, inhabits wet meadows or shady riparian streambanks. Blooms Apr - July.	No confirmed observations, but suitable habitat may exist.	Survey mesic areas in proposed treatment units during appropriate season. Allow thinning and burning around confirmed population(s) to maintain existing site conditions. Monitor population.
Ribes laxiflorum	trailing black currant	4.3	S4	G5	--	--	5-1395	Western USA	Deciduous perennial shrub, inhabits coniferous forests. Blooms Mar - Aug.	No confirmed observations, but suitable habitat exists.	Survey proposed treatment units during appropriate season. Allow thinning and burning around confirmed population(s) to maintain existing site conditions. Monitor population.
Sidalcea malachroides	maple-leaved checkerbloom	4.2	S3	G3	--	--	0-730	Northern CA, OR.	Perennial herb, often in disturbed sites in woodlands.	No confirmed observations, but suitable	Survey proposed treatment units during appropriate season. Allow burning or thinning

Scientific Name	Common Name	CNPS Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation Range (m)	Geographic Distribution	Ecological Information	Occurrence in Headwaters	Summary of Measures Proposed to Avoid Significant Impacts (Proposed Action)
									Blooms Mar - Aug.	habitat may exist.	around across confirmed sites to maintain preferred habitat conditions. Monitor population(s).
Sidalcea malviflora ssp. patula	Siskiyou checkerbloom	1B.2	S2	G5T2	--	--	15-880	CA (DNT, HUM, MEN Co.), OR.	Perennial rhizomatous herb, inhabits open coastal forest and bluffs. Blooms May - Aug.	No confirmed observations, likely very little to no suitable habitat in Headwaters.	No suitable habitat in second or old-growth forest in Headwaters.
Sidalcea oregana ssp. eximia	coast checkerbloom	1B.2	S1	G5T1	--	--	5-1340	CA (DNT, HUM, SIS, TRI Co.).	Perennial rhizomatous herb, coastal meadows, blooms June - Aug.	No confirmed observations, likely very little to no suitable habitat in Headwaters.	No suitable habitat in second or old-growth forest in Headwaters.
Tiarella trifoliata var. trifoliata	trifoliate laceflower	3.2	S2S3	G5T5	--	--	170-1500	CA (TRI, HUM Co.), western USA.	Perennial herb, inhabits moist shady streambanks. Blooms Jun - Aug.	No confirmed observations, but suitable habitat exists.	Survey mesic areas in proposed treatment units during appropriate season. Avoid thinning disturbance to any confirmed population(s) to maintain existing site conditions. Allow low intensity fire.

Scientific Name	Common Name	CNPS Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation Range (m)	Geographic Distribution	Ecological Information	Occurrence in Headwaters	Summary of Measures Proposed to Avoid Significant Impacts (Proposed Action)
Viola palustris	alpine marsh violet	2B.2	S1S2	G5	--	--	0-150	CA (Klamath, known from only 5 occurrences) western USA.	Perennial herb, mesic areas such as marshes and streambanks, often beneath shrubs. Blooms Mar - Aug.	No confirmed observations, but suitable habitat may exist.	Survey mesic areas in proposed treatment units during appropriate season. Avoid disturbance to any confirmed population(s) to maintain existing site conditions.

Appendix C. List of Common Wildlife Species that may occur, either seasonally or year-round, in the Headwaters Forest Reserve

Mammals

raccoon (*Procyon lotor*)
opossum (*Didelphis virginiana*)
brush rabbit (*Sylvilagus bachamni*)
deer mouse (*Peromyscus maniculatus*)
shrew (*Sorex spp*.)
wood rat (*Neotoma spp*.)
Douglas' squirrel (*Tamaiasciurus douglasii*)
chipmunk (*Tamias spp*.)
Sonoma tree vole (*Arborimus pomo*)
voles (*Microtus spp*.)
spotted skunk (*Spilogale gracilis*)
striped skunk (*Mephitis mephitis*)
gray fox (*Urocyon cinereoargenteus*)
bobcat (*Lynx rufus*)
black bear (*Ursus americanus*)
mountain lion (*Puma concolor*)
coyote (*Canis latrans*)
river otter (*Lontra canadensis*)
mountain beaver (*Aplodontia rufa*)
myotis bats (*myotis spp*.)
big brown bat (*Eptesicus fuscus*)
fisher (*Pekania pennanti*)
black-tailed deer (*Odocoileus hemionus columbianus*)

Birds

marbled murrelet (*Brachyramphus marmoratus*)
sharp shinned hawk (*Accipiter striatus*)
red-shouldered hawk (*Buteo lineatus*)
red-tailed hawk (*Buteo jamaicensis*)
turkey vulture (*Cathartes aura)*
band-tailed pigeon (*Patagioenas fasciata*)
northern spotted owl (*Strix occidentalis caurina*)
barred owl (*Strix varia*)
northern pygmy owl (*Glaucidium gnoma*)
Anna's hummingbird (*Calypte anna*)
Allen's hummingbird (*Selasphorus sasin*)
downy woodpecker (*Picoides pubescens*)
hairy woodpecker (*Picoides villosus*)
northern flicker (*Colaptes auratus*)
Pacific sloped flycatcher (*Empidonax difficilis*)
black phoebe (*Sayomis nigricans*)
Steller's jay (*Cyonocitta stelleri*)
common raven (*Corvus corax*)

tree swallow (*Tachycineta bicolor*)
violet-green swallow (*Tachycineta thalassina*)
barn swallow (*Hirundo rustica*)
chestnut-backed chickadee (*Poecile rufescens*)
brown creeper (*Certhia americana*)
bushtit (*Psaltriparus minimus*)
Pacific wren (*Troglodytes pacificus*)
American dipper (*Cinclus mexicanus*)
golden-crowned kinglet (*Regulus satrapa*)
ruby-crowned kinglet (*Regulus calendula*)
wrentit (*Chamaea fasciata*)
Swainson's thrush (*Catharus ustulatus*)
American robin (*Turdus migratorius*)
varied thrush (*lxoreus naevius*)
Wilson's warbler (*Cardellina pusilla*)
song sparrow (*Melospiza melodia*)
white-crowned sparrow (*Zonotrichia leucophrys*)
dark-eyed junco (*Junco hyemalis*)

Amphibians and Reptiles

western pond turtle (*Emys marmorata*)
southern torrent salamander (*Rhyacotriton variegatus*)
Pacific giant salamander (*Dicampotodon tenebrosus*)
rough-skinned newt (*Taricha granulosa*)
ensatina (*Ensatina spp.*)
wandering salamander (*Aneides vagrans*)
slender salamander (*Batrachoseps spp.*)
Pacific treefrog (*Hyla ragilla*)
Pacific tailed frog (*Ascaphus truei*)
foothills yellow-legged frog (*Rana boylii*)
northern red-legged frog (*Rana aurora*)
rubber boa (*Charina bottoa*)
ring-necked snake (*Diadophis punctatus*)
garter snake (*Thamnophis spp.*)

Appendix D. Mitigation Measures and Best Management Practices

Normal Operating Season and Weather Restrictions

To avoid significant impacts to special status wildlife species, the normal operation season for thinning operations will be between September 15 and February 1. In limited areas identified in Figure 5, thinning operations in Headwaters may involve the use of heavy equipment for biomass and/or log removal. While all attempts will be made to complete work involving the use of heavy equipment during the dry season (September 15 – October 15), due to the short dry season operating window some operations will need to take place during the wet season (October 15 – February 1). During this time period, the following wet weather restrictions will be in place.

1. All hauling (including logs, heavy equipment and/or rock), construction, reconstruction, and maintenance operations on non-paved roads shall cease when precipitation is sufficient to generate overland flow off the road surface in hydrologically-connected road segments. Use of the road shall not resume until such overland flow has abated and the road surface within hydrologically-connected road segments do not exhibit saturated soil conditions. This rule shall not prohibit vehicles from exiting Headwaters. In addition, when road use ceases due to the above condition, log trucks at an active landing may be loaded and may exit Headwaters. Log trucks returning to active landings when road use ceases due to the above condition shall be required to exit Headwaters and shall not be loaded.

2. The wet weather period is defined as occurring between October 15 and May 31, inclusive.

3. On roads that do not meet the permanent standard (see definition below), once hauling operations have ceased during the wet weather period due to Item 1, above, they shall not resume until September 15 or the road meets the permanent standard.

4. Hauling operations during the wet weather period, in addition to complying with Item 1, above, shall cease when any of the following conditions exist:

   4.1 When previously hydrologically-disconnected road segments become hydrologically connected road segments;

   4.2. When there is standing water within hydrologically-connected road segments;

   4.3. When equipment operation causes rutting to the extent that the ruts direct runoff from the road to discharge into a waterway; or

   4.4. When equipment operation results in the transportation of sediment from hydrologically-disconnected road segments to hydrologically-connected road segments in amounts that result in a visible increase in turbidity in receiving waters.

5. When hauling operations during the wet weather period have ceased due to Item 4, above, they shall not resume until:

   5.1. All hydrologically-connected road segments have been isolated; and

5.2. Maintenance has corrected the condition under Item 4, which resulted in cessation of hauling, and the road meets the permanent standard.

6. When hauling operations during the wet weather period have ceased due to Item 4 above and hauling will not be resumed, then the road shall be returned to the upgraded standard as soon as practicable. If repairing damage requires heavy equipment, such that the effort will cause greater harm than good, then BLM shall treat the site with feasible effective erosion control measures as an interim measure.

7. During the wet weather period, all roads may be used by light vehicles (defined as vehicles with pay load ratings of 1 ton, or less, or smaller vehicles such as quadra-tracks or motorcycles). In addition, all roads may be used by water-tenders (maximum of three axles) providing support to prescribed fire operations undertaken as part of site preparation. If such use results in road-related damage within hydrologically-connected road segments to the road surface, drainage facilities, waterbreaks, or water crossings, the damage will be repaired using hand tools prior to the end of the workday during which the initial damage occurred. Damage shall not be to such an extent that heavy equipment will be required for repairs.

8. In order to prevent or minimize significant adverse effects to aquatic resources, emergency access is allowed in order to correct emergency, road-related problems in the form of blocked culverts, imminent road fill failure, or other erosion problems, and emergency human life situations.

Work sites, including roads and landings, will be winterized at project completion. Winterization includes: 1) grading exposed road and landing surfaces to allow water to freely drain across them without concentrating, ponding or rilling, 2) installing rolling dips/drains to drain steeper sections of road necessary to convey concentrated water across exposed road and landing surfaces, 3) clearing clogged drainage ditches or culverts, (4) using existing slash, wadddles, or installing silt fences —or other erosion control devices — where needed to prevent concentration of flow and to prevent sediment from reaching stream channels or water source, and 5) spreading native brush and/or weed-free straw over bare soil to prevent surface erosion.

A permanent road is a road that has a surface adequate for hauling of forest products in non-wet weather periods, and in extended dry periods occurring during the wet weather period. A permanent road shall be an upgraded road and shall have a firm rocked, chipsealed, or paved surface on hydrologically-connected road segments, road segments within 150 feet of a waterway, and road surface segments that drain to points within 150 feet of a waterway. Operation of equipment shall not deform the surface such that hydrologically-disconnected road segments convey water to a hydrologically-connected road segment, or ruts in hydrologically-connected road segments direct runoff from the road to discharge into a waterway, or there is standing water within a hydrologically-connected road segment (typically located over water crossings). Permanent roads shall be maintained to minimize the delivery of fine sediment from their surfaces and drainage facilities during periods of operation specified above.

General Operating Restrictions

There are operating requirements that will apply to any area where trees will be removed off-site. The operating requirements will minimize adverse effects on soils, streams, wetlands, sensitive wildlife, and trees targeted for preservation.

- No old-growth trees of any species will be cut and the largest trees removed will not exceed 24 inches DBH. No trees will be felled towards residual old-growth trees, trees with value as wildlife habitat, or trees targeted for preservation (large conifers or hardwoods, deformed trees, redwood stump sprouts).
- All existing downed woody material and snags will be retained. Snags felled for operational or safety reasons will be left on site as large wood.
- Thinning will only occur in stands identified in Figure 4 and where the average DBH of canopy trees is 24 inches or less. Treatments will be designed to retain the largest, most vigorous individual trees in order to accelerate development of late seral characteristics. Once a stand reaches the average DBH described above, no more thinning will occur. Each thinning unit will also receive no more than 4 thinning treatments, including those previously implemented.
- Trees thinned with biomass or log removal will be marked by BLM staff. BLM staff will be on-site as necessary to ensure that operations are being conducted according to prescriptions.
- Thinning without biomass removal operations will be conducted (typically by contract crews) using gas-powered chainsaws.
- No heavy equipment (felling, yarding, or otherwise) will be allowed within the dripline of any residual old-growth trees in order to prevent damage to trunks and root systems.
- Ground-based equipment will not operate on unstable features such as landslides and swales or where slope steepness is greater than 30%. Such features will be delineated by BLM staff on the ground. No pre-existing woody debris will be removed from any unit. If whole trees are initially brought out of a unit for processing, the slash (tree tops, branches etc.), if not used for cogeneration material, will be brought back into the unit and used as ground cover to reduce erosion.
- All felled trees up to eight inches dbh qualifying for cogeneration biomass material can be loaded and trucked to a cogeneration power plant. If this material is not removed, it will be limbed, bucked, and lopped to get the wood in contact with the forest floor, piled and burned or chipped. All woody material that is not removed (including cull logs, limbs, bark, and other woody debris) will be lopped and scattered throughout the project area, piled and burned or chipped.

Site Access

Thinning crews will drive as close to project sites as possible using existing roads without causing excessive road rutting that could lead to delivery of sediment into watercourses.

All vehicles and equipment utilized in this project will be cleaned prior to entering the area to prevent transmission of non-native invasive plants or forest pathogens.

Equipment, both hand tools and heavy equipment, will be inspected daily to check for leaks. Equipment that may leak lubricants or fuels will not be used until leaks are repaired. All equipment will be stored, serviced and fueled outside of riparian areas and away from stream crossings. Fuel trucks will transport fuel for the equipment to the project site. Fuel may be stored on-site, but must be outside of riparian areas

and away from stream crossings. A spill plan and materials for spill containment will be required. In the event of a spill, work will be stopped immediately, clean up will begin and the appropriate authorities will be notified.

Use of Existing Roads, Landings and Skid Trails

No roads will be reopened and no new roads will be built as a result of thinning or prescribed fire operations in Headwaters. Only existing roads will be used.

Only existing landings that were constructed prior to Headwaters establishment will be used. New landings will not be constructed. Landings will be kept to the minimum size needed to accomplish the job and existing road surfaces will be used as much as possible. Reopening old landings will include: removal of brush and small trees and minimal grading and possible stump removal. Brush and small trees removed may be stockpiled near the site to be used for winterization material. Landings will not be larger than one-tenth of an acre each.

Only existing skid trails will be used for project operations. Skid trail widths will be limited to what is operationally necessary for the equipment. Skid trails will be blocked where they access main roads following project completion.

Tire tracks, skidding ruts and other depressions and surface irregularities will be obliterated and restored to pre-disturbance surface condition, where practicable following project completion. Erosion control measures, such as water bars and slash placement on skid trails and disturbed soils, will be implemented where the potential exists for erosion and delivery of sediment to waterbodies, floodplains, and wetlands. Water bars and other damaged drainage structures will be repaired or replaced. Logging slash including cull logs, chunks, limbs, bark, and other woody debris that is not removed will be piled or spread uniformly to not exceed an average of 24 inches in depth.

Streamside Buffers

All streamside buffers will be clearly marked by BLM staff on the ground. These buffers will be 100 feet on non-fish bearing streams and 150 feet on fish bearing streams. Within these buffers, thinning will be allowed to promote recruitment of pool-forming wood in areas identified in Figure 4 and to promote the health of the forest within the buffer.

Within these zones, all work will be accomplished by hand crews; no ground based equipment will be used. All cut trees will be left on site. Cut material will be primarily lopped and scattered to get them in contact with the ground, except where limited opportunities exist to fall trees (up to 24 inches DBH) directly into fish-bearing streams to increase large woody debris recruitment. In these buffer zones, thinning will retain at least a 70% post-treatment tree canopy.

Appendix E. CEQA Environmental Checklist

PROJECT DESCRIPTION AND BACKGROUND

Project Title:	Headwaters Forest Restoration Resource Management Plan Amendment
Lead agency name and address:	Bureau of Land Management 1695 Heindon Road Arcata, CA 95521
Contact person and phone number:	Jennifer Wheeler (707) 825-2310
Project Location:	Headwaters Forest Reserve, Humboldt County, CA
Project sponsor's name and address:	Bureau of Land Management 1695 Heindon Road Arcata, CA 95521
General plan description:	N/A – Federal land
Zoning:	N/A – Federal land
Description of project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation.)	The project proposes to amend the 2004 Headwaters Resource Management Plan to provide a broader suite of forest restoration tools for land managers. This amendment will update the 2004 plan to incorporate the best available forest restoration science.
Surrounding land uses and setting; briefly describe the project's surroundings:	The proposed project falls within the Headwaters Forest Reserve, which is managed with an emphasis on ecological restoration and protection, environmental education/ interpretation, and science and research. Private, industrial timberlands surround the Reserve.
Other public agencies whose approval is required (e.g., permits, financial approval, or participation agreements):	California Department of Fish and Wildlife (co-manager), US Fish and Wildlife Service, NOAA National Marine Fisheries Service.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, but none of these affects are considered to be Potentially Significant Impacts as indicated by the checklist on the following pages.

☐ Aesthetics	X Agriculture and Forestry Resources	X Air Quality
X Biological Resources	☐ Cultural Resources	☐ Geology / Soils
☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials	X Hydrology / Water Quality
☐ Land Use / Planning	☐ Mineral Resources	☐ Noise
☐ Population / Housing	☐ Public Services	X Recreation
☐ Transportation / Traffic	☐ Utilities / Service Systems	☐ Mandatory Findings of Significance

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

X I find that although the proposed project COULD have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a potentially significant impact or potentially significant unless mitigated impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project COULD have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature _____ Date 6/13/2017

Jennifer Wheeler, Headwaters Manager, Acting, Bureau of Land Management

Printed Name For

CEQA Environmental Checklist

This checklist identifies physical, biological, social and economic factors that might be affected by the proposed project. In many cases, background studies performed in connection with the projects indicate no impacts. A NO IMPACT answer in the last column reflects this determination. Where there is a need for clarifying discussion, the discussion is included either following the applicable section of the checklist or is within the body of the environmental document itself. The words "significant" and "significance" used throughout the following checklist are related to CEQA, not NEPA, impacts. The questions in this form are intended to encourage the thoughtful assessment of impacts and do not represent thresholds of significance.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
I. AESTHETICS: Would the project:				
a) Have a substantial adverse effect on a scenic vista	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒
II. AGRICULTURE AND FOREST RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒
III. AIR QUALITY: Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	☒
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒
IV. BIOLOGICAL RESOURCES: Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☒	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒
V. CULTURAL RESOURCES: Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☐	☒
See description above under item a.				
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒
VI. GEOLOGY AND SOILS: Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☒
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42?	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
VII. GREENHOUSE GAS EMISSIONS: Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☐	☒
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒
VIII. HAZARDS AND HAZARDOUS MATERIALS: Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒
IX. HYDROLOGY AND WATER QUALITY: Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☒	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
f) Otherwise substantially degrade water quality?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j) Inundation by seiche, tsunami, or mudflow	☐	☐	☐	☒
X. LAND USE AND PLANNING: Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b)Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒
XI. MINERAL RESOURCES: Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒
XII. NOISE: Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☒
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
XIII. POPULATION AND HOUSING: Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
XIV. PUBLIC SERVICES:				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	☐	☐	☐	☒
Fire protection?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XV. RECREATION:				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒
XVI. TRANSPORTATION/TRAFFIC: Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☒
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒
XVII. UTILITIES AND SERVICE SYSTEMS: Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

XVIII. MANDATORY FINDINGS OF SIGNIFICANCE

a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

Finding of No Significant Impact Determination

Headwaters Forest Restoration

Resource Management Plan Amendment

U.S. Department of the Interior

Bureau of Land Management (BLM)

Based upon a review of the EA and the supporting documents, the BLM has determined that this Resource Management Plan Amendment is not a major federal action and will not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. The project includes no environmental effects that meet the definition of significance in context or intensity as defined in 40 CFR 1508.27. Design features to reduce impacts were incorporated into the Resource Management Plan Amendment. None of the environmental effects discussed in detail in the EA and associated appendices are considered significant. The Resource Management Plan Amendment involves use of common implementation and monitoring techniques and there is no scientific controversy or uncertainty over the type or level of impacts. The Resource Management Plan Amendment will not adversely affect an endangered or threatened species or habitat, historic or cultural properties, wilderness, or other unique characteristics of the area. The Resource Management Plan Amendment is in compliance with all laws and policies guiding management of the area. Therefore, an environmental impact statement is not needed.

_____ _____

Jerome Perez Date

State Director, California